



State of Utah

JON M. HUNTSMAN, JR.  
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GARY R. HERBERT  
Lieutenant Governor

Department of Administrative Services

KIMBERLY K. HOOD  
Executive Director

Division of Facilities Construction and Management

DAVID G. BUXTON  
Director

## ADDENDUM NO. 4

Date: December 18, 2008  
To: Contractors  
From: Jim Russell, Project Manager, DFCM  
Reference: Library/Classroom Building  
Snow College  
DFCM Project No. 07258700  
Subject: **Addendum No. 4**

Pages	Addendum Cover Sheet	1 page
	Revised Bid Form	2 page
	Architect's Addendum	8 pages
	Revised Electrical Addendum	6 pages
	Revised Mechanical Addendum	18 pages
	Revised Specifications	85 pages
	Revised Drawings	8 pages
	Miscellaneous Details	3 pages
	Total	131 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.

**4.1** **SCHEDULE CHANGES:** None

**4.2** **GENERAL ITEMS:**

- 4.2.1 Project is tax exempt. A copy of the certificate will be given to the awarded contractor.
- 4.2.2 See revised bid form – particularly additive alternates.
- 4.2.3 Temporary power connection by contractor. Usage costs paid by owner.
- 4.2.4 See attached Architect's Addendum.



STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES  
**Division of Facilities Construction and Management**

**DFCM**

**COST PROPOSAL FORM – REVISED  
 PER ADDENDUM NO. 4 DATED DECEMBER 18, 2008**

NAME OF PROPOSER \_\_\_\_\_ DATE \_\_\_\_\_

To the Division of Facilities Construction and Management  
 4110 State Office Building  
 Salt Lake City, Utah 84114

The undersigned, responsive to the "Notice to Contractors" and in accordance with the "Request for Proposals" for the **LIBRARY/CLASSROOM BUILDING – SNOW COLLEGE – EPHRAIM, UTAH – DFCM PROJECT NO. 07258700** and having examined the Contract Documents and the site of the proposed Work and being familiar with all of the conditions surrounding the construction of the proposed Project, including the availability of labor, hereby proposes to furnish all labor, materials and supplies as required for the Work in accordance with the Contract Documents as specified and within the time set forth and at the price stated below. This price is to cover all expenses incurred in performing the Work required under the Contract Documents of which this bid is a part:

I/We acknowledge receipt of the following Addenda: \_\_\_\_\_

**BASE BID:** For all work shown on the Drawings and described in the Specifications and Contract Documents, I/we agree to perform for the sum of:

\_\_\_\_\_ DOLLARS (\$ \_\_\_\_\_)  
 (In case of discrepancy, written amount shall govern)

**ADDITIVE ALTERNATE NO. 1:** For all work shown on the Drawings and described in the Specifications as Landscaping Option A and Contract Documents for plaza landscaping, I/we agree to perform for the sum of:

\_\_\_\_\_ DOLLARS (\$ \_\_\_\_\_)  
 (In case of discrepancy, written amount shall govern)

**ADDITIVE ALTERNATE NO. 2:** For all work shown on the Drawings and described in the Specifications as Landscaping Option B and Contract Documents for plaza landscaping, I/we agree to perform for the sum of:

\_\_\_\_\_ DOLLARS (\$ \_\_\_\_\_)  
 (In case of discrepancy, written amount shall govern)

**ADDITIVE ALTERNATE NO. 3:** For all work shown on the Drawings and described in the Specifications and Contract Documents for a rooftop terrace, I/we agree to perform for the sum of:

\_\_\_\_\_ DOLLARS (\$ \_\_\_\_\_)  
 (In case of discrepancy, written amount shall govern)

**ADDITIVE ALTERNATE NO. 4:** For all work shown on the Drawings and described in the Specifications and Contract Documents for the 3<sup>rd</sup> floor buildout, I/we agree to perform for the sum of:

\_\_\_\_\_ DOLLARS (\$ \_\_\_\_\_ )  
(In case of discrepancy, written amount shall govern)

I/We guarantee that the Work will be Substantially Complete by **June 18, 2010**, should I/we be the successful proposer, and agree to pay liquidated damages in the amount of **\$700.00** per day for each day after expiration of the Contract Time as stated in Article 3 of the Contractor's Agreement.

This bid shall be good for 45 days after bid opening.

Enclosed is a 5% bid bond, as required, in the sum of \_\_\_\_\_

The undersigned Contractor's License Number for Utah is \_\_\_\_\_.

Upon receipt of notice of award of this bid, the undersigned agrees to execute the contract within ten (10) days, unless a shorter time is specified in the Contract Documents, and deliver acceptable Performance and Payment bonds in the prescribed form in the amount of 100% of the Contract Sum for faithful performance of the contract. The Bid Bond attached, in the amount not less than five percent (5%) of the above bid sum, shall become the property of the Division of Facilities Construction and Management as liquidated damages for delay and additional expense caused thereby in the event that the contract is not executed and/or acceptable 100% Performance and Payment bonds are not delivered within the time set forth.

Type of Organization: \_\_\_\_\_ (Corporation, Partnership, Individual, etc.)

Any request and information related to Utah Preference Laws:

\_\_\_\_\_

Respectfully submitted,

\_\_\_\_\_  
Name of Proposer

ADDRESS:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
Authorized Signature



# Addendum #004

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**PROJECT NAME:** SNOW COLLEGE LIBRARY / CLASSROOM BUILDING      **DATE:** DEC 18, 2008

**DFCM Proj. No:** DFCM # 07258700

**FROM:** Cooper Roberts Simonsen Associates (435) 673-7362  
55 S. Bluff St. Suite B Fax 435) 673-7392  
St. George, UT 84770

**TO:** All Bidders

This Addendum forms a part of the Contract Documents and modifies the original Bid Documents dated Sept. 15, 2008 as noted below. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

This Addendum consists of (8) 8 1/2"x11" pages, (85) 8 1/2"x11" specification pages, (18) 8 1/2"x11" Mechanical Addendum, (6) 8 1/2"x11" Electrical Addendum, and (8) 30"x42" drawing pages.

## I. CHANGES TO PRIOR ADDENDA:

### I-1 Addendum #2 & #3: SECTION 012300 ALTERNATES

Part 3 – EXECUTION

3.1 Schedule of Alternates

A. **Alternate No. 1:** Site Plan Option A. (To include all costs associated with work noted in drawings as Add Alternate 1A and Architectural Site Plans as Add Alt. Scheme A, and Electrical sheet ES101-Add Alt 1, Scheme A

B. **Alternate No. 2:** Site Plan Option B. (To include all work noted in Civil drawings as Add Alternate 1B and Architectural Site Plans as Add Alt. Scheme B.) Alternate No. 2 is to include deduction for work associated with **Alternate No. 1**.

C. **Alternate No. 3:** Roof Top Terrace.

D. **Alternate No. 4:** Complete Attic Build Out. (To include all items in drawings and documents noted as alternates 3, 4, and 5.

### I-2 Addendum #3:

**ITEM V-7** SECTION 044200 – EXTERIOR CLADDING  
PART 2 – PRODUCTS  
DELETE SECTION:  
2.1 GRANITE

**RE-INSERT** SECTION 44200 – EXTERIOR CLADDING  
PART 2 – PRODUCTS  
2.1 GRANITE  
(Granite is to be used at plaza locations as identified in drawings)

**ALL STONE** identified on the exterior of the building and in details of such is to be OOLITIC LIMESTONE.

### I-3 Delete sheet **AE602 DOOR SCHEDULE** and replace with attached sheet **AE602 DOOR SCHEDULE**

## II. CHANGES TO BIDDING REQUIREMENTS:

II-1 NONE

## III. CHANGES TO AGREEMENT & OTHER CONTRACT FORMS:

III-1 NONE

## IV. CHANGES TO CONDITIONS OF THE CONTRACT:

IV-1 NONE

## V. CHANGES TO SPECIFICATIONS:

V-1 CLARIFICATION: This project includes only the Snow College Library. There are not any other buildings associated with this bid process.

V-2 SECTION 096813 TILE CARPETING

### CONTRACTOR NOTE:

**ALL CARPET WILL BE PROCURED THROUGH STATE CONTRACT MA1863 HELD BY WALL2WALL COMMERCIAL FLOOR COVERINGS.**

V-3 SECTION 084113 ALUMINUM FRAMED ENTRANCES AND STOREFRONTS

A. Please change the following section:

1.4 C. 1.b. Importance Factor: 1.15

B. Please remove the following paragraph:

1.4 F. Windborne-Debris-Impact Resistance Performance.

C. Please change the following section:

1.8 A. 2. Warranty Period: 5 years from date of Substantial Completion.

D. Please change the following paragraph:

2.5 A. 1. Door Construction: 1 -3/4-inch overall thickness with minimum 0.125-inch thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

V-4 For Skyfold door, see specification section 102226 OPERABLE PARTITIONS

V-5 TABLE OF CONTENTS

Add the following to their respective locations:

055300 Metal Gratings

066260 Fiberglass Column Covers

074600 Soffit & Trim

075550 Precast Concrete Pavers

083320 Overhead Coiling Doors

084113 Aluminum Framed Entrances and Storefronts

084900 Sliding Mall Front Systems

126100 Fixed Audience Seating

323119 Decorative Metal Fences And Gates

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- V-6 Section 051200 STRUCTURAL STEEL FRAMING  
DELETE:  
Paragraph 2.7-B  
We are not using pre-fabricated 2-hr steel columns.
- V-7 Section 101100 VISUAL DISPLAY SURFACES  
Please add the following paragraph to:  
2.3 B. Polyester-Fabric-Faced Tackboard: Polyester fabric factory laminated to 3/8-inch- (9.5-mm-) thick fiberboard backing.
- V-8 INSERT SECTION 126100 – FIXED AUDIENCE SEATING
- V-9 INSERT SECTION 323119 DECORATIVE METAL FENCES AND GATES
- V-10 SECTION 064023  
A. Please change the following sections:  
A. 2.9 D. 2. Matching of Veneer Leaves: Slip match.  
B. 2.9 D. 4. Veneer Matching within Panel Face: Center-balance match.  
C. 2.9 E. 1. Surfaces Other Than Drawer Bodies: Same species and cut indicated for exposed surfaces.  
D. 2.9 E. 2. Drawer Sides and Backs: Solid-hardwood lumber.  
E. 2.9 E. 3. Drawer Bottoms: Hardwood plywood.
- V-11 INSERT SECTION 328400 – IRRIGATION SYSTEMS
- V-12 INSERT SECTION 074600 – SOFFIT & TRIM
- V-13 SECTION 093000 TILING  
Accepted substitutes:  
For #44 Oxford gray (Alpine) – America’s Quarry Basics 505 Plaza Gray  
Restroom wall tile – GAINEY Florentine BIANCO – Crema Crackle 1503  
- Burano Crackle 1507 (3x6)
- Please ADD the following sections:  
1.2 A. 5. : Dolomite Tile for stair  
2.3 H. :  
H. Dolomite Tile: Stair treads, Risers, and Landings  
1. Basis-of-Design: Alpine Tile –“ Dolomite”  
2. Approved alternate manufacturer: Vermont Structural Slate Co. – “kent” Limestone, Honed finish, and “Stanton” limestone, Honed finish.  
3. Stairtread: 43.2cm x 212.1cm x 3cm  
a. Dolomite “polished”, straight bullnose edge, anti-slip (5 mill cuts). (note: seams to be placed on the side with the rail).  
4. Risers 17.2cm x 212.1 cm x 2cm  
a. Dolomite “polished”, (note: seams to be placed on the side with the rail).  
5. Landing: 50.8cm x 21.1cm x 3cm  
a. Dolomite “polished”, straight bullnose edge, anti-slip (5 mill cuts)



## Addendum #004

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- 6. Landing 50.8cm x 212.1cm x 3cm
  - a. Dolomite "polished".

V-14 INSERT SECTION 066260 FIBERGLASS COLUMN COVERS

V-15 INSERT SECTION 071000 VEGETATED ROOFING SYSTEMS

V-16 Section 064023 – INTERIOR ARCHITECTURAL WOODWORK  
ADD the following:

2.4 MISCELLANEOUS MATERIALS

B. Aluminum Reveals and Trim:

1. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.

2. Profiles:

- a. 1/2" x 1/2" recessed U-shaped aluminum divider strips between panels.
- b. 6" x 1/2" recessed aluminum base.
- c. 1/2" x 1/2" L-shaped strip

V-17 DELETE existing section 044200 EXTERIOR STONE CLADDING and INSERT attached section 044200 EXTERIOR STONE CLADDING

V-18 DELETE existing section 044300 STONE MASONRY and INSERT attached section 044300 STONE MASONRY

V-19 Section 084900 Sliding Mall Front System  
US Aluminum is an approved manufacturer.

V-20 Section 071300 PRE-APPLIED SHEET MEMBRANE WATERPROOFING  
Part 2 Products

Approved:

- 1. HydroShield by CETCO
- 2. MiraDRI by Carlisle
- 3. Coreflex by CETCO

Unberslab membrane is required for this project.

There is no soil retention systems. Application is to foundation wall.

V-21 INSERT attached section 075550 PRECAST CONCRETE PAVERS

V-22 Section 042000 UNIT MASONRY

2.5 BRICK

B.7 COLOR & TEXTURE

H.C. MUDDOX – INTERSTATE BRICK

-Mission Common 3 3/4" x 2 1/2" x 8" cored

## VI. CHANGES TO DRAWINGS:

VI-1 CLARIFICATION: GEOPIER systems are not included in this project and all notes referring to GEOPIERS are to be omitted. The contractor is responsible to provide a foundation system capable of resisting the building loads as shown in the documents. The contractor is free to

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use Micro piles, Helical Piers, or a typical spread foundation system supported on compacted structural fill (all moisture sensitive soils must be removed for this option). If the contractor does not wish to obtain costs for multiple foundation systems, he is free to choose the system he is most amenable to.

- VI-2 Sheet **SE002 GENERAL STRUCTURAL NOTES** section V.J.4  
The required steel deck diaphragm shear capacity shall be changed from 2,390 plf to 1,484 plf.
- VI-3 Structural :  
Clarification:  
All loads shown on the drawings are to be applied at the centroid of the pile cap.  
Vertical loads are to be applied in the direction of gravity.  
Shear loads are to be applied perpendicular to the direction of gravity in any direction.  
Moment loads are to be applied as a rotational force rotating around an axis perpendicular to the direction of gravity in any direction.
- VI-4 Clarification:  
Utility Tunnel is intended to be cast-in-place.
- VI-5 Clarification:  
Detail D6/AE403 Handrail is to be mounted to the wall.  
Handrails detailed on sheets AE402 & AE 403 is STAINLESS STEEL.
- VI-6 Clarification: Exterior stairway on sheet A3/AE304 is to be included in the base bid.
- VI-7 Clarification: Ships ladder detailed at B4/AE506 is a pre-fabricated-manufacture supplied ladder. See specification
- VI-8 Sheet AE406 – ENLARGED FLOOR PLANS  
ITEM #4 needs to be a custom 3-compartment sink manufactured to meet design specifications and dimensions.
- VI-9 Remove existing sheet AE408 ENLARGED PLANS AND INTERIOR ELEVATIONS and insert attached sheet AE408 ENLARGED PLANS AND INTERIOR ELEVATIONS. Elevation A4 was enlarged and dimensions on casework were changed.
- VI-10 Remove existing sheet AE409 ENLARGED PLANS AND INTERIOR ELEVATIONS and insert attached sheet AE409 ENLARGED PLANS AND INTERIOR ELEVATIONS. Dimensions on casework were changed.
- VI-11 Sheet AF101 BASEMENT FINISH PLAN  
Server Room 003 is to have raised access flooring with carpet tile
- VI-12 Sheet **AF105 FINISH SCHEDULES**  
Insert attached remaining Finish Schedule ARCHITECTURAL COMPONENTS below existing FINISH SCHEDULE.
- VI-13 On sheet C0.1 & C5.1 the note “See sheet C0.1AA for Add Alternate 1 Demolition. See Sheet C0.1AB for Add Alternate 2 Demolition.” Should be changed to read “**See Sheet C0.1AA for Add Alternate 1A Demolition. See Sheet C0.1AB for Add Alternate 1B Demolition**”

- VI-14 On sheet C1.1 the note "See sheet C1.1AA for Add Alternate 1 Site Plan. See Sheet C1.1AB for Add Alternate 2 Site Plan." should be changed to read "**See Sheet C1.1AA for Add Alternate 1A Site Plan. See Sheet C1.1AB for Add Alternate 1B Site Plan.**"
- VI-15 On sheets C2.1 & C5.4 the note "See sheet C2.1AA for Add Alternate 1 Grading Plan. See Sheet C2.1AB for Add Alternate 2 Grading Plan." should be changed to read "**See Sheet C2.1AA for Add Alternate 1A Grading Plan. See Sheet C2.1AB for Add Alternate 1B Grading Plan.**"
- VI-16 On sheets C3.1 & C5.3 the note "See sheet C3.1AB for Add Alternate 2 Utility Plan." should be changed to read "**See Sheet C3.1AB for Add Alternate 1B Utility Plan.**"
- VI-17 On Sheet C3.1 & C5.3 the note "Steam Tunnel and Associated Steam & Condensate Return Lines Must Be Completed by October 15, 2008." should be removed.
- VI-18 The Sheet Title on Sheet No.C0.1-AA "Demolition Plan Add Alternate A" should be changed to "**Demolition Plan Add Alternate 1A**".
- VI-19 The Sheet Title on Sheet No.C0.1-AB "Demolition Plan Add Alternate B" should be changed to "**Demolition Plan Add Alternate 1B**".
- VI-20 The Sheet Title on Sheet No.C1.1-AA "Site Plan Add Alternate A" should be changed to "**Site Plan Add Alternate 1A**".
- VI-21 The Sheet Title on Sheet No.C1.1-AB "Site Plan Add Alternate B" should be changed to "**Site Plan Add Alternate 1B**".
- VI-22 The Sheet Title on Sheet No.C2.1-AA "Grading Plan Add Alternate A" should be changed to read "**Grading Plan Add Alternate 1A**".
- VI-23 The Sheet Title on Sheet No.C2.1-AB "Grading Plan Add Alternate B" should be changed to read "**Grading Plan Add Alternate 1B**".
- VI-24 The Sheet Title on Sheet No.C3.1-AB "Utility Plan Add Alternate B" should be changed to read "**Utility Plan Add Alternate 1B**".
- VI-25 On sheets C0.1-AA and C1.1-AA any text reading "Add Alternate A" should be changed to read "**Add Alternate 1A**".
- VI-26 On sheets C0.1-AB, C1.1-AB and C3.1-AB any text reading "Add Alternate B" or reading "Add Alternate 2" should be changed to read "**Add Alternate 1B**".
- VI-27 On sheet C1.1AB the note "Const. ?"x12" Steps, 4 Risers." should be removed.
- VI-28 On sheet C1.1AB the note "Const. 6"X12" Steps, 4 Risers." should be removed.

- VI-29 Detail Q/AE501, for size of steel angle, see sheet SF602.
- VI-30 Detail D5/AE505, for size of material, use 1 ½" x 1 ½" - .065 tube steel for frame and 1"x1" - .065 tube steel for pickets.
- VI-31 **Clarification:** Provide either spring isolators or pad vibrators, as long as the vibration and seismic performance requirements of the specifications are met.
- VI-32 **Clarification:** Automatic dampers are specified to keep the interior generator enclosure at temperatures to comply with NFPA110. That is the intent of these dampers. Comply with performance requirements of NFPA110.
- VI-33 **Clarification:** Engine cooling airflow through the enclosure maintaining temperature rise of system components within the required limits when unit operates at 110% of rated load remains as specified.
- VI-34 **Clarification:** Wall thimble at exterior generator is not applicable to this project.
- VI-35 **Clarification:** After final testing and startup of generator, specifications require fuel tank to be filled after testing.
- VI-36 **Clarification:** The specification requires three 100% rated circuit breakers with adjustable long time, short time, and instantaneous. This will remain as specified.
- VI-37 **Clarification:** The Shunt trip will remain as specified.
- VI-38 **Clarification:** No remote annunciators required for the automatic transfer switches.
- VI-39 **Clarification:** The manual transfer switch under load will remain as specified.
- VI-40 **Clarification:** The speaker systems shown in electrical plans are to be boxes and raceway only.
- VI-41 **Clarification:** Tele/Data systems are to be raceway only.
- VI-42 **Clarification:** Detail A1/AE505 notes "NO MITERS". This is made from 4x8 sheet goods and can be routed out for recessed panels.
- VI-43 **Clarification:** Only columns on the Main Level receive the wood paneling finish as detailed. Refer to Detail B1/AE502 for details. Column wrap consists of aluminum base, aluminum reglets/edging at corners/edges with hardwood veneer plywood panels, hardwood trim cap, with painted gypsum board above. Provide a reglet similar to Reveal Channel Screed between panels and "X" Moulding at outside and inside corners.
- VI-44 **Clarification:** Detail B5/AE409 is a window/wall elevation. See window schedules and types.
- VI-45 **Clarification:** Restrooms referenced on AE404 revised. D1/AE404 is Level One Restrooms. D2/AE404 is Basement Level Restrooms.



# Addendum #004

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- VI-46 **Clarification:** 200G Faculty Breakout should refer to three areas on the floor plans which align with the placement of flat panel monitors on ET103. These are areas with flexible seating arrangements suitable for faculty/student discussions and informal instruction.
- VI-47 **Clarification:** Rooms 301-309 are shown on AE108a as a component of the Additive Alternate to build out the Attic Level.
- VI-48 Remove existing sheet AE404 ENLARGED FLOOR PLANS, INTERIOR ELEVATIONS and INSERT attached sheet AE404 ENLARGED FLOOR PLANS, INTERIOR ELEVATIONS.
- VI-49 Remove existing sheet AE405 ENLARGED FLOOR PLANS and INSERT attached sheet AE405 ENLARGED FLOOR PLANS
- VI-50 Remove existing sheet AE406 ENLARGED FLOOR PLANS and INSERT attached sheet AE406 ENLARGED FLOOR PLANS
- VI-51 Remove existing sheet AE408 ENLARGED PLANS , INTERIOR ELEVATIONS and INSERT attached sheet AE408 ENLARGED PLANS , INTERIOR ELEVATIONS.
- VI-52 Remove existing sheet AE409 ENLARGED PLANS , INTERIOR ELEVATIONS and INSERT attached sheet AE409 ENLARGED PLANS , INTERIOR ELEVATIONS.
- VI-53 Remove existing sheet AS101 ARCHITECTURAL SITE PLAN, Add Alt Scheme A and replace with attached sheet AS101 ARCHITECTURAL SITE PLAN, Add Alt Scheme A
- VI-54 Remove existing sheet AS102 ARCHITECTURAL SITE PLAN, Add Alt Scheme B and replace with attached sheet AS102 ARCHITECTURAL SITE PLAN, Add Alt Scheme B
- VI-55 For planting at live roof, see attached sheet ADD-04-01
- VI-56 For irrigation at live roof, see attached sheet ADD-04-02
- VI-57 Sheet AF105 FINISH SCHEDULES

Add the following:

		Floor/Base	N	S	E	W	C	NOTES
300	Reading Room	F7/F8/B1	W2	W2	W2	W2	C1/C3	
316	mech	F2/B7	-	-	-	-	-	unpainted walls and ceiling
317	mech	F2/B7	-	-	-	-	-	unpainted walls and ceiling
318	storage	F2/B7	-	-	-	-	-	unpainted walls and ceiling
	storage	F2/B7	-	-	-	-	n/a	room east of Stair 001A, unpainted walls

- VI-58 See Attached **Mechanical Addendum.**
- VI-59 See Attached **Electrical Addendum.**

### End of Addendum



# ELECTRICAL ADDENDEUM

Snow College Library  
CRSA

December 18, 2008

## **Sheet EP-101:**

1. Change floorbox type from "FB4" to "FB8" in the following Conference rooms: 007, 008, 010, 011, 012, 013, 015, 016.

## **Sheet EP-103:**

1. Change poke-through device type from "PT1" to "PT3" in the following Group Study rooms: 201, 202, 211.

## **Sheet ES-104:**

1. Change homerun wiring for 1HA-11,13,15 to 6 # 6, 1 #6 CU GR, 1.25" CND (dedicated neutrals for each phase conductor per specifications).

## **Sheet EL-101:-**

1. Chair and Table Storage 025: Deleted (2) fixture type (W-3). Added (2) fixture type (GS-3).
2. Stair 001B: Deleted (1) fixture type (W-3).

## **Sheet EL-102:**

1. OG-9 Luminaires deleted from the project
2. Add 2 wall box dimmer switches and 2 wall switches in Waiting 101A area. Feed with circuit shown, rearrange circuiting to and between lighting fixtures to group identical lighting fixtures together for control purposes. Switch pendants (5- TX-1) and wall sconces (10- WS-3) separately. Dim downlights (9- DF-37d), and wall lights (3- DL-99) separately. Provide emergency transfer device (ET) compatible with dimmed circuit wiring to allow emergency operation. Locate 2 wall box dimmers and 2 wall switches in space as directed by Architect.

## **Sheet EL-103:**

1. Janitor 203: Moved (1) W-3 fixture.
2. Reading Room 207 Add (4) DL-11 in new millwork on north side of room. Add wall dimmer, circuit with room lighting.

## **Sheet EL-104:**

1. Reading 300: Deleted (38) fixture type (S-3). Added (2) fixture type (DF-37).
2. Mech. 316: Rotated (1) SA-1 fixture to be horizontal at entry door

## **Sheet EL-601:**

1. Lighting fixture types (DF-98), (DF-99), (DL-11) and (DL-99) must be dual voltage 120/277.
2. DL-99 provide matching luminaire with flange when in tile ceiling.
3. Delete Fixture type OG-9.
4. Added approved manufacturer and catalog numbers for the following:  
CM-16      AXIS LIGHTING #CU-PL-12-T8-3-W-O-FP-E-UNV-1-CA-XX  
CM-16      PINNACLE #R9X9P-3T8-XX-AC48G1-UNV-1C-W-DL80

# ELECTRICAL ADDENDEUM

Snow College Library  
CRSA

December 18, 2008

CM-16 PEERLESS #BRM4 3 32 20/80 SR4 WPB 4 FT R4 MVOLT GEB10- SCT L/LP F1 12  
C210-ACG  
CM-17 GAMMALUX G-Beam GB24B-1/128T5 or G-Beam GB24B-1/128T5  
DF-98 PORTFOLIO #PD7/H226-E/7HL4C  
DF-98 PRESCOLITE #LF6CFH132EB-6CFH1-DL-B6  
DF-98 OMEGA #S6SRD2H26QPL-U-T6SRD-2HQPL-SPL-FL  
DF-98 KIRLIN #FRR-08039 26W 120V  
DF-99 PRESCOLITE #LF6CFH132EB-6CFH1-DL-B6  
DF-99 OMEGA #S6SRD2H26QPL-U-T6SRD-2HQPL-SPL-FL  
DF-99 KIRLIN #FRR-06027 26W 120V  
DL-99 RSA LIGHTING #CO416STR-WH-50-XX-XXX-120  
DL-99 BELFER #1614-BP-HP-1-TL-WH-W/LV-1616-01-69  
DL-99 OMEGA #OMU-450-MR16LV-WH-ET120  
DL-99 3G # RC164CR  
OC-99 VISIONAIRE #SIL-1-T3-42-CF-6-DL-DK BRONZE  
OC-99 DECO LIGHTING #D420-260-M(PULSE START)-MT-SCBA  
OC-99 LITHONIA #TWR1 150S MVOLT LPI  
OJ-1 WINONA #LED-STEP01-RECT-S-001-ND12V-BAL-X-STD  
OJ-1 LUCIFER LIGHTING SSL-LED-SS-FOABB  
PS-1 NEORAY #42-R-2T8-XX-U-EB-S1-GLR-S79  
TX-1 Cubic Custom Luminaire by CW Cole Lighting  
TX-1 KUBO Custom Luminaire by 3G Lighting  
TX-2 Cubic Custom Luminaire by CW Cole Lighting  
TX-2 KUBO Custom Luminaire by 3G Lighting  
TX-4 KUBO 4.5" Custom Luminaire by 3G Lighting  
TX-4 Cubic Custom Luminaire by CW Cole Lighting  
TX-5 KUBO 4.5" Custom Luminaire by 3G Lighting  
TX-5 Cubic Custom Luminaire by CW Cole Lighting  
WS-1 Cubic Custom Luminaire by CW Cole Lighting  
WS-1 KUBO Custom Luminaire by 3G Lighting  
WS-2 VISA #CB3106  
WS-2 DM LIGHTING #4684-277-SC-TPL/BTL  
WS-2 SPI #AEW1492 2F26 277V X  
WS-3 LITE ENERGY #LE/W-40824-CF24BX  
WS-4 PINNACLE #PLS-BX55-SI-277-1C-W-B  
WS-4 LITE ENERGY #ALS1SI-FT55-25-277-7-X-WH-VS-IB  
WS-4 SPI #EIS2010 1F55 277V CS EBL  
WS-5 BETA CALCO #31-7074-PM-2  
WS-5 SPI #AEW1492 2F42 277V X

5. Corrected catalog numbers for the following:

AS-16d PINNACLE #C105-2T5HO-XX-DB-277  
DF-17 LIGHTOLIER #8021CCLW/S6132BU  
DF-17 PRESCOLITE #LF6CFV32EB-6CFV-B6  
DF-37 LIGHTOLIER #8039CLW/S8232HU  
DF-37d LIGHTOLIER #8039CLW/7132BCU3  
DF-98 LIGHTOLIER #8096 CCLW/7226HU-277V  
G-1 LIGHTOLIER #CFS2GPF2FT-UNV-SB  
G-2 LIGHTOLIER #CFS2GPF332-UNV-HI  
G-2d LIGHTOLIER #CFS2GPF332-XXX-DIM  
GF-4 LIGHTOLIER #XP2FVI332-U-P3  
OC-32 VISIONAIRE #SIL-1T3-42CF-UNV-DL-DK BRONZE  
OJ-1 COLE #L141-LED  
P3-12 LIGHTOLIER #WMRL143-UNV-P2-WHITE  
S-3 LIGHTOLIER #SW4S232HPF-UNV-P2

## ELECTRICAL ADDENDEUM

Snow College Library  
CRSA

December 18, 2008

SA-1 LIGHTOLIER #KW4A232-UNV-P2  
UC-5 LIGHTOLIER # TSL121WUNVPG-BPR  
W-3 LIGHTOLIER #WA4A232-UNV-P2

6. Added fixture type (GS-3)

2X4, 2 LAMP, 0.6 BALLAST FACTOR \ 2-F32T8, RE835 \ 65W \ 277/120V  
LITHONIA #2 SP8G 232 A12125 MVOLT TUBRHP  
METALUX #2GP-232A125-UNV-EB81-PROGRAM START  
DAYBRITE #2DPG232-FS21-UNV-1/2EB-SPEC  
LSI #LA125 232 SD SSO10PS UE  
LIGHTOLIER #XT2GVI232-UNV-SOP  
COLUMBIA #ST824-232G-FSA12.125-EB8LHPRUNV

7. Contractor Allowance Prices:

ZX-11 Contractors are to use \$1613.00 each as their contractor allowance price for this lighting fixture.  
Conditions for allowance pricing can be found in the lighting fixture schedule header.

**Sheet ET-101:**

1. General Note: The floorboxes indicated on this sheet are the same floorboxes that are shown on Sheet EP-101.

**Sheet ET-103:**

1. Change floorboxes to poke-through device type "PT3" in the following Group Study rooms: 201, 202, 211.  
Note that these are the same poke-through devices indicated on Sheet EP-103.

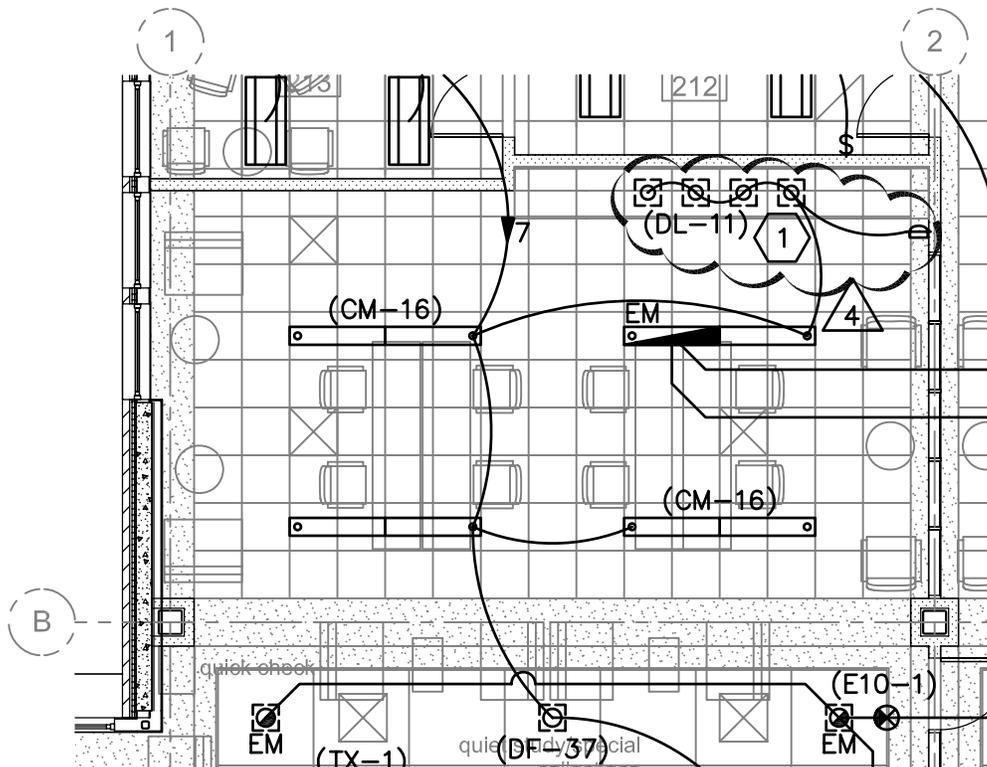
**END OF ELECTRICAL ADDENDUM**

**Attachments:**



# SHEET KEYNOTES

1. FIXTURES LOCATED IN MILLWORK. 



\\Spectrum\ENR\Projects\Level2-Light-PLAN.dwg

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REFERENCE:	EL-103
ISSUE:	ADDENDUM #4
DATE:	2008-12-17
PROJ NO:	20070473
DRAWN BY:	WDA
CHECKED BY:	JMG

PROJECT  
 SNOW COLLEGE LIBRARY

SHEET TITLE  
 LEVEL 2 LIGHTING PLAN

SCALE  
 1/8" = 1'-0"

EL-103-R4-1

## ADDENDUM

**DATE:** December 18, 2008  
**PROJECT NO:** 7523  
**PROJECT:** Snow College Library

### DIVISION - 15

#### DRAWINGS

**SHEET - MH401**

1. Detail 1 MECHANICAL ROOM PLAN: See attached supplemental drawing MSD-01 for changes.

**SHEET - MH502**

1. Detail 4 STEAM TO HOT WATER CONVERTER PIPING DETAIL: See attached supplemental drawing MSD-02 for pipe sizes.
2. Detail 8 1/3, 2/3 STEAM TO HOT WATER CONVERTER PIPING DETAIL: See attached supplemental drawing MSD-03 for pipe sizes.
3. Detail 11 STEAM PRESSURE REDUCING STATION: Add the following note to the detail – Safety valves shall be sized so as to relieve at pressures of 5 to 10 lbs. in excess of delivered pressures of PRV's and to have a capacity equal to the maximum capacity of the PRV it is to relieve. Vent pipe shall be no less than one pipe size larger than safety valve discharge and shall further be sized so that frictional resistance or vent does not exceed velocity pressure at safety valve outlet. Vent piping shall vent to roof through shaft located at grids 2 & B.5. Outlet of vent shall be a minimum of 8 feet above the roof.

**SHEET - MH503**

1. Detail 1 SNOW MELT DETAIL: Add snow melt detail. See attached supplemental drawing MSD-04 for detail.

**SHEET - MH601**

1. See the table below for a summary of changes to the fans associated with the air handling units:

ID	Total CFM	# OF FANS	WHEEL DIA.	TSP	ESP	ISP	BHP/FAN	TOTAL BHP	MOTOR HP/FAN	TOTAL MHP
AH-1 SF	12100	3	16	4.05	1.95	2.10	3.88	11.65	5	15
AH-1 RF	11194	3	20	0.45	0.25	0.20	0.50	1.50	1	3
AH-2 SF	50000	12	16	4.80	2.80	2.00	4.75	57.06	5	60
AH-2 RF	42700	10	20	0.45	0.25	0.20	0.64	6.42	1	10

**SHEET - MH603**

1. Snow Melt Schedule: Add snow melt schedule. See attached supplemental drawing MSD-06 for added schedule.
2. Pump Schedule: Delete note 1 for pumps P-3, P-4, P-5, P-6 and P-7. See attached supplemental drawing MSD-05.

**SHEET - MH701**

1. HOT WATER PIPING SCHEMATIC: Add 2-way valves to the return lines. See attached supplemental drawing MSD-07.
2. SNOW MELT PIPING SCHEMATIC: Add 3-way valves to all three zones on the return lines. See attached supplemental drawing MSD-07
3. CHILLED WATER PIPING SCHEMATIC: Add 3-way control valves to the cooling coils in both the air handlers on the return lines. See attached supplemental drawing MSD-08
4. GLYCOL HOT WATER PIPING SCHEMATIC: Add 3-way control valves to the pre-heat coils in both of the air handling units. See attached supplemental drawing MSD-08

**SHEET - MP101**

1. KEYED NOTES: Add keyed not "1" to read: Run Snow Melt piping to outdoor manifold box.
2. Add keyed note "1" next to the snow melt piping in between grids "A" , "B" and "1" , "2".
3. Delete pipes shown in wall next to grid "3" and "A".
4. Delete pipes shown in wall next to grid "4" and "A".
5. Move snow melt piping from between grid "6.1" , "7" and grid "A", to grid "6" and "A".

**SHEET - MP102**

1. Delete snow melt zone 3 and accompanying keyed not "3".
2. Reroute piping to connect to VR-36, VR-35 and VR-34. See attached supplemental drawing MSD-10.
3. Reroute piping to connect to VR-19, VR-20, VR-21, VR-22 and VR-23, move the access doors as well. See attached supplemental drawing MSD-09.

**SHEET - MP103**

1. Reroute piping to connect to VR-38. See attached supplemental drawing MSD-11.

**SHEET - PP102**

1. Connect a ¾" cold water line to the ¾" line at hall 100D. Provide a ball valve in the new line. Extend the ¾" line to the column at grids C/6 rise up through floor and provide a WH-1 wall hydrant serving the rooftop terrace. ADD ALTERNATE (ROOF TOP TERRACE).
2. Connect a ¾" cold water line to the ¾" line at grid 6.1 near grid A. Provide a ball valve in the new line. Extend the ¾" line to the column at grids A/6 rise up through floor and provide a WH-1 wall hydrant serving the rooftop terrace. ADD ALTERNATE (ROOF TOP TERRACE)

**SPECIFICATIONS**

**SECTION - 230523 GENERAL PIPING VALVES FOR HVAC PIPING**

**Section 2.5 Add the following:**

- B. The Flow-Tech valves are allowed in sizes up to 12 inch for steam use.

**SECTION - 230990 Building Management and Control System**

1. Page 9, paragraph 1.6: Delete the words "Work by Others and "
2. Page 9, paragraph 1.6.b.3: Replace the word "others with "related trades".
3. Page 24, paragraph 7: Delete.
4. Page 25, paragraph 16: Air Flow Monitoring. Replace with the following:

**OUTSIDE AIRFLOW MEASURING STATION**

- A. General:

1. Provide Ebtron or Onicon outside airflow measurement stations (AFMS) for each air handling unit. **The outside air flow measuring stations shall be Ebtron or Air Monitor, delete Onicon.**
  2. AFMS shall consist of single or multiple probes as required to achieve an airflow measurement accuracy of  $\pm 3\%$  of reading.
  3. AFMS probe assemblies must have multiple sensors that use instrument grade thermal dispersion, temperature compensated, thermistor sensing technology and digital electronics.
  4. The AFMS manufacturer &/or their local representative shall recommend and approve the actual location for the AFMS and determine whether or not a honeycomb straightener is required.
  5. Vortex shedding or pitot tube arrays and differential pressure sensing arrays with sensors that require auto-zeroing will not be accepted.
- B. Sensors:
1. Each sensing point shall consist of one glass encapsulated self-heated thermistor for velocity sensing and one glass encapsulated thermistor for temperature sensing.
  2. Sensors must be hermetically sealed to be water resistant and capable of being frequently exposed to moisture without causing sensor failure.
  3. Factory calibration: @ 0 fpm & @ 16 different airflow rates to NIST standards.
  4. Velocity accuracy:  $\sim 2\%$  of reading.
  5. Temperature accuracy:  $\pm 0.18^{\circ}\text{F}$ .
  6. Velocity output scaling: 0-500; 0-1000; 0-2500; 0-5000 or 0-10000 fpm (as required by the application).
  7. Operating temp. range:  $\sim 20$  to 1600 F.
  8. Operating RH range: 0 to 99% (non-condensing).
- C. Probes:
1. Aluminum, 316 stainless steel or gold anodized bodies with 2 to 8 sensors per probe.
  2. Air pressure drop: 0.0005 in wg. @ 2000 fpm (maximum).
- D. Electronics:
1. Microprocessor based, totally solid state, industrial grade integrated circuits that do not require periodic calibration.
  2. Each sensor shall be independent from any other sensor.
  3. An intelligent "sensor detection system" (SDS) shall put the transmitter into an alarm mode if any sensor or the transmitter is not operating properly.
  4. The SDS shall ignore any sensor that is inoperable and utilize only the remaining operable sensors to determine airflow and assure an accurate and uninterrupted output signal.
  5. Transmitter outputs: 4-20 ma; 0-10 vdc; N2~ or Modbus~.
  6. Operating temp. range:  $-20$  to  $160^{\circ}\text{F}$ .
  7. Operating RH range: 0 to 99% (non-condensing).
  8. Multi-character based for transmitter visual interface (note: LCD available or Gold Series product line only).
- E. Start-up:
1. Factory authorized start-up certification and owner-training services must be provided and conducted by the AFMS manufacturer's local representative.
- F. Warranty:
1. 36 months from date of start-up certification.

5. Page 25, paragraph 17: Delete

6. Page 25, replace paragraph 18 with the following:

## CONDENSATE METERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
    - 1. Central Station Steam Co.
    - 2. Lincoln Meter Company.
    - 3. Onicon.
  - D. Body: Cast iron, bronze, or brass.
  - E. Turbine: Copper, brass, or stainless steel.
  - F. Connections: Threaded for NPS 2 (DN 50) and smaller and flanged for NPS 2-1/2 (DN 65).
  - G. Totalizer: Meters shall have a microprocessor to display flow, flow rate, time, and date; alarms for high and low flow rate, pressure, and temperature.
    - 1. Computer shall have 4- to 20-mA or 2- to 10-volt output for temperature, pressure, and contact closure for flow increments.
    - 2. Independent timers to store four peak flow rates and total flow.
    - 3. Interface compatible with central workstation specified in Division 23 Section "Instrumentation and Control for HVAC."
    - 4. Microprocessor Enclosure: NEMA 250, Type 4.
  - H. Pressure Rating: Atmospheric.
  - I. Maximum Temperature Rating: 250 deg F.
7. Page 26, delete paragraphs 27, 29 and 30 and replace with the following:

### Control Valves

- 1. All automatic control valves shall be fully proportioning and provide near linear heat transfer control. The valves shall be quiet in operation and fail-safe open, closed, or in their last position. All valves shall operate in sequence with another valve when required by the sequence of operations. All control valves shall be sized by the control manufacturer, and shall be guaranteed to meet the heating and cooling loads, as specified. All control valves shall be suitable for the system flow conditions and close against the differential pressures involved. Body pressure rating and connection type (sweat, screwed, or flanged) shall conform to the pipe schedule elsewhere in this Specification.
- 2. Hot and chilled water control valves shall be modulating plug, ball and/or butterfly, as required by the specific application. Modulating water valves shall be sized per manufacturer's recommendations for the given application. In general, valves (2 or 3-way) serving variable flow air handling unit coils shall be sized for a pressure drop equal to the actual coil pressure drop, but no less than 5 PSI. Valves (3-way) serving constant flow air handling unit coils with secondary water circuits shall be sized for a pressure drop of no less than 5 PSI. Valves for terminal reheat coils shall be sized for a 2 PSIG pressure drop, but no more than a 5 PSI drop.
- 3. Ball valves shall be used for hot and chilled water applications, water terminal reheat coils, radiant panels, unit heaters, package air conditioning units, and fan coil units except those described hereinafter.
- 4. Modulating plug water valves of the single-seat type with equal percentage flow characteristics shall be used for all special applications as indicated on the valve schedule. Valve discs shall be composition type. Valve stems shall be stainless steel.

5. Butterfly valves shall be acceptable for modulating large flow applications greater than modulating plug valves, and for all two-position, open/close applications. Incline and/or three-way butterfly valves shall be heavy-duty pattern with a body rating comparable to the pipe rating, replaceable lining suitable for temperature of system, and a stainless steel vane. Valves for modulating service shall be sized and travel limited to 50 degrees of full open. Valves for isolation service shall be the same as the pipe. Valves in the closed position shall be bubble-tight.
6. Steam system globe valves shall have the following characteristics:
  - a. NPS 2 (DN 50) and Smaller: Class 125 bronze body, bronze trim, rising stem, renewable composition disc, and screwed ends with backseating capacity repackable under pressure.
  - b. NPS 2-1/2 (DN 65) and Larger: Class 125 iron body, bronze trim, rising stem, plug-type disc, flanged ends, and renewable seat and disc.
  - c. Internal Construction: Replaceable plugs and stainless-steel seats.
    - 1) Single-Seated Valves: Cage trim provides seating and guiding surfaces for plug on top and bottom of guided plugs.
    - 2) Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom of guided plugs.
  - d. Sizing: For pressure drop based on the following services:
    - 1) Two Position: 20 percent of inlet pressure.
    - 2) Modulating [15-psig (103-kPa) Steam]: 80 percent of inlet steam pressure.
  - e. Flow Characteristics: Modified linear characteristics.
  - f. Close-Off (Differential) Pressure Rating: Combination of actuator and trim shall provide minimum close-off pressure rating of 150 percent of operating (inlet) pressure.
7. Acceptable manufacturers: Johnson Controls
8. Page 27, Delete paragraphs 7,8,9,10,11.
9. Page 28, Delete paragraph D.2
10. Page 32 & 33, Part 4 Sequence of Operation, replace entire pages with the following:

#### PART 4 - SEQUENCE OF OPERATION

##### AIR HANDLERS

SUPPLY FAN START/STOP: THE SUPPLY FAN WILL BE STARTED ACCORDING TO THE SCHEDULE. IF THE SUPPLY FAN STATUS DOES NOT MATCH THE COMMANDED VALUE, AN ALARM WILL BE GENERATED. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

RELIEF AIR FAN START/STOP: IF THE RELIEF AIR FAN STATUS DOES NOT MATCH THE COMMANDED VALUE, AN ALARM WILL BE GENERATED.

SUPPLY FAN SPEED CONTROL: THE SUPPLY FAN WILL MODULATE THE VFD TO MAINTAIN THE DISCHARGE STATIC PRESSURE AT SETPOINT. DUCT STATIC PRESSURE SHALL BE RESET FROM ZONE REQUIRING MOST COOLING.

RELIEF AIR FAN: POSITIVE BUILDING DIFFERENTIAL PRESSURE OF 0.05 INCHES W.C. IS MAINTAINED BY MODULATING THE RELIEF DAMPER AND FAN IN PARALLEL WITH THE OUTSIDE

AIR DAMPER. ONCE THE RELIEF DAMPER IS OPEN TO 100% , THE RELIEF FAN VFD MODULATES.

UPON SHUTDOWN OF THE AIR HANDLING UNIT SYSTEM SUPPLY AND RELIEF FAN VARIABLE FREQUENCY DRIVES ARE STOPPED AND THE SPEED SIGNAL SHALL GO TO ZERO SPEED.

DISCHARGE AIR CONTROL: THE MIXED AIR DAMPERS, THE HEATING VALVE AND THE COOLING VALVE WILL MODULATE IN SEQUENCE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE AT SETPOINT.

ECONOMIZER DRY BULB SWITCHOVER: WHEN THE SHARED OUTSIDE AIR TEMPERATURE IS BELOW THE SWITCHOVER SETPOINT, THE ECONOMIZER WILL BE ENABLED. WHEN THE SHARED OUTSIDE AIR TEMPERATURE RISES ABOVE THE SWITCHOVER SETPOINT PLUS A DIFFERENTIAL, THE ECONOMIZER WILL BE DISABLED.

NIGHT SETBACK/NIGHT SETUP: WHEN IN "UNOCCUPIED" MODE, THE UNIT WILL CYCLE AS NECESSARY TO MAINTAIN THE SHARED NIGHT SETBACK ZONE TEMPERATURE AT SETPOINT. A DIFFERENTIAL PREVENTS THE UNIT FROM CYCLING EXCESSIVELY.

MINIMUM OUTSIDE AIR CONTROL: AN AIR FLOW SENSOR WILL MEASURE THE OUTSIDE AIR FLOW, THE MINIMUM OUTSIDE AIR FLOW SHALL BE CONTROLLED BETWEEN THE UPPER AND LOWER AIR FLOWS BY A CO2 SENSOR, IF THE CO2 LEVEL IS BELOW SETPOINT (800 PPM), THE OUTSIDE AIR DAMPERS SHALL CLOSE TO THE LOWER AIR FLOW. THE OUTSIDE AIR DAMPERS AND RETURN AIR DAMPERS WILL MODULATE TO MAINTAIN THE MINIMUM AIR FLOW.

SAFETY:

ALL OF THE SAFETY DEVICES ARE MANUAL RESET; THE DEVICE THAT HAS TRIPPED MUST BE MANUALLY RESET BEFORE RESTARTING THE AIR HANDLING UNIT.

IF A TEMPERATURE LOW LIMIT SWITCH SENSES A TEMPERATURE BELOW SETPOINT THE SUPPLY FAN AND RETURN FAN WILL BE SHUTDOWN.

ON FIRE ALARM SHUTDOWN, THE SUPPLY FAN AND RELIEF FAN WILL BE SHUTDOWN WHEN TRIGGERED.

SHUTDOWN:

WHEN THE UNIT IS SHUTDOWN BY EITHER A STOP COMMAND OR SYSTEM SAFETY THE UNIT WILL BE SET AS FOLLOWS:

- SUPPLY FAN WILL BE OFF
- RELIEF FAN WILL BE OFF
- SUPPLY FAN VFD WILL BE COMMANDED TO 0%
- RELIEF FAN VFD WILL BE COMMANDED TO 0%
- OUTSIDE AIR DAMPER WILL CLOSE
- RELIEF AIR DAMPER WILL OPEN
- EXHAUST AIR DAMPER WILL CLOSE
- HEATING VALVE WILL REMAIN IN CONTROL
- COOLING VALVE WILL CLOSE

VAV BOXES

DISCHARGE AIR TEMP SENSOR: A DISCHARGE AIR TEMP SENSOR IS PROVIDED ON EACH BOX FOR MONITORING PURPOSES.

OCCUPIED MODE: WHEN THE ZONE TEMPERATURE IS BETWEEN THE OCCUPIED HEATING AND COOLING SETPOINTS (INSIDE OF THE BIAS), THE PRIMARY AIR DAMPER WILL BE AT THE MINIMUM CFM AND THE REHEAT VALVE WILL BE FULLY CLOSED. ON A RISE IN ZONE TEMPERATURE ABOVE THE COOLING SETPOINT, THE PRIMARY AIR DAMPER WILL INCREASE TO THE VENTILATION COOLING MAXIMUM CFM AND THE REHEAT VALVE REMAINS FULLY CLOSED. ON A DROP IN ZONE TEMPERATURE BELOW THE HEATING SETPOINT, THE REHEAT VALVE MODULATES OPEN AND THE DAMPER IS MODULATED OPEN TO THE HEATING MAXIMUM CFM.

UNOCCUPIED (NIGHT SETBACK) MODE: WHEN THE AIR HANDLING UNIT SHUTS DOWN, OR THE ROOM OCCUPANCY SENSOR (REFER TO DIV. 26) IS IN THE UNOCCUPIED MODE, BOX CONTROLLER IS INDEXED TO UNOCCUPIED MODE. WHEN THE ZONE TEMPERATURE IS BETWEEN THE UNOCCUPIED HEATING AND COOLING SETPOINTS (INSIDE OF THE BIAS), THE DAMPER WILL BE CLOSED, AND THE REHEAT VALVE WILL BE FULLY CLOSED. ON A RISE IN ZONE TEMPERATURE ABOVE THE UNOCCUPIED COOLING SETPOINT, THE DAMPER WILL INCREASE THE CFM AND THE REHEAT VALVE REMAINS FULLY CLOSED. ON A DROP IN ZONE TEMPERATURE BELOW THE UNOCCUPIED HEATING SETPOINT, THE REHEAT VALVE MODULATES OPEN, AND THE DAMPER IS MODULATED OPEN.

FAN POWERED VAV BOXES

DISCHARGE AIR TEMP SENSOR: A DISCHARGE AIR TEMP SENSOR IS PROVIDED ON EACH BOX FOR MONITORING PURPOSES.

OCCUPIED MODE: DURING THIS MODE THE SERIES FAN RUN CONTINUOUSLY. WHEN THE ZONE TEMPERATURE IS BETWEEN THE OCCUPIED HEATING AND COOLING SETPOINTS (INSIDE OF THE BIAS), THE PRIMARY AIR DAMPER WILL BE AT THE VENTILATION MINIMUM CFM AND THE REHEAT VALVE WILL BE FULLY CLOSED. ON A RISE IN ZONE TEMPERATURE ABOVE THE COOLING SETPOINT, THE PRIMARY AIR DAMPER WILL INCREASE THE CFM TO THE COOLING MAXIMUM CFM AND THE REHEAT VALVE REMAINS FULLY CLOSED. ON A DROP IN ZONE TEMPERATURE BELOW THE HEATING SETPOINT, THE REHEAT VALVE MODULATES OPEN AND THE DAMPER IS MODULATED OPEN TO THE HEATING MAXIMUM CFM.

UNOCCUPIED (NIGHT SETBACK) MODE: WHEN THE AIR HANDLING UNIT SHUTS DOWN, ALL OF THE FAN-POWERED BOX CONTROLLERS ARE INDEXED TO UNOCCUPIED MODE. WHEN THE ZONE TEMPERATURE IS BETWEEN THE UNOCCUPIED HEATING AND COOLING SETPOINTS (INSIDE OF THE BIAS), THE PRIMARY AIR DAMPER WILL BE AT THE MINIMUM CFM, THE REHEAT VALVE WILL BE FULLY CLOSED, AND THE SERIES FAN WILL BE OFF. ON A RISE IN ZONE TEMPERATURE ABOVE THE UNOCCUPIED COOLING SETPOINT, THE PRIMARY AIR DAMPER WILL INCREASE THE CFM (IF AVAILABLE), THE REHEAT VALVE REMAINS FULLY CLOSED AND THE SERIES FAN WILL CYCLE ON. ON A DROP IN ZONE TEMPERATURE BELOW THE UNOCCUPIED HEATING SETPOINT THE REHEAT VALVE MODULATES OPEN, THE DAMPER REMAIN FULLY CLOSED, AND THE SERIES FAN WILL CYCLE ON.

STEAM HEAT EXCHANGERS (HEATING HOT WATER AND PREHEAT)

HOT WATER PUMP CONTROL: THE HOT WATER PUMP WITH THE LOWEST RUNTIME WILL AUTOMATICALLY START WHEN THE OUTSIDE AIR TEMPERATURE FALLS BELOW THE SYSTEM ENABLE SETPOINT. WHEN THE OUTSIDE AIR TEMPERATURE RISES ABOVE THIS SETPOINT, THE HOT WATER PUMPS WILL TURN OFF. WHEN ENABLED, THE LEAD PUMP WILL START AND

11. Page 34, "Heat Exchanger Control Valves", add the following:

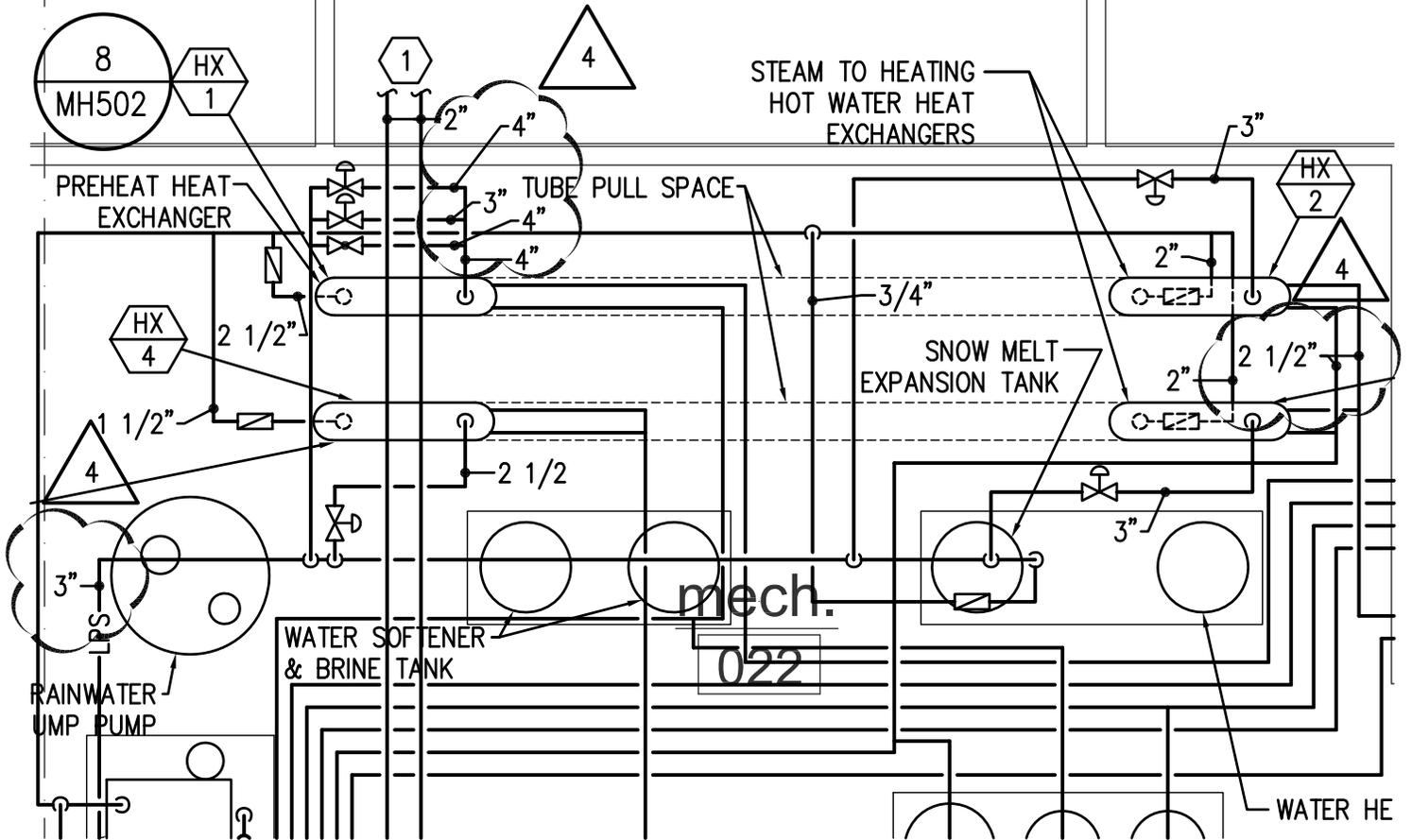
The pump speed, through a VFD, will be controlled by a differential pressure controller. The heating hot water temperature will be rest from outside temperature as follows:

<u>Outside Temp</u>	<u>Hot Water Temp</u>
60 degrees F	110 degrees F
0 degrees F	180 degrees F

The preheat water temperature will remain constant.

# chair & table storage

025



## MECHANICAL ROOM PLAN

SCALE: 1/4" = 1'-0"



DECEMBER 18TH, 2008

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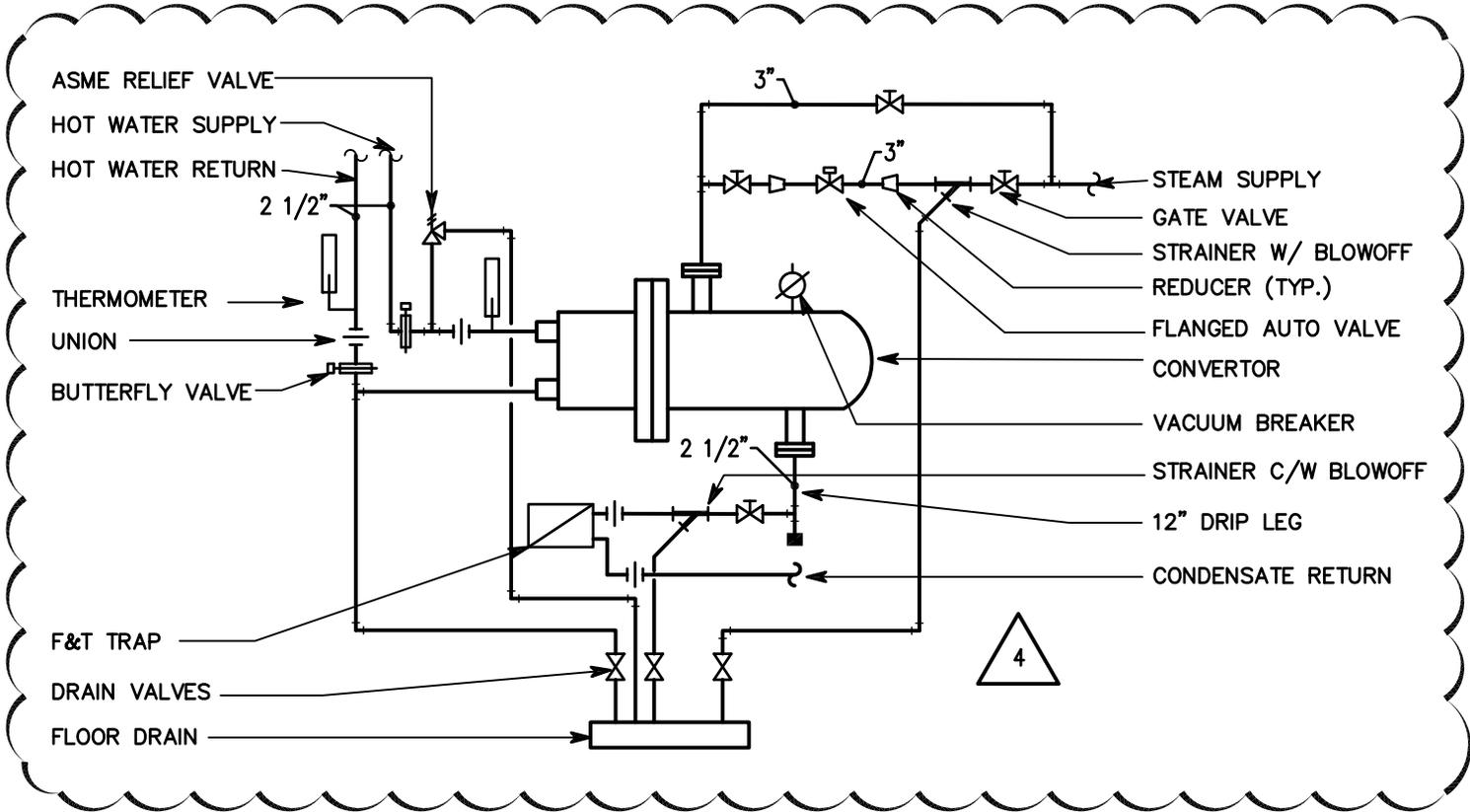
**crsa**  
COOPER  
ROBERTS  
SIMONSEN  
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SHEET CONTENTS	

### MECHANICAL ROOM PLAN

**MSD-01  
MH401**



**4** **STEAM TO HOT WATER CONVERTER PIPING DETAIL**  
**MH502** **NO SCALE**

4

DECEMBER 18TH, 2008

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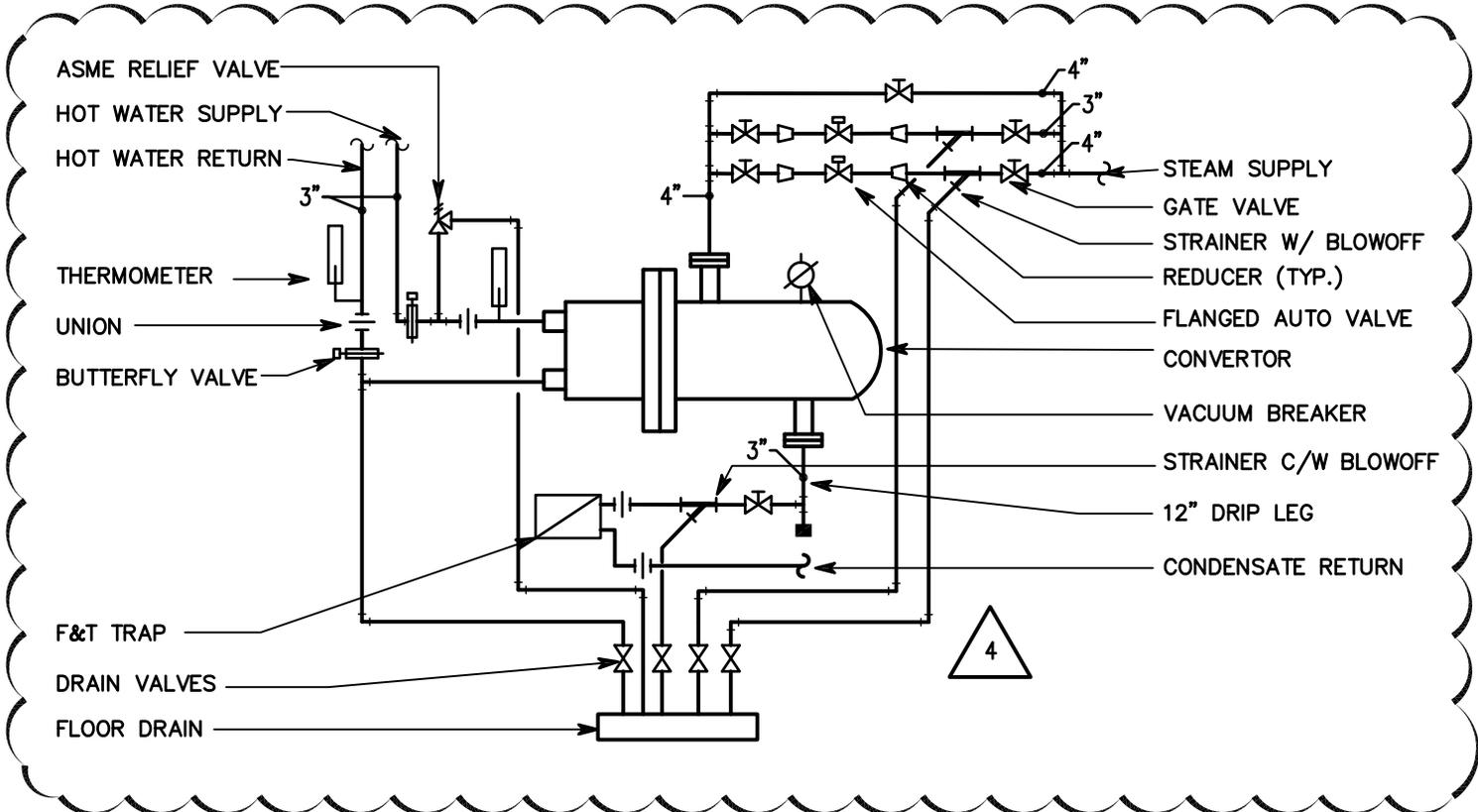
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MECHANICAL  
 DETAILS

**MSD-02**  
**MH502**



5  
MH502

1/3, 2/3 STEAM TO HOT WATER CONVERTER PIPING DETAIL

NO SCALE

4

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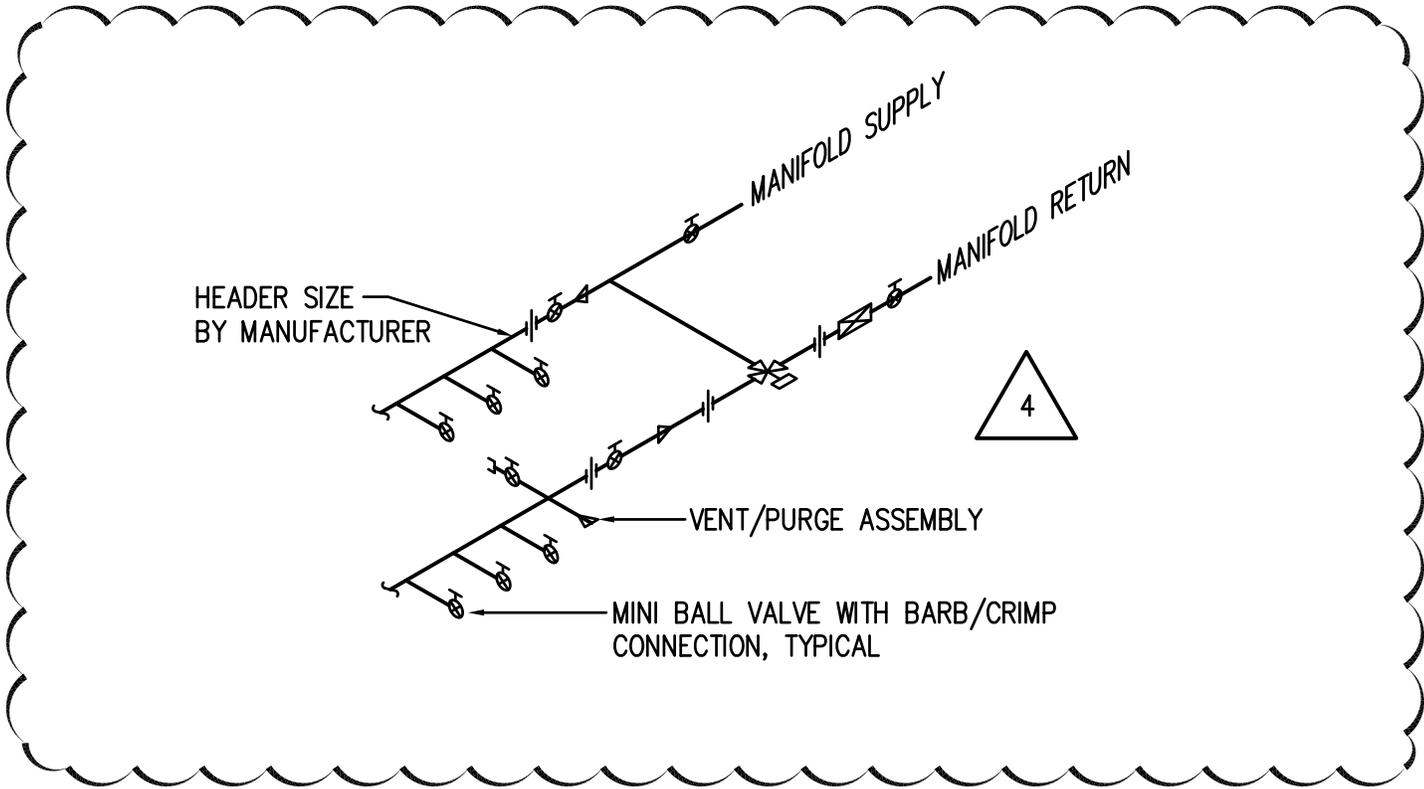
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MECHANICAL  
DETAILS

**MSD-03  
MH502**



1
MH503

**SNOW MELT MANIFOLD DETAIL**  
**NO SCALE**



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MECHANICAL DETAILS

**MSD-04**  
**MH502**

## PUMP SCHEDULE

ID	MANUFACTURER AND MODEL NUMBER	LOCATION	TYPE	FLUID			PUMP		ELECTRICAL				NOTES
				FLOW RATE (GPM)	WORKING FLUID	HEAD LOSS (FT)	EFFICIENCY (%)	MOTOR SIZE (HP)	MOTOR BHP (HP)	MOTOR SPEED (RPM)	VOLT/PH/Hz		
P-1	B&G 1510 1-1/4AC	REHEAT		98	WATER	100	57	5	4.377	3504	460/3/60	1,2	
P-2	B&G 1510 1-1/4AC	REHEAT		98	WATER	100	57	5	4.377	3504	460/3/60	1,2	
P-3	B&G 1510 2AC	CHILLED WATER		223	30%P.GLYCOL	110	72	10	9.201	3500	460/3/60	2	
P-4	B&G 1510 2AC	CHILLED WATER		223	30%P.GLYCOL	110	72	10	9.201	3500	460/3/60	2	
P-5	B&G 1510 1-1/4AC	PREHEAT		108	45% P.GLYCOL	100	85.3	7.5	5.535	3500	460/3/60	2	
P-6	B&G 1510 1-1/4AC	PREHEAT		108	45% P.GLYCOL	100	85.3	7.5	5.535	3500	460/3/60	2	
P-7	GRUNDFOS CR5-4	SNOWMELT		36	40% P.GLYCOL	47	28.2	2	1365	3600	460/3/60		

1. VFD, SEE ELECTRICAL DRAWINGS AND SPECS FOR PUMPS.
2. PRIMARY STANDBY OPERATION



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MECHANICAL  
SCHEDULES

**MSD-05  
MH603**

## SNOW MELT SCHEDULE

ZONE	LOCATION	NUMBER OF CIRCUITS	CIRCUIT LENGTH (FEET)	LOAD (BTU/H)	HYDRONIC			PHYSICAL			NOTES
					FLOW RATE (GPM)	ENTERING/ LEAVING TEMP. (°F)	WORKING FLUID	HEAD LOSS (FT)	TUBE SPACING (IN)	HEATED AREA (FT²)	
1	NE ENTRY	6	200	215,269	11.83	127/87	40% P.GLYCOL	10.6	9	795	1,2
1A	NW ENTRY	3	200	81,470	5.12	127/87	40% P.GLYCOL	8.3	9	281	1,2
	NW LANDING	3	200	86,226	5.41	127/87	40% P.GLYCOL	11	9	297	1,2
2	NW STAIRS	5	200	68,916	8.91	127/87	40% P.GLYCOL	10.3	4	230	1,2
	WEST ENTRY	2	200	57,185	3.93	127/87	40% P.GLYCOL	10.7	9	192	1,2

1. HEATED AREA IS APPROXIMATE. SEE AREAS ON MECHANICAL PIPING DRAWINGS.
2. 4 INCH MINIMUM SLAB THICKNESS. 2 INCH SLAB THICKNESS ABOVE TUBE.



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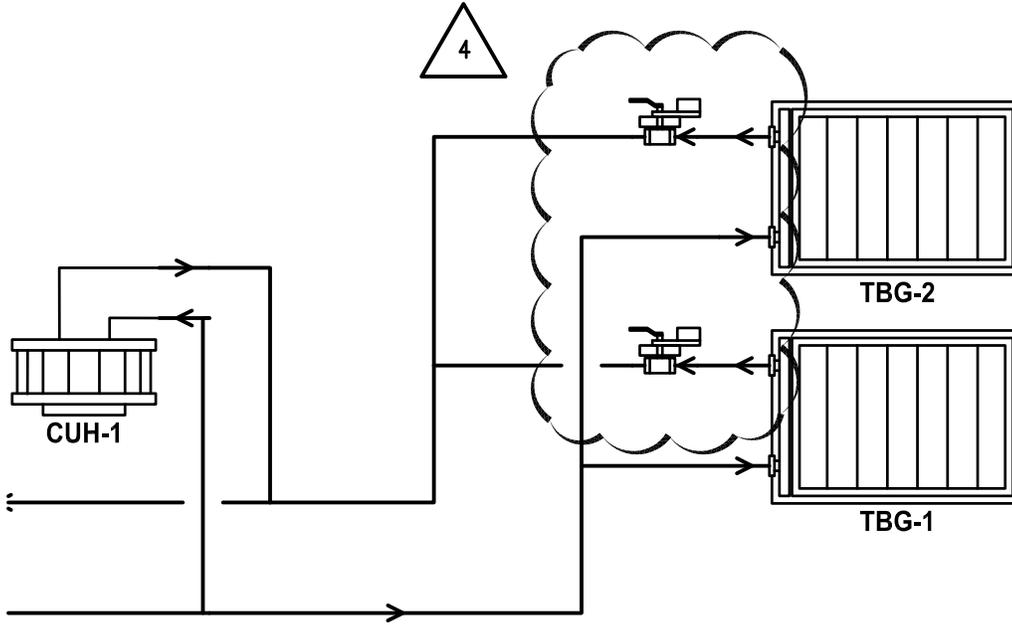
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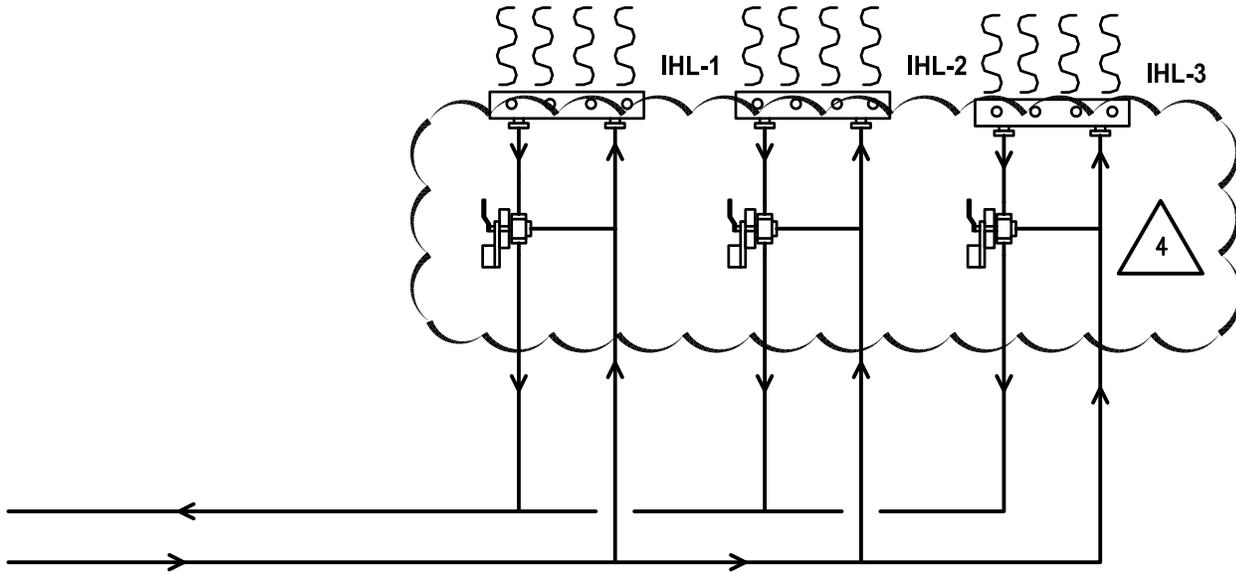
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**MECHANICAL SCHEDULES**

MSD-06  
MH603



1 HOT WATER PIPING SCHEMATIC  
 MH701 NO SCALE



2 SNOW MELT PIPING SCHEMATIC  
 MH701 NO SCALE



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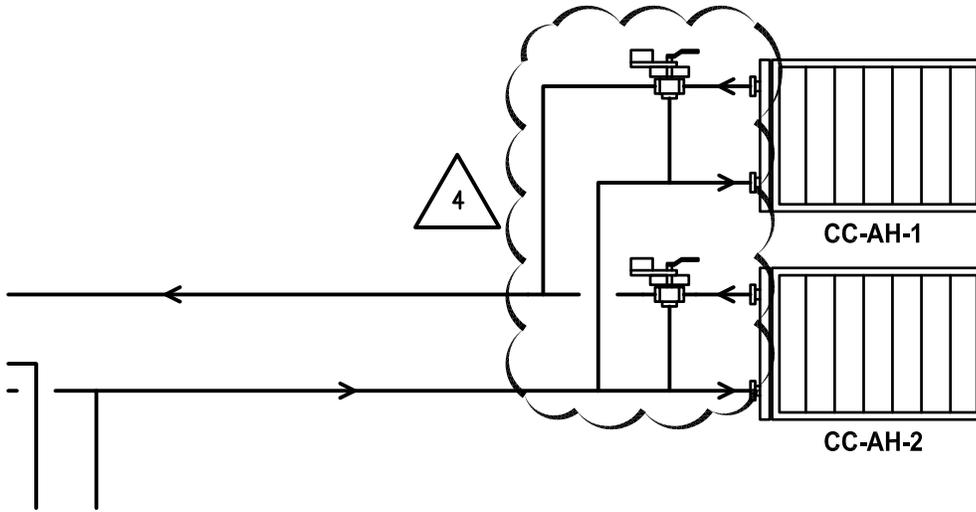
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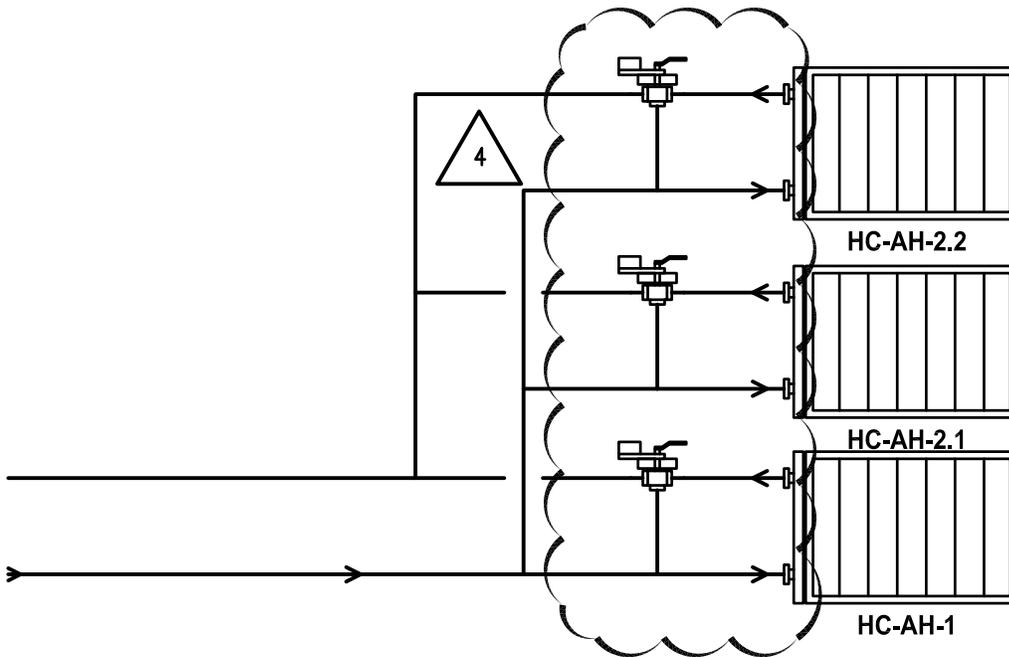
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MECHANICAL SCHEMATICS

**MSD-07  
 MH701**



3 CHILLED WATER PIPING SCHEMATIC  
 MH701 NO SCALE



4 GLYCOL HOT WATER PIPING SCHEMATIC  
 MH701 NO SCALE



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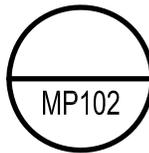
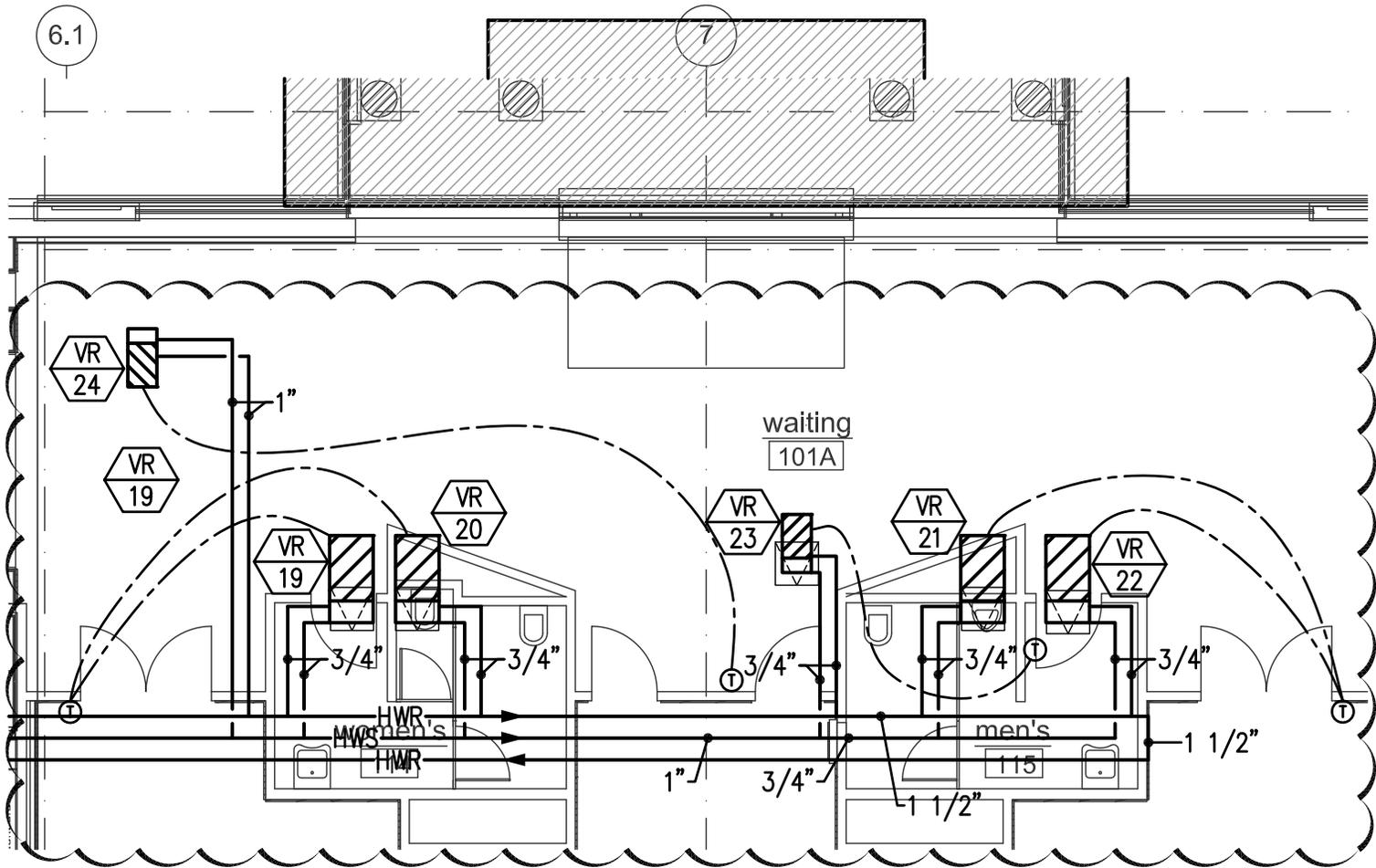
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MECHANICAL  
 SCHEMATICS

**MSD-08**  
**MH701**



# MAIN LEVEL MECHANICAL PIPING PLAN

SCALE: 1/8" = 1'-0"



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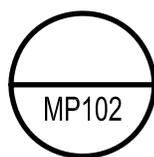
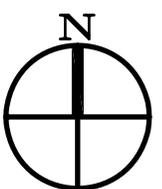
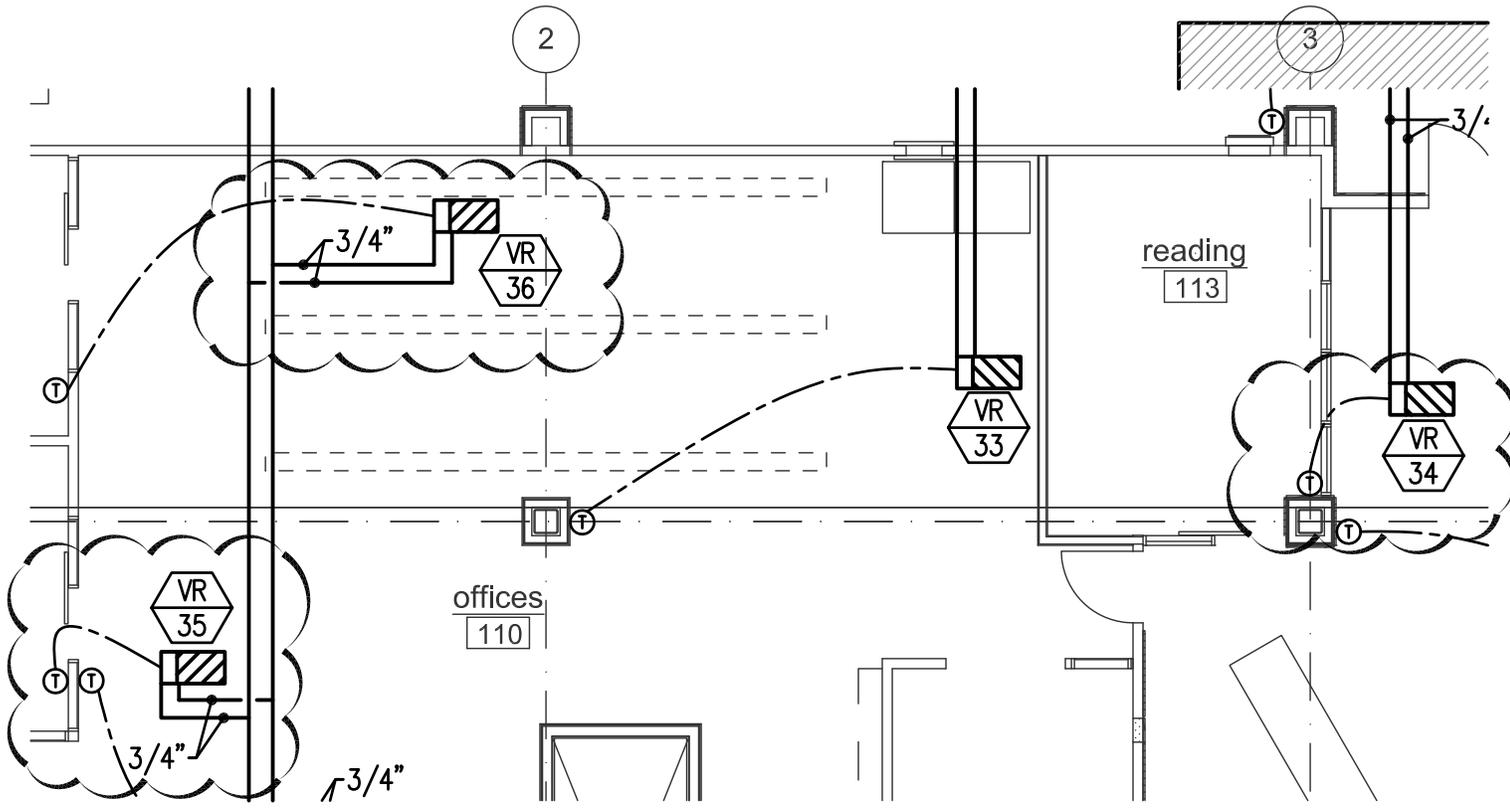
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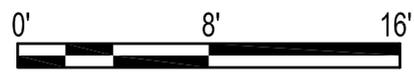
**MAIN LEVEL MECHANICAL PIPING PLAN**

**MSD-09  
MP102**



# MAIN LEVEL MECHANICAL PIPING PLAN

SCALE: 1/8" = 1'-0"



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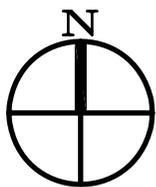
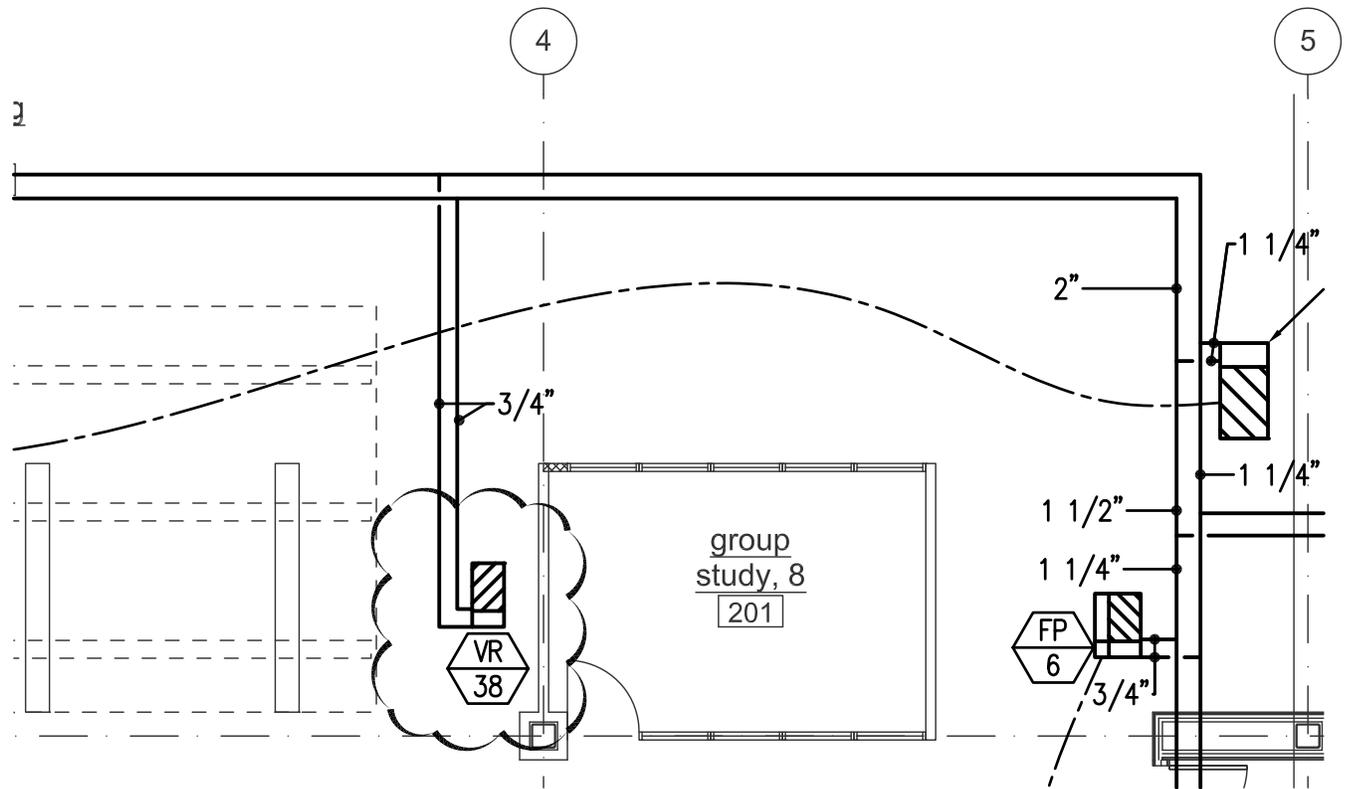
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MAIN LEVEL  
MECHANICAL PIPING  
PLAN

**MSD-10  
MP102**



# UPPER LEVEL MECHANICAL PIPING PLAN

SCALE: 1/8" = 1'-0"



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**UPPER LEVEL MECHANICAL PIPING PLAN**

**MSD-11  
MP103**

## SECTION 126100 - FIXED AUDIENCE SEATING

### 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. Section includes fixed audience seating with the following:
  - 1. Floor mounted
  - 2. Upholstered chairs
  - 3. Self-rising seat mechanism.
- B. Related Sections:
  - 1. Division 21 Sections for electrical service and connections to seating junction box locations for power.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fixed audience seating, Include electrical characteristics.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  - 1. Seating Layout: Show seating layout, aisle widths, chair widths, and chair spacing in each row.
  - 2. Accessories: Show accessories, including locations of left- and right-hand tablet arms, electrical devices, accessibility provisions, and attachments to other work.
  - 3. Wiring Diagrams: For power, signal, and control wiring.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
  - 1. Molded Plastic: Manufacturer's standard-size unit, not less than 3 inches (75 mm) square.
  - 2. Plastic Laminate: Manufacturer's standard-size unit, not less than 3 inches (75 mm) square.
  - 3. Upholstery Fabric: Full width by 36-inch- (914-mm-) long section of fabric from dye lot to be used for the Work, with specified treatments applied. Show complete pattern repeat. Mark top and face of fabric.
  - 4. Power Service Devices: Full-size units.
  - 5. Exposed Fasteners: Full-size units of each type.
- D. Product Certificates: For each type of flame-retardant treatment of fabric, from manufacturer.
- E. Maintenance Data: For fixed audience seating to include in maintenance manuals. Include the following:
  - 1. Methods for maintaining upholstery fabric.

2. Precautions for cleaning materials and methods that could be detrimental to seating finishes and performance.

F. Warranty: Sample of special warranty.

#### 1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of seating required, including accessories and mounting components, from single source from single manufacturer.

1. Upholstery Fabric: Obtain fabric of a single dye lot for each color and pattern of fabric required.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockups for the following types of fixed audience seating including fabric, finishes, and accessories:

Size: Two typical seats for standard-mounted style.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Preinstallation Conference: Conduct conference at Project site.

#### 1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install seating until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary or permanent HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

B. Field Measurements: Verify actual dimensions of seating layout and construction contiguous with seating by field measurements before fabrication.

#### 1.6 COORDINATION

A. Coordinate layout and installation of electrical wiring and devices with seating layout to ensure that floor junction boxes for electrical devices are accurately located to allow connection without exposed conduit.

1. Coordinate wiring and power receptacles installed in seating with requirements in Division 16 Sections.
2. Coordinate wiring installed in seating with requirements in Division 16 Sections.

## 1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fixed audience seating that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
    - a. Structural failures including standards, beams, and pedestals.
    - b. Faulty operation of self-rising seat mechanism.
    - c. Faulty operation of electrical components.
    - d. Wear and deterioration of fabric and stitching beyond normal use.
    - e. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
    - f. Wear and deterioration of tablet arm mechanism and associated construction beyond normal usage.
  2. Warranty Periods: As follows, from date of Substantial Completion.
    - a. Structural: Five years.
    - b. Operating Mechanisms: Three years.
    - c. Electrical Components: Three years.
    - d. Plastic, and Paint Components: Five years.

## PART 2 - PRODUCTS

### 2.1 MATERIALS AND FINISHES

- A. Steel: ASTM A 36/A 36M plates, shapes, and bars; ASTM A 513 mechanical tubing; ASTM A 1008/A 1008M cold-rolled sheet; and ASTM A 1011 hot-rolled sheet and strip.
- B. Plastic Laminate: NEMA LD 3, Grade VGS for vertical surfaces and Grade HGS for horizontal surfaces.
1. Color and Pattern: As selected by Architect from manufacturer's full range.
- C. Fabric: meet the following criteria:
1. Content: Any manufacturer's natural and/or synthetic fabric blend.
  2. Abrasion: 100,000 minimum double rubs
  3. Color and Pattern: As selected by Architect from manufacturer's full range.
- D. Upholstery Padding: Flexible, cellular, molded or slab polyurethane foam.
- E. Molded Plastic: High-density polyethylene or polypropylene, blow or injection molded, with smooth or textured surface that is mar and dent resistant.
1. Color and Texture: As selected by Architect from manufacturer's full range.

### 2.2 FIXED AUDIENCE SEATING

- A. Fixed Audience Seating: Interior assembly-space seating in permanent arrangement as shown on Drawings.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. **KI Seating - BASIS OF DESIGN: CONCERTO AUDITORIUM SEATING**

- b. American Seating Company.
- c. Irwin Seating Company.

B. Chair Mounting Standards: Floor attached of the following material:

1. Steel: One-piece heavy-tube or reinforced sheet with welded mounting plate and welded connections for seat pivots, backs, armrests, and end panels.

C. End Panels:

1. Plastic Laminate to match chair backs.
  - a. Style: Rectangular with rounded corners.

D. Fabric Upholstered Chairs:

- a. Backrests:
  - 1) Fabric upholstered cushion over rigid inner support structure. Cushion thickness: 2 inches (51 mm).
  - 2) Top Corners: Flat top with radius corners.
- b. Seats:
  - 1) Fabric upholstered cushion over rigid inner support structure. Cushion thickness: Minimum 2 inches (51 mm).
  - 2) Seat Underside: Molded plastic shell.

E. Chair Width: Vary chair widths to accommodate sightlines and row lengths.

F. Back Height: Standard-height backs,

G. Back Pitch:

1. Fixed

H. Chair Seat Hinges:

1. Self-lubricating, compensating type with noiseless self-rising seat mechanism passing ASTM F 851 and with positive internal stops cushioned with rubber or neoprene.

I. Chair Back Hinges:

1. Self-lubricating type with noiseless mechanism that raises back to vertical position when chair is unoccupied.

J. Self-Rising Seat Mechanism:

1. Gravity-actuated, full fold.

K. Armrests:

1. Plastic with rounded edges, concealed mounting.

L. Power and Data Service Package: Manufacturer's standard service to every seat in every other row including terminal devices and wiring with 18 inches (457 mm) of extra length and as follows, coordinate location of under-slab power and data feed with electrical contractor:

1. Power Receptacles: 120 V with wiring and simplex receptacle as specified in Division 21.

M. Tablet Arms:

1. Manufacturer's large size (approx. 12"x16") foldaway tablet arm with plastic-laminate writing surface over plywood core and with rounded clear lacquered edges.
2. Mounting: Right-hand mounted unless otherwise indicated.
3. Fold-Away Mechanism: Cast-iron or steel hinge and swivel mechanism that gives positive support in open position and semiautomatic return to stored position below arm block.

N. Accessible Seating:

1. Provide one accessible chair on aisle side in locations indicated, but not less than 5 percent of aisle seats. Identify these seats with a sign or marker.

## 2.3 FABRICATION

- A. Floor Attachments: Fabricate to conform to floor slope, if any, so that standards and pedestals are plumb and chairs are maintained at same angular relationship to vertical throughout Project.
- B. For beam-mounted chairs, curve the beam to the various radii required for the rows.
- C. Upholstery: Fabricate fabric-covered cushions with molded padding beneath fabric and with fabric covering free of welts, creases, stretch lines, and wrinkles. For each upholstered component, install pile and pattern run in a consistent direction.
- D. Fabricate as follows:
  1. Two-Part Upholstered Back: In length required to protect seat in raised position, with padded cushion glued to a curved steel, plywood, or molded-plastic support panel covered with easily replaceable fabric, and with curved rear shell that fully encloses upholstery edges.
  2. Two-Part Upholstered Seats: Upper part, an upholstered cushion with formed padding over a five-ply plywood panel with fabric cover conforming to shape of cushion to conceal inner seat structure and hinge mechanism. Lower part, molded-plastic shell.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine floors, risers, and other adjacent work and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install seating in locations indicated and fastened securely to substrates according to manufacturer's written installation instructions.
  1. Use installation methods and fasteners that produce fixed audience seating assemblies with individual chairs capable of supporting an evenly distributed 600-lb (272-kg) static load without failure or other conditions that might impair the chair's usefulness.
  2. Install standards and pedestals plumb.
- B. Install chairs in curved rows at a smooth radius as indicated in drawings.
- C. Install seating so moving components operate smoothly and quietly.

- D. Install wiring conductors and cables concealed in components of seating and accessible for servicing.

### 3.3 ADJUSTING

- A. Adjust chair backs so that they are aligned with each other in uniformly curved rows.
- B. Adjust self-rising seat mechanisms so seats in each row are aligned when in upright position.
- C. Verify that all components and devices are operating properly.
- D. Verify that seating returns to correct at-rest position.
- E. Repair minor abrasions and imperfections in finishes with coating that matches factory-applied finish.
- F. Replace upholstery fabric damaged during installation.

END OF SECTION 126100

## SECTION 044200 - EXTERIOR STONE CLADDING

### 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 types of dimension stone:
  - 1. Panels set with individual anchors.
  - 2. Panels set in architectural precast concrete.
  - 3. Units with carving or inscriptions.
- B. Related Sections include the following:
  - 1. Division 03 Section "Cast-in-Place Concrete" for installing inserts in concrete for anchoring dimension stone cladding.
  - 2. Division 03 Section "Precast Architectural Concrete" for setting dimension stone panels in architectural precast concrete units.
  - 3. Division 07 Section "Joint Sealants" for sealing joints in dimension stone cladding system with elastomeric sealants.

#### 1.3 DEFINITIONS

- A. Definitions contained in ASTM C 119 apply to this Section.
- B. Dimension Stone Cladding System: An exterior wall covering system consisting of dimension stone panels together with anchors, mortar, adhesives, fasteners, and sealants used to secure the stone to building structure and to produce a weather-resistant covering.
  - 1. Backup structure includes miscellaneous steel framing required to secure stone to concrete wall.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. General: Design stone anchors and anchoring systems according to ASTM C 1242.
- B. Structural Performance: Provide dimension stone cladding system capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Wind Loads: Determine loads based on the following minimum design wind pressures:
    - a. Uniform pressure of 20 lbf/sq. ft. (957 Pa), acting inward or outward.
    - b. Uniform pressure as indicated on Drawings.
  - 2. Equipment Loads: Allow for loads due to window cleaning and maintenance equipment.
- C. Seismic Performance: Provide dimension stone cladding system capable of withstanding the effects of earthquake motions determined according to ASCE 7.

- D. Thermal Movements: Provide dimension stone cladding system that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing displacement of stone, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- E. Horizontal Building Movement (Interstory Drift): Allow for maximum horizontal building movement equal to quotient resulting from dividing floor-to-floor height at any floor by 400.
- F. Shrinkage and Creep: Allow for progressive vertical shortening of building frame equal to 1/8 inch in 10 feet (3 mm in 3 m).
- G. Safety Factors for Stone: Design dimension stone cladding system to withstand loads indicated without exceeding allowable working stress of stone determined by dividing stone's average ultimate strength, as established by testing, by the following safety factors:
1. Safety Factor for Granite: 3.
- H. Design stone anchors to withstand loads indicated without exceeding allowable working stresses established by the following:
1. For Cast-in-Place and Postinstalled Fasteners in Concrete: One-fourth of tested capacity when installed in concrete with compressive strength indicated.
- I. Limit deflection in each prefabricated assembly caused by indicated loads and thermal movements, acting singly or in combination with one another, to not more than 1/720 of assembly's clear span or the following, whichever is smaller:
1. 1/16 inch (1.5 mm), measured in plane of wall.
  2. 1/4 inch (6 mm), measured perpendicular to wall.
- J. Provisions for Fabrication and Erection Tolerances: Allow for fabrication and erection tolerances of building's structural system. Concrete fabrication and erection tolerances are specified in Division 03 Section "Cast-in-Place Concrete."
- K. Provision for Deflection of Building Structure: Allow for the following:
1. Deflection due to Weight of Dimension Stone Cladding System: Allow for 1/4-inch (6-mm) vertical deflection in 20-foot (6-m) span of structural members supporting dimension stone cladding system.
- L. Leakage Resistance, Water and Air: Provide dimension stone cladding system that complies with the following:
1. Air Infiltration: Not more than 0.004 cfm/sq. ft. (0.02 L/s per sq. m) of wall area, as measured by testing mockup per ASTM E 283 at a differential pressure of 1.57 lbf/sq. ft. (75 Pa).
  2. Water Penetration: No uncontrolled water penetration beyond plane of back of dimension stone cladding system that is not contained or drained back to exterior, as measured by testing mockup per ASTM E 331 at a differential pressure of 20 percent of positive design wind load, but not less than 10 lbf/sq. ft. (479 Pa).
- M. Control of Corrosion and Staining: Prevent galvanic and other forms of corrosion as well as staining by isolating metals and other materials from direct contact with incompatible materials. Use materials that do not stain exposed surfaces of stone and joint materials.

## 1.5 SUBMITTALS

- A. Product Data: For each stone accessory, and other manufactured products indicated.
- B. Shop Drawings: Show fabrication and installation details for dimension stone cladding system, including dimensions and profiles of stone units.
  - 1. Show locations and details of joints both within dimension stone cladding system and between dimension stone cladding system and other construction.
  - 2. Include details of mortar joints and mortar joints pointed with sealant.
  - 3. Show locations and details of anchors.
  - 4. Include large-scale shaded elevations and details of decorative surfaces and inscriptions.
  - 5. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples for Initial Selection: For joint materials involving color selection.
- D. Stone Samples for Verification: Sets for each color, grade, finish, and variety of stone required; not less than 12 inches (300 mm) square.
  - 1. Sets shall consist of at least four Samples, exhibiting extremes of the full range of color and other visual characteristics expected and will establish the standard by which stone will be judged.
- E. Colored Pointing Mortar Samples for Verification: For each color required, showing the full range of exposed color and texture expected in the completed Work.
- F. Sealant Samples for Verification: For each type and color of joint sealant required.
- G. Welding certificates.
- H. Qualification Data: For Installer, fabricator, professional engineer, and testing agency.
- I. Material Test Reports: From a qualified independent testing agency, as follows:
  - 1. Stone Test Reports: For stone variety proposed for use on Project, provide test data indicating compliance with required physical properties, other than abrasion resistance, according to referenced ASTM standards. Base reports on testing done within previous three years.
  - 2. For metal components, indicate chemical and physical properties of metal.
  - 3. Sealant Compatibility and Adhesion Test Report: From sealant manufacturer complying with requirements in Division 07 Section "Joint Sealants" and indicating that sealants will not stain or damage stone. Include interpretation of test results and recommendations for primers and substrate preparation needed for adhesion.
  - 4. Preconstruction Sealant Field Test Report: From Installer, complying with requirements in Division 07 Section "Joint Sealants."
- J. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual experienced in installing dimension stone cladding systems similar in material, design, and extent to that indicated for this Project, whose work has a record of successful in-service performance.
- B. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate dimension stone cladding systems similar to that required for this Project and whose products have a record of successful in-service performance.

1. Fabricator's responsibilities include fabricating dimension stone cladding and providing professional engineering services needed to assume engineering responsibility.
  2. Engineering Responsibility: Comprehensive engineering analysis by a qualified professional engineer.
- C. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.
- D. Source Limitations for Stone: Obtain stone, regardless of finish, from a single quarry, whether specified in this Section or in another Section of the Specifications, with resources to provide materials of consistent quality in appearance and physical properties.
1. For stone types that include same list of varieties and sources, provide same variety from same source for each.
  2. Make quarried blocks available for examination by Architect for appearance characteristics.
- E. Source Limitations for Mortar Materials: Obtain mortar ingredients of uniform quality for each cementitious component from a single manufacturer and each aggregate from one source or producer.
- F. Source Limitations for Other Materials: Obtain each type of stone accessory, sealant, and other material from a single manufacturer for each product.
- G. Preconstruction Stone Testing: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Payment for these services will be made by Owner.
1. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.
  2. Furnish test specimens that are representative of materials proposed for incorporation into the Work.
  3. Physical Property Tests: For stone variety proposed for use on Project, tested for compliance with physical property requirements, other than abrasion resistance, according to referenced ASTM standards.
  4. Flexural Strength Tests: For stone variety, thickness, orientation of cut, and finish, proposed for use on Project, tested according to ASTM C 880, in both wet and dry conditions.
  5. Anchorage Tests: For stone variety, orientation of cut, finish, and anchor type proposed for use on Project, tested according to ASTM C 1354.
  6. Anchoring System Mockup Tests: For performance of stone anchoring system, evaluated for compliance with requirements by mockup testing per ASTM C 1201, Procedure B, with a maximum test load equal to 3 times the design load.
  7. Cladding System Mockup Tests: For performance of dimension stone cladding system, evaluated for compliance with requirements by mockup testing per ASTM E 72, with a maximum test load equal to 3 times the design load.
  8. Contractor is required to build test mockups of representative portion of dimension stone cladding system corresponding to area indicated on Drawings. Build test mockups at testing agency's facilities from same materials proposed for Project, using installers who will perform same tasks for Project.
  9. Testing agency will report test results in writing to Architect and Contractor.
- H. Preconstruction Sealant Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for compatibility and adhesion testing according to sealant manufacturer's standard testing methods and Division 07 Section "Joint Sealants," samples of materials that will contact or affect joint sealants.
- I. Preconstruction Field Testing of Sealants: Before installing joint sealants, field test their adhesion to joint substrates per requirements specified in Division 07 Section "Joint Sealants."
- J. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel"; and AWS D1.3, "Structural Welding Code--Sheet Steel."
- K. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of typical wall area as shown on Drawings.
2. Build mockups of typical exterior wall with dimension stone cladding, approximately 72 inches (1800 mm) long by 48 inches (1200 mm) high.
  - a. Show typical components, attachments to building structure, and methods of installation.
  - b. Include window opening with stone returns and trim.
  - c. Include sealant-filled joint complying with requirements in Division 07 Section "Joint Sealants."
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle stone and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, and other causes.
  1. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.
  2. Store stone on wood skids or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to stone. Ventilate under covers to prevent condensation.
- B. Mark stone units, on surface that will be concealed after installation, with designations used on Shop Drawings to identify individual stone units. Orient markings on vertical panels so that they are right side up when units are installed.
- C. Deliver sealants to Project site in original unopened containers labeled with manufacturer's name, product name and designation, color, expiration period, pot life, curing time, and mixing instructions for multicomponent materials.
- D. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- E. Store aggregates in locations where grading and other required characteristics can be maintained and where contamination can be avoided.

#### 1.8 PROJECT CONDITIONS

- A. Protect dimension stone cladding during erection as follows:
  1. Cover tops of dimension stone cladding installation with nonstaining, waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress. Extend cover a minimum of 24 inches (600 mm) down both sides and hold securely in place.
  2. Prevent staining of stone from mortar, grout, sealants, and other sources. Immediately remove such materials without damaging stone.
  3. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on ground and over wall surface.
  4. Protect sills, ledges, and projections from mortar and sealant droppings.
- B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Remove and replace dimension stone cladding damaged by frost or freezing conditions.
  1. Comply with cold-weather construction and protection requirements for masonry contained in ACI 530.1/ASCE 6/TMS 602.
  2. Cold-Weather Construction: When ambient temperature is within limits indicated, use the following procedures:

- a. At 40 deg F (5 deg C) and below, produce mortar temperatures between 40 and 120 deg F (5 and 49 deg C) by heating mixing water, sand, or both. Do not heat water to above 160 deg F (71 deg C).
  - b. At 32 deg F (0 deg C) and below, maintain temperature of mortar on boards above freezing. Heat stone and substrates so they are above 32 deg F (0 deg C) at time of installation.
  - c. At 25 to 20 deg F (minus 4 to minus 7 deg C), heat both sides of walls under construction. Use windbreaks or enclosures when wind velocity exceeds 15 mph (25 km/h).
  - d. At 20 deg F (minus 7 deg C) and below, provide enclosure and auxiliary heat to maintain air temperature above 32 deg F (0 deg C) within enclosure.
3. Cold-Weather Protection: When mean daily temperature is within limits indicated, provide the following protection for 48 hours after construction:
- a. 40 to 25 Deg F (Plus 5 to Minus 4 Deg C): Cover dimension stone cladding with a weather-resistant membrane.
  - b. 25 to 20 Deg F (Minus 4 to Minus 7 Deg C): Cover dimension stone cladding with weather-resistant, insulating blankets or provide enclosure and heat to maintain air temperature above 32 deg F (0 deg C) within enclosure. Use windbreaks or enclosures when wind velocity exceeds 15 mph (25 km/h).
  - c. 20 Deg F (Minus 7 Deg C) and below: Provide enclosure and heat to maintain air temperature above 32 deg F (0 deg C) within enclosure.
- C. Hot-Weather Requirements: Comply with hot-weather construction and protection requirements for masonry contained in ACI 530.1/ASCE 6/TMS 602.
- D. Environmental Limitations for Sealants: Do not install sealants when ambient and substrate temperatures are outside limits permitted by sealant manufacturer or below 40 deg F (5 deg C) or when joint substrates are wet.

## 1.9 COORDINATION

- A. Coordinate installation of inserts that are to be embedded in concrete or masonry, flashing reglets, and similar items to be used by dimension stone cladding Installer for anchoring, supporting, and flashing of dimension stone cladding system. Furnish setting drawings, templates, and directions for installing such items and deliver to Project site in time for installation.
- B. Time delivery and installation of dimension stone cladding to avoid extended on-site storage and to coordinate with work adjacent to dimension stone cladding.

## 1.10 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Dimension Stone Units: Furnish 10 finished stone panels standard dimensions for each finish and variety of stone specified.

## PART 2 - PRODUCTS

### 2.1 GRANITE

- A. Granite: Comply with ASTM C 615.
- B. Description: Uniform, fine-grained, stone without veining.

- C. Available Varieties and Sources: Subject to compliance with requirements, stone varieties that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Cold Springs Granite – Prairie Brown, or approved equal.
- D. Cut stone from one block or contiguous, matched blocks in which natural markings occur.
- E. Finish: Polished.
- F. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.
- G. Thickness: Not less than 1-1/4 inches (32 mm), unless otherwise indicated.

## 2.2 LIMESTONE

- A. Limestone: Comply with ASTM C 568.
  - 1. Classification: II Medium-Density, except change requirements per ASTM C 568 for absorption by weight, density, compressive strength, and modulus of rupture to, respectively, 5 percent maximum, 150 lb/cu. ft. (2400 kg/cu. m) minimum, 8000 psi (55 MPa), and 800 psi (5.5 MPa) minimum.
  - 2. Description: Oolitic limestone.
- B. Available Varieties and Sources: Subject to compliance with requirements, stone varieties that may be incorporated into the Work include, but are not limited to, the following:
- C. Varieties and Sources: Subject to compliance with requirements, provide one of the following:
- D. Variety and Sources: Indiana, Kansas, Texas, or Utah oolitic limestone.
  - 1. State Stone, 4640 S. 300 W., Murray, Utah (801) 262-9323
  - 2. Bound Stone Products, Matt Bound (435) 851-0206
- E. Oolitic Limestone Grade and Color: Standard, buff, according to grade and color classification established by ILI.
- F. Cut: Fleuri cut.
- G. Cut stone from one block or contiguous, matched blocks in which natural markings occur.
- H. Finish, Matching Standard ILI Finish: As indicated.
- I. Finish: Ashlar face at foundation/plinth. Smooth face at arches, sills, lintels and stringer courses.
- J. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.
- K. Thickness: Not less than 4 inches (100 mm), unless otherwise indicated.

## 2.3 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
  - 1. Low-Alkali Cement: Portland cement for use with limestone shall contain not more than 0.60 percent total alkali when tested according to ASTM C 114.
- B. Hydrated Lime: ASTM C 207.

- C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.
- D. Colored Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III; hydrated lime complying with ASTM C 207; and mortar pigments. Use a mix of formulation required to produce color indicated or, if not indicated, as selected from manufacturer's standard formulations. Pigments shall not exceed 10 percent of portland cement by weight.
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Essroc, Italcementi Group; Capitol PCL Blend or Saylor's Plus.
    - b. Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
    - c. Lafarge North America Inc.; Eaglebond.
    - d. Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.
- E. Aggregate: ASTM C 144; except for joints narrower than 1/4 inch (6 mm) and pointing mortar, use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.
  - 1. White Aggregates: Natural white sand or ground white stone.
  - 2. Colored Aggregates: Natural-colored sand or ground marble, granite, or other durable stone; of color necessary to produce required mortar color.
- F. Mortar Pigments: Natural and synthetic iron oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in mortar and containing no carbon black.
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Bayer, Industrial Chemicals Div.; Bayferrox Iron Oxide Pigments.
    - b. Davis Colors; True Tone Mortar Colors.
    - c. Solomon Colors; SGS Mortar Colors.
- G. Water: Potable.

## 2.4 ANCHORS AND FASTENERS

- A. Fabricate anchors, including shelf angles, from stainless steel, ASTM A 666, Type 304, temper as required to support loads imposed without exceeding allowable design stresses. Fabricate dowels and pins for anchors from stainless steel, ASTM A 276, Type 304.
- B. Fabricate shelf angles for limestone from hot-dip galvanized steel, ASTM A 36/A 36M for materials and ASTM A 123/A 123M for galvanizing.
- C. Fabricate anchors, including shelf angles, from extruded aluminum, ASTM B 221 (ASTM B 221M), alloy and temper as required to support loads imposed without exceeding allowable design stresses, but not less than strength and durability properties of Alloy 6063-T6.
- D. Cast-in-Place Concrete Inserts: Steel, cast iron, or malleable iron adjustable inserts, with bolts, nuts, washers, and shims; all hot-dip galvanized or mechanically zinc coated, with capability to sustain, without failure, a load equal to 4 times the loads imposed as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
- E. Postinstalled Anchor Bolts for Concrete and Masonry: undercut anchors made from stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Alloy Group A1 or A4) for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed, for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

- F. Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers.
1. For stainless steel and aluminum, use annealed stainless-steel bolts, nuts, and washers; **ASTM F 593 (ASTM F 738M)** for bolts; and **ASTM F 594 (ASTM F 836M)** for nuts, Alloy Group 1 (A1).
  2. For galvanized steel shelf angles and backup structure, use carbon steel bolts, nuts, and washers; **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)**, for bolts; **ASTM A 563 (ASTM A 563M)**, Grade A, for nuts; and **ASTM F 436 (ASTM F 436M)** for washers; all hot-dip or mechanically zinc coated.
- G. Weld Plates for Installation in Concrete: Comply with Division 05 Section "Metal Fabrications."

## 2.5 STONE ACCESSORIES

- A. Setting Shims: Strips of resilient plastic or vulcanized neoprene, Type A Shore durometer hardness of 50 to 70, nonstaining to stone, of thickness needed to prevent point loading of stone on anchors and of depths to suit anchors without intruding into required depths of pointing materials.
- B. Setting Buttons: Resilient plastic buttons, nonstaining to stone, sized to suit joint thicknesses and bed depths of stone units without intruding into required depths of pointing materials.
- C. Concealed Sheet Metal Flashing: Fabricate from zinc-tin alloy-coated stainless steel in thicknesses indicated, but not less than **0.0156 inch (0.4 mm)** thick. Comply with requirements specified in Division 07 Section "Sheet Metal Flashing and Trim."
- D. Cementitious Dampproofing for Limestone: Provide cementitious formulations that are recommended by ILL and that are nonstaining to stone, compatible with joint sealants, and noncorrosive to anchors and attachments.
- E. Weep and Vent Tubes: Medium-density polyethylene tubing, **1/4-inch (6-mm)** OD and of length required to extend from exterior face of stone to cavity behind.
- F. Plastic Weep Hole/Vents: One-piece, flexible extrusion manufactured from UV-resistant polypropylene copolymer, designed to weep moisture in masonry cavity to exterior, in color selected from manufacturer's standard.
- G. Wicking Material: Absorbent rope, made from UV-resistant synthetic fiber, **1/4 to 3/8 inch (6 to 10 mm)** in diameter, in length required to produce **2-inch (50-mm)** exposure on exterior and **18 inches (450 mm)** in cavity between wythes.
- H. Sealants for Joints in Dimension Stone Cladding: Manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated below that comply with applicable requirements in Division 07 Section "Joint Sealants" and do not stain stone.
1. Multicomponent, nonsag, polysulfide sealant.
  2. Multicomponent, nonsag, urethane sealant.
  3. Single-component, neutral-curing silicone sealant.
  4. Colors: Provide colors of exposed sealants to comply with the following requirement:
    - a. Provide color as selected by Architect from manufacturer's full range.
- I. Sealant for Filling Kerfs: Manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated below that comply with applicable requirements in Division 07 Section "Joint Sealants" and that do not stain stone.
1. Single-component, nonsag, urethane sealant; Class 25, Use T (traffic), and Use M (masonry).
  2. Single-component, nonsag, neutral-curing, medium to high modulus, silicone sealant; Class 25, Use NT (nontraffic), and Use M (masonry).

3. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Sika Corporation, Inc.; Sikaflex - 1a.
  - b. Sonneborn, Division of ChemRex; NP 1.
  - c. Sonneborn, Division of ChemRex; Ultra.
  - d. Tremco, Sealant/Waterproofing Division; Vulkem 116.
  - e. Tremco, Sealant/Waterproofing Division; Spectrem 2.

## 2.6 STONE FABRICATION

- A. General: Fabricate stone units in sizes and shapes required to comply with requirements indicated, including details on Drawings and Shop Drawings.
  1. For granite, comply with recommendations in NBGQA's "Specifications for Architectural Granite."
  2. For limestone, comply with recommendations in ILL's "Indiana Limestone Handbook."
- B. Control depth of stone and back check to maintain minimum clearance of **1 inch (25 mm)** between backs of stone units and surfaces or projections of structural members, fireproofing (if any), backup walls, and other work behind stone.
- C. Dress joints (bed and vertical) straight and at right angle to face, unless otherwise indicated. Shape beds to fit supports.
- D. Cut and drill sinkages and holes in stone for anchors, fasteners, supports, and lifting devices as indicated or needed to set stone securely in place.
- E. Finish exposed faces and edges of stone, except sawed reveals, to comply with requirements indicated for finish and to match approved samples and mockups.
- F. Quirk-miter corners, unless otherwise indicated; provide for cramp anchorage in top and bottom bed joints of corner pieces.
- G. Cut stone to produce uniform joints **3/8 inch (10 mm)** wide and in locations indicated.
- H. Contiguous Work: Provide chases, reveals, reglets, openings, and similar features as required to accommodate contiguous work.
- I. Fabricate molded work, including washes and drips, to produce stone shapes with a uniform profile throughout entire unit length, with precisely formed arris slightly eased to prevent snipping, and with matching profile at joints between units.
  1. Produce moldings and molded edges with machines that use abrasive shaping wheels made to reverse contour of molding shape.
- J. Carve and cut inscriptions according to Shop Drawings. Use skilled stone carvers experienced in the successful performance of work similar to that indicated.
- K. Abrasively etch [**inscriptions**] according to Shop Drawings.
- L. Laser etch [**inscriptions**] according to Shop Drawings.
- M. Clean backs of stone to remove rust stains, iron particles, and stone dust.
- N. Inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.

1. Grade and mark stone for overall uniform appearance when assembled in place. Natural variations in appearance are acceptable if installed stone units match range of colors and other appearance characteristics represented in approved samples and mockups.

## 2.7 SHOP-PAINTED STEEL FINISHES

- A. General: Paint uncoated steel backup structure before delivering to Project site to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel."
- B. Surface Preparation: After completing fabrication of steel items, prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- C. Apply one coat of fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#76. After primer has dried, apply one coat of exterior alkyd enamel complying with MPI#96 of a different color than primer.
- D. Apply two-coat high-performance coating system consisting of organic zinc-rich primer, complying with SSPC-Paint 20 or SSPC-Paint 29 and topcoat of high-build urethane or epoxy coating recommended by manufacturer for application over specified zinc-rich primer.
  1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Benjamin Moore & Co.; Epoxy Zinc-Rich Primer CM18/19 and M73/M75 Aliphatic Acrylic Urethane Semi-Gloss.
    - b. Carboline Company; Carbozinc 621 and Carboguard 890 2-Component Epoxy.
    - c. ICI Devoe Coatings; Catha-Coat 313 and Devthane378 Aliphatic Urethane Semi-Gloss Enamel.
    - d. International Coatings Limited; Interzinc 315 Epoxy Zinc-Rich Primer and Interthane 870.
    - e. PPG Architectural Finishes, Inc.; Aquapon Zinc-Rich Primer 97-670 and Aquapon 97-130 Epoxy.
    - f. Sherwin-Williams Company (The); Corothane I GalvaPac Zinc Primer and Macropoxy HS High Solids Epoxy.
    - g. Tnemec Company, Inc.; Tneme-Zinc 90-97 and Series 27 Hi-Build Epoxy.

## 2.8 MORTAR MIXES

- A. General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortar of uniform quality and with optimum performance characteristics.
  1. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated. Do not use calcium chloride.
  2. Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer, unless otherwise indicated. Discard mortar when it has reached initial set.
- B. Portland Cement-Lime Setting Mortar: Comply with ASTM C 270, Proportion Specification, for types of mortar indicated below:
  1. Set granite with Type S mortar.
  2. Set limestone with Type N mortar.
- C. Pointing Mortar: Comply with ASTM C 270, Proportion Specification, for types of mortar indicated. Provide pointing mortar mixed to match Architect's sample and complying with the following:
  1. Pigmented Pointing Mortar: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1:10, by weight.

2. Packaged Portland Cement-Lime Mix Mortar: Use portland cement-lime mix of selected color.
3. Colored-Aggregate Pointing Mortar: Produce color required by combining colored aggregates with portland cement of selected color.
4. Point granite with Type S mortar.
5. Point limestone with Type N mortar.

## 2.9 SOURCE QUALITY CONTROL

- A. Source Quality-Control Testing Service: Owner will employ an independent testing agency to perform source quality-control testing indicated below. Payment for these services will be made by Owner.
  1. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.
  2. Furnish test specimens selected by testing agency from same blocks as actual materials proposed for incorporation into the Work.
  3. Flexural Strength Tests: ASTM C 880, performed on specimens of same thickness, orientation of cut, and finish as installed stone. One set of test specimens is required to be tested for every **3000 sq. ft. (300 sq. m)**, but not fewer than 2 sets for each stone variety.
- B. Testing agency will report test results in writing to Architect and Contractor.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine surfaces to receive dimension stone cladding and conditions under which dimension stone cladding will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
  1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of dimension stone cladding.
  2. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 SETTING DIMENSION STONE CLADDING, GENERAL

- A. Before setting stone clean surfaces that are dirty or stained by removing soil, stains, and foreign materials. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.
- B. Coat limestone with dampproofing to extent indicated below:
  1. Stone at Grade: Beds, joints, and back surfaces to at least **12 inches (300 mm)** above finish-grade elevations.
  2. Stone Extending below Grade: Beds, joints, back surfaces, and face surfaces below grade.
  3. Allow cementitious dampproofing formulations to cure before setting dampproofed stone. Do not damage or remove dampproofing while handling and setting stone.
- C. Parge back side of travertine panels with mortar not less than **3/8 inch (10 mm)** thick.
- D. Execute dimension stone cladding installation by skilled mechanics and employ skilled stone fitters at Project site to do necessary field cutting as stone is set.
  1. Use power saws with diamond blades to cut stone. Produce lines cut straight and true, with edges eased slightly to prevent snipping.

- E. Contiguous Work: Provide reveals, reglets, and openings as required to accommodate contiguous work.
- F. Set stone to comply with requirements indicated on Drawings and Shop Drawings. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure dimension stone cladding in place. Shim and adjust anchors, supports, and accessories to set stone accurately in locations indicated with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances.
- G. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.
  - 1. Sealing expansion and other joints is specified in Division 07 Section "Joint Sealants."
  - 2. Keep expansion joints free of mortar and other rigid materials.
- H. Install concealed flashing at continuous shelf angles, lintels, ledges, and similar obstructions to downward flow of water to divert water to building exterior.
- I. Keep cavities open where unfilled space is indicated between back of stone units and backup wall; do not fill cavities with mortar or grout.
  - 1. Place weep holes in joints where moisture may accumulate, including base of cavity walls, above shelf angles, and flashing. Locate weep holes at intervals not exceeding **24 inches (600 mm)**. Use weep and vent tubes.
  - 2. Place vents in cavity walls at tops of cavities, below shelf angles and flashing, and at intervals not exceeding **20 feet (6 m)** vertically. Locate vents in joints at intervals not exceeding **60 inches (1500 mm)** horizontally. Use weep and vent tubes.

### 3.3 SETTING MECHANICALLY ANCHORED DIMENSION STONE CLADDING

- A. Attach anchors securely to stone and to backup surfaces. Comply with recommendations in ASTM C 1242.
- B. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with sealant indicated for filling kerfs.
- C. Set stone supported on clips or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths and to prevent point loading of stone on anchors. Hold shims back from face of stone a distance at least equal to width of joint.

### 3.4 SETTING DIMENSION STONE CLADDING WITH MORTAR

- A. Set stone in full bed of mortar with head joints filled, unless otherwise indicated.
  - 1. Use setting buttons of adequate size, in sufficient quantity, and of thickness required to maintain uniform joint width and to prevent mortar from extruding. Hold buttons back from face of stone a distance at least equal to width of joint, but not less than depth of pointing materials.
  - 2. Do not set heavy units or projecting courses until mortar in courses below has hardened enough to resist being squeezed out of joint.
  - 3. Support and brace projecting stones until wall above is in place and mortar has set.
  - 4. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with mortar.
- B. Fill space between back of stone units and backup wall solidly with mortar or grout.
- C. Embed ends of sills in mortar; leave remainder of joint open until final pointing.
- D. Rake out joints for pointing with mortar to depths of not less than **1/2 inch (12 mm)**. Rake joints to uniform depths with square bottoms and clean sides.

- E. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply first layer of pointing mortar in layers not more than **3/8 inch (10 mm)** until a uniform depth is formed.
- F. Point stone joints by placing pointing mortar in layers not more than **3/8 inch (10 mm)**. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.
- G. Tool joints with a round jointer having a diameter **1/8 inch (3 mm)** larger than width of joint, when pointing mortar is thumbprint hard.
- H. Rake out mortar from sealant-pointed joints to depths of not less than **1/2 inch (12 mm)** nor less than that required for sealant and sealant backing. Rake joints to uniform depths with square bottoms and clean sides.
- I. Set the following dimension stone cladding with unfilled head joints for installing joint sealants:
  - 1. Cornices.
  - 2. Copings.
  - 3. Belt and other projecting courses.

### 3.5 JOINT-SEALANT INSTALLATION

- A. Prepare joints and apply sealants of type and at locations indicated to comply with applicable requirements in Division 07 Section "Joint Sealants."

### 3.6 INSTALLATION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces of walls, do not exceed **1/4 inch in 10 feet (6 mm in 3 m)**, or more. For external corners, corners and jambs within **20 feet (6 m)** of an entrance, expansion joints, and other conspicuous lines, do not exceed **1/8 inch in 10 feet (3 mm in 3 m)**, or more.
- B. Variation from Level: For lintels, sills, water tables, parapets, horizontal bands, horizontal grooves, and other conspicuous lines, do not exceed **1/8 inch in 10 feet (3 mm in 3 m)**, maximum.
- C. Variation of Linear Building Line: For positions shown in plan and related portions of walls and partitions, do not exceed **1/4 inch in 20 feet (6 mm in 6 m)** or more.
- D. Variation in Cross-Sectional Dimensions: For thickness of walls from dimensions indicated, do not exceed plus or minus **1/4 inch (6 mm)**.
- E. Variation in Joint Width: Do not vary from average joint width more than plus or minus **1/8 inch (3 mm)** or a quarter of nominal joint width, whichever is less. For joints within **60 inches (1500 mm)** of each other, do not vary more than **1/8 inch (3 mm)** or a quarter of nominal joint width, whichever is less from one to the other.
- F. Variation in Plane between Adjacent Stone Units (Lipping): Do not exceed **1/16-inch (1.5-mm)** difference between planes of adjacent units.

### 3.7 FIELD QUALITY CONTROL

- A. Field Quality-Control Water Leakage Test: Test dimension stone cladding system according to AAMA 501.2.
  - 1. Notify Architect seven days in advance of dates and times when testing will be done.
  - 2. Perform test at three locations as directed by Architect.
  - 3. Report test results in writing to Architect and Owner.

3.8 ADJUSTING AND CLEANING

- A. Remove and replace broken, chipped, stained, or otherwise damaged stone, defective joints, and dimension stone cladding that does not match approved samples and mockups. Damaged stone may be repaired if Architect approves methods and results.
- B. Replace in a manner that results in dimension stone cladding's matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean dimension stone cladding as work progresses. Remove mortar fins and smears before tooling joints. Remove excess sealant and smears as sealant is installed.
- D. Final Cleaning: Clean dimension stone cladding no fewer than six days after completion of pointing and sealing, using clean water and stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning agents containing caustic compounds or abrasives, or other materials or methods that could damage stone.

END OF SECTION 044200

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## SECTION 044300 - STONE MASONRY

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes the following applications of stone masonry:
  - 1. Anchored to concrete backup.
  - 2. Anchored to unit masonry backup.
  - 3. Anchored to cold-formed metal framing and sheathing.
- B. Related Sections:
  - 1. Division 03 Section "Cast-in-Place Concrete" for dovetail slots in concrete for anchoring stone.
  - 2. Division 04 Section "Unit Masonry" for cavity-wall insulation concealed flashing, horizontal joint reinforcement and veneer anchors.
  - 3. Division 07 Section "Thermal Insulation" for cavity-wall insulation installed between stone masonry and backup material.
  - 4. Division 07 Section "Sheet Metal Flashing and Trim" for exposed sheet metal flashing.
- C. Products installed, but not furnished, in this Section include:
  - 1. Steel lintels and shelf angles for stone masonry specified in Division 05 Section "Metal Fabrications."

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
  - 1. For stone varieties proposed for use on Project, include test data indicating compliance with physical properties specified or required by referenced ASTM standards.
- B. Samples for Initial Selection: For colored mortar and other items involving color selection.
- C. Samples for Verification:
  - 1. For each stone type indicated. Include at least four samples in each set for each type of stone, exhibiting extremes of the full range of color and other visual characteristics expected in completed Work. Samples will establish the standard by which stone provided will be judged.
  - 2. For each color of mortar required. Label Samples to indicate types and amounts of pigments used.
- D. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, sources of supply, and other information as required to identify materials used. Include mix proportions for mortar and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockups constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

E. Qualification Data: For qualified Installer.

#### 1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs experienced stonemasons and stone fitters.

B. Source Limitations for Stone: Obtain each variety of stone, regardless of finish, from one quarry, whether specified in this Section or in another Section of the Specifications, with resources to provide materials of consistent quality in appearance and physical properties.

C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

D. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of typical wall area as shown on Drawings.
2. Build mockups for each type of stone masonry in sizes approximately 48 inches long by 72 inches high by full thickness, including face and backup wythes and accessories.
  - a. Include stone coping at top of mockup.
  - b. Include a sealant-filled joint at least 16 inches (400 mm) long in mockup.
  - c. Include through-wall flashing installed for a 24-inch (600-mm) length in corner of mockup approximately 16 inches (400 mm) down from top of mockup, with a 12-inch (300-mm) length of flashing left exposed to view (omit stone masonry above half of flashing).
  - d. Include metal studs, sheathing, veneer anchors, flashing, and weep holes in exterior masonry-veneer wall mockup.
3. Protect accepted mockups from the elements with weather-resistant membrane.
4. Approval of mockups is for color, texture, and blending of stone; relationship of mortar and sealant colors to stone colors; tooling of joints; and aesthetic qualities of workmanship.
  - a. Approval of mockups is also for other material and construction qualities Architect specifically approves in writing.
  - b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
5. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Preinstallation Conference: Conduct conference at Project site.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

A. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

B. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

- C. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.
- D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

## 1.6 PROJECT CONDITIONS

- A. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed stone masonry when construction is not in progress.
  - 1. Extend cover a minimum of 24 inches (600 mm) down both sides and hold cover securely in place.
- B. Stain Prevention: Immediately remove mortar and soil to prevent them from staining the face of stone masonry.
  - 1. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on the ground and over the wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
  - 4. Turn scaffold boards near the wall on edge at end of each day to prevent rain from splashing mortar and dirt on completed stone masonry.
- C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace stone masonry damaged by frost or freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
  - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

## 1.7 COORDINATION

- A. Advise installers of other work about specific requirements for placement of reinforcement, veneer anchors, flashing, and similar items to be built into stone masonry.

## PART 2 - PRODUCTS

### 2.1 STONE

- A. Varieties and Sources: Subject to compliance with requirements, provide stone of varieties and from sources complying with Division 04 Section "Exterior Stone Cladding."

### 2.2 LIMESTONE

- A. Limestone: Comply with ASTM C 568.

1. Products: Subject to compliance with requirements, stone varieties that may be incorporated into the Work include, but are not limited to, the following:
    - a. Indiana, Texas, Kansas, or Utah Oolitic limestone.
  2. Classification: II Medium-Density.
  3. Description: Oolitic limestone.
  4. Suppliers:
    - a. State Stone, 4640 S. 300 W., Murray, Utah (801) 262-9323
    - b. Bound Stone Products, Matt Bound (435) 851-0206
- B. Indiana Oolitic Limestone Grade and Color: Standard, buff, according to grade and color classification established by ILI.
- C. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.

### 2.3 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or III, and hydrated lime complying with ASTM C 207.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Essroc, Italcementi Group; Capitol PCL Blend or Saylor's Plus.
    - b. Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
    - c. Lafarge North America; Eaglebond.
    - d. Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.
- D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in stone masonry mortar.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Davis Colors; True Tone Mortar Colors.
    - b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
    - c. Solomon Colors; SGS Mortar Colors.
- E. Colored Cement Product: Packaged blend made from portland cement and lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.
1. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
  2. Pigments shall not exceed 10 percent of portland cement by weight.
  3. Pigments shall not exceed 5 percent of masonry cement by weight.
  4. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Colored Portland Cement-Lime Mix:
      - 1) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.

- 2) Lafarge North America; Eaglebond.
- 3) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.

F. Aggregate: ASTM C 144 and as follows:

1. For pointing mortar, use aggregate graded with 100 percent passing **No. 16 (1.18-mm)** sieve.
2. White Aggregates: Natural white sand or ground white stone.
3. Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.
  - a. Match Architect's sample.

G. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement mortar bed, and not containing a retarder.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Boiardi Products Corporation.
  - b. Bonsal.
  - c. Bostik Findley Inc.
  - d. C-Cure.
  - e. Custom Building Products.
  - f. DAP Inc.
  - g. Laticrete International, Inc.
  - h. MAPEI Corp.
  - i. Summitville Tiles, Inc.
  - j. TEC Specialty Construction Brands; H. B. Fuller Company.

H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Euclid Chemical Company (The); Accelguard 80.
  - b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Morset.
  - c. Sonneborn, Div. of Degussa Building Systems; Trimix-NCA.

I. Water: Potable.

## 2.4 VENEER ANCHORS

A. Materials:

1. Hot-Dip Galvanized-Steel Wire: ASTM A 82, with ASTM A 153/A 153M, Class B-2.
2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304.
3. Hot-Dip Galvanized-Steel Sheet: ASTM A 1008/A 1008M, cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M, Class B-2.
4. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.

B. Size: Sufficient to extend at least halfway, but not less than **1-1/2 inches (38 mm)**, through stone masonry and with at least **5/8-inch (16-mm)** cover on outside face.

C. Wire Veneer Anchors: Wire ties formed from W1.7 or **0.148-inch- (3.8-mm-)** diameter, hot-dip galvanized-steel wire.

1. Ties are bent in the form of loops with legs not less than **15 inches (381 mm)** in length and with last **2 inches (50 mm)** bent at 90 degrees.
  2. Ties are bent in the form of rectangular loops with ends bent downward for inserting into eyes projecting from masonry joint reinforcement specified in Division 04 Section "Unit Masonry."
  3. Ties are bent in the form of triangular loops designed to be attached to masonry joint reinforcement specified in Division 04 Section "Unit Masonry" with vertical wires passing through ties and through eyes projecting from masonry joint reinforcement.
- D. Corrugated-Metal Veneer Anchors: Not less than **0.030-inch- (0.76-mm-)** thick by **7/8-inch- (22-mm-)** wide hot-dip galvanized-steel sheet with corrugations having a wavelength of **0.3 to 0.5 inch (7.6 to 13 mm)** and an amplitude of **0.06 to 0.10 inch (1.5 to 2.5 mm)**.
- E. Adjustable, Screw-Attached Veneer Anchors: Units consisting of a wire tie section and a metal anchor section that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Dur-O-Wal, a Dayton Superior Company; D/A 213 or D/A 210 with D/A 700-708.
    - b. Heckmann Building Products Inc.; 315-D with 316 or Pos-I-Tie.
    - c. Hohmann & Barnard, Inc.; DW-10, DW-10HS or DW-10-X.
    - d. Wire-Bond; 1004, Type III or RJ-711.
  2. Structural Performance Characteristics: Capable of withstanding a **100-lbf (445-N)** load in both tension and compression without deforming or developing play in excess of **0.05 inch (1.3 mm)**.
  3. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, **2-3/4 inches (70 mm)** wide by **3 inches (75 mm)** high; with projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit veneer anchor section.
  4. Anchor Section: Sheet metal plate, **1-1/4 inches (32 mm)** wide by **6 inches (150 mm)** long, with screw holes top and bottom and with raised rib-stiffened strap, **5/8 inch (16 mm)** wide by **5-1/2 inches (140 mm)** long, stamped into center to provide a slot between strap and plate for inserting wire tie.
  5. Anchor Section: Gasketed sheet metal plate, **1-1/4 inches (32 mm)** wide by **6 inches (150 mm)** long, with screw holes top and bottom; top and bottom ends bent to form pronged legs of length to match thickness of insulation or sheathing; and raised rib-stiffened strap, **5/8 inch (16 mm)** wide by **6 inches (150 mm)** long, stamped into center to provide a slot between strap and plate for inserting wire tie. Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and extend beyond pronged legs.
  6. Anchor Section: Zinc-alloy barrel section with flanged head with eye and corrosion-resistant, self-drilling screw. Eye designed to receive wire tie and to serve as head for drilling fastener into framing. Barrel length to suit sheathing thickness, allowing screw to seat directly against framing with flanged head covering hole in sheathing.
  7. Fabricate sheet metal anchor sections and other sheet metal parts from **0.097-inch- (2.5-mm-)** thick, steel sheet, galvanized after fabrication.
  8. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from **0.25-inch- (6.4-mm-)** diameter, hot-dip galvanized-steel wire.
- F. Seismic Veneer Anchors: Units consisting of a metal anchor section and a connector section designed to engage a continuous wire embedded in stone masonry mortar joint, complying with the following requirements:
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Dur-O-Wal, a Dayton Superior Company; D/A 213S.
    - b. Hohmann & Barnard, Inc.; DW-10-X-Seismiclip.
    - c. Wire-Bond; RJ-711 with Wire-Bond Clip.
  2. Structural Performance Characteristics: Capable of withstanding a **100-lbf (445-N)** load in both tension and compression without deforming or developing play in excess of **0.05 inch (1.3 mm)**.

3. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, 2-3/4 inches (70 mm) wide by 3 inches (75 mm) high; with projecting tabs having slotted holes for inserting vertical leg of connector section.
  4. Connector Section: Rib-stiffened, sheet metal bent plate with down-turned leg designed to fit in anchor section slot and with integral tabs designed to engage continuous wire. Size connector to extend at least halfway through stone masonry but with at least 5/8-inch (16-mm) cover on outside face.
  5. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, 2-3/4 inches (70 mm) wide by 3 inches (75 mm) high; with projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit anchor section. Size wire tie to extend at least 1-1/2 inches (38 mm) into stone masonry but with at least 5/8-inch (16-mm) cover on outside face.
  6. Connector Section: Sheet metal clip welded to wire tie with integral tabs designed to engage continuous wire.
  7. Anchor Section: Gasketed sheet metal plate, 1-1/4 inches (32 mm) wide by 6 inches (150 mm) long, with screw holes top and bottom; top and bottom ends bent to form pronged legs to bridge insulation or sheathing and contact studs; and raised rib-stiffened strap, 5/8 inch (16 mm) wide by 6 inches (150 mm) long, stamped into center to provide a slot between strap and plate for inserting wire tie. Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and extend beyond pronged legs.
  8. Connector Section: Triangular wire tie and rigid PVC extrusion with snap-in grooves for inserting continuous wire.
  9. Fabricate sheet metal anchor sections and other sheet metal parts from 0.097-inch- (2.5-mm-) thick, steel sheet, galvanized after fabrication.
  10. Fabricate wire connector sections from 0.25-inch- (6.4-mm-) diameter, hot-dip galvanized, carbon-steel wire.
  11. Continuous Wire: 0.188-inch- (4.8-mm-) diameter, hot-dip galvanized-steel wire.
- G. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene washer, No. 10 (4.8-mm diameter) by length required to penetrate steel stud flange with not less than 3 exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. ITW Buildex; Teks Maxiseal with Climaseal finish.
    - b. Textron Inc., Textron Fastening Systems; Elco Drill-Flex with Stalgard finish.
- H. Stainless-Steel Drill Screws for Steel Studs: Proprietary fastener consisting of carbon-steel drill point and 300 Series stainless-steel shank, complying with ASTM C 954 except manufactured with hex washer head and neoprene washer, No. 10 (4.8-mm diameter) by length required to penetrate steel stud flange with not less than three exposed threads.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Dur-O-Wal, a Dayton Superior Company; Stainless Steel SX Fastener.
    - b. ITW Buildex; Scots Long Life Teks.
- I. Polymer-Coated, Steel Drill Screws for Wood Studs: Self-drilling, bugle-head or wafer-head wood screws recommended by veneer anchor manufacturer for fastening to wood studs; not less than No. 10 (4.8-mm diameter), 1-1/2 inches (38 mm) long, and with organic polymer coating with salt-spray resistance to red rust of more than 500 hours per ASTM B 117.
- J. Polymer-Coated, Steel Tapping Screws for Concrete Masonry: Self-tapping screws with specially designed threads for tapping and wedging into masonry, with hex washer head and neoprene washer, 3/16-inch (4.8-mm) diameter by 1-1/2-inch (38-mm) length, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. ITW-Buildex; Tapcon.
- b. Powers Fasteners; Tapper.

## 2.5 STONE TRIM ANCHORS

- A. Stone Trim Anchors: Units fabricated with tabs or dowels designed to engage kerfs or holes in stone trim units and holes for fasteners or postinstalled anchor bolts for fastening to substrates or framing as indicated.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Halfen Anchoring Systems; Meadow Burke.
    - b. Heckmann Building Products Inc.
    - c. Hohmann & Barnard, Inc.
- B. Materials: Fabricate anchors from stainless steel, ASTM A 240/A 240M, Type 304. Fabricate dowels from stainless steel, ASTM A 276, Type 304.
- C. Fasteners for Stone Trim Anchors: Annealed stainless-steel bolts, nuts, and washers; **ASTM F 593 (ASTM F 738M)** for bolts and **ASTM F 594 (ASTM F 836M)** for nuts.
- D. Postinstalled Anchor Bolts for Fastening Stone Trim Anchors: Chemical anchors, torque-controlled expansion anchors or undercut anchors made from stainless-steel components complying with (ASTM F 738M and ASTM F 836M, Alloy Group A1 or A4) for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.

## 2.6 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing, where flashing is exposed or partly exposed and where indicated, complying with SMACNA's "Architectural Sheet Metal Manual and Division 07 Section "Sheet Metal Flashing and Trim" and as follows:
  1. Stainless Steel: ASTM A 240/A 240M, Type 304, **0.016 inch (0.4 mm)** thick.
  2. Fabricate continuous flashings in sections **96 inches (2400 mm)** long minimum, but not exceeding **12 feet (3.6 m)**. Provide splice plates at joints of formed, smooth metal flashing.
  3. Fabricate through-wall metal flashing embedded in masonry from stainless steel, with ribs at **3-inch (75-mm)** intervals along length of flashing to provide an integral mortar bond.
    - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) Cheney Flashing Company; Cheney Flashing (Dovetail) or Cheney 3-Way Flashing (Sawtooth).
      - 2) Keystone Flashing Company, Inc.; Keystone 3-Way Interlocking Thruwall Flashing.
  4. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
  5. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing **1/2 inch (13 mm)** out from wall, with outer edge bent down 30 degrees and hemmed.
  6. Fabricate through-wall flashing with sealant stop unless otherwise indicated. Fabricate by bending metal back on itself **3/4 inch (19 mm)** at exterior face of wall and down into joint **3/8 inch (10 mm)** to form a stop for retaining sealant backer rod.
  7. Fabricate metal drip edges and sealant stops for ribbed metal flashing from plain metal flashing of same metal as ribbed flashing and extending at least **3 inches (75 mm)** into wall with hemmed inner edge to receive ribbed flashing and form a hooked seam. Form hem on upper surface of metal so that completed seam will shed water.

8. Metal Drip Edges: Fabricate from stainless steel. Extend at least **3 inches (75 mm)** into wall and **1/2 inch (13 mm)** out from wall, with outer edge bent down 30 degrees and hemmed.
  9. Metal Flashing Terminations: Fabricate from stainless steel. Extend at least **3 inches (75 mm)** into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for **3/4 inch (19 mm)** and down into joint **3/8 inch (10 mm)** to form a stop for retaining sealant backer rod.
  10. Metal Expansion-Joint Strips: Fabricate from stainless steel to shapes indicated.
- B. Flexible Flashing: For flashing not exposed to the exterior, use one of the following unless otherwise indicated:
1. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy as follows:
    - a. Monolithic Sheet: Elastomeric thermoplastic flashing, **0.040 inch (1.0 mm)** thick.
    - b. Self-Adhesive Sheet: Elastomeric thermoplastic flashing, **0.025 inch (0.6 mm)** thick, with a **0.015-inch- (0.4-mm-)** thick coating of rubberized-asphalt adhesive.
    - c. Self-Adhesive Sheet with Drip Edge: Elastomeric thermoplastic flashing, **0.025 inch (0.6 mm)** thick, with a **0.015-inch- (0.4-mm-)** thick coating of rubberized-asphalt adhesive. Where flashing extends to face of masonry, rubberized-asphalt coating is held back approximately **1-1/2 inches (38 mm)** from edge.
      - 1) Color: Tan/buff.
    - d. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.
    - e. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) Hyload, Inc.; Hyload Cloaked Flashing System.
  2. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637, **0.040 inch (1.0 mm)** thick.
    - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) Carlisle Coatings & Waterproofing; Pre-Kleened EPDM Thru-Wall Flashing.
      - 2) Firestone Building Products; FlashGuard.
      - 3) Heckmann Building Products Inc.; No. 81 EPDM Thru-Wall Flashing.
- C. Solder and Sealants for Sheet Metal Flashings: As specified in Division 07 Section "Sheet Metal Flashing and Trim."
1. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
  2. Solder for Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
  3. Elastomeric Sealant: ASTM C 920, chemically curing **[urethane] [polysulfide] [silicone]** sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- D. Adhesives, Primers, and Seam Tapes for Flexible Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.
- 2.7 MISCELLANEOUS MASONRY ACCESSORIES
- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

- B. Asphalt Dampproofing: asphalt emulsion complying with ASTM D 1227, Type III or IV.
- C. Weep Hole/Vent Products: Use the following unless otherwise indicated:
  - 1. Vinyl Weep Holes/Vents: One-piece, offset, T-shaped units made from flexible, injection-molded PVC, designed to fit into head joint and consisting of louvered vertical leg, flexible wings to seal against ends of stone units, and top flap to keep mortar out of head joint; in color approved by Architect to match that of mortar.
    - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) Hohmann & Barnard, Inc.; #343 Louvered Weep Hole.
      - 2) Williams Products, Inc.; Williams-Goodco Brick Vent.
      - 3) Wire-Bond; Louvered Weepholes.
- D. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
  - 1. Provide one of the following configurations:
    - a. Sheets or strips not less than **3/4 inch (19 mm)** thick and installed to full height of cavity with additional strips **4 inches (100 mm)** high at weep holes and thick enough to fill entire depth of cavity and prevent weep holes from being clogged with mortar.
  - 2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Advanced Building Products Inc.; Mortar Break.
    - b. CavClear/Archovations, Inc.; CavClear Masonry Mat.
    - c. Dur-O-Wal, a Dayton Superior Company; Polytite MortarStop.
    - d. Mortar Net USA, Ltd.; Mortar Net.
- E. Expanded Metal Lath: **3.4 lb/sq. yd. (1.8 kg/sq. m)**, self-furring, diamond-mesh lath complying with ASTM C 847. Fabricate from structural-quality, zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, **G60 (Z180)**.
- F. Woven-Wire Lath: ASTM C 1032, fabricated into **1-1/2-inch (38-mm)** hexagonal-shaped mesh with minimum **0.0510-inch- (1.3-mm-)** diameter, galvanized-steel wire.
- G. Welded-Wire Lath: ASTM C 933, fabricated into **2-by-2-inch (50-by-50-mm)** mesh with minimum **0.0625-inch- (1.6-mm-)** diameter, galvanized-steel wire.
- H. Lath Attachment Devices: Material and type required by ASTM C 1063 for installations indicated.

## 2.8 CAVITY-WALL INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type X, closed-cell product extruded with an integral skin.
- B. Extruded-Polystyrene Board Insulation with Increased R-Value: ASTM C 578, Type IV, but with an aged thermal resistance (R-value) for **2-inch (25-mm)** thickness of **5.6 deg F x h x sq. ft./Btu at 75 deg F (1.0 K x sq. m/W at 24 deg C)** at 5 years; closed-cell product with a carbon-black filler and extruded with an integral skin.
- C. Molded-Polystyrene Board Insulation: ASTM C 578, Type I.
- D. Polyisocyanurate Board Insulation: ASTM C 1289, Type I (aluminum-foil faced), Class 2 (glass-fiber reinforced).

- E. Adhesive: Type recommended by insulation board manufacturer for application indicated.

## 2.9 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar and grout stains, efflorescence, and other new construction stains from stone masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cleaner manufacturer and stone producer.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Diedrich Technologies, Inc.
    - b. Dominion Restoration Products.
    - c. EaCo Chem, Inc.
    - d. Hydrochemical Techniques, Inc.
    - e. Prosoco, Inc.

## 2.10 MORTAR MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
  - 1. Do not use calcium chloride.
  - 2. Limit cementitious materials in mortar to portland cement and lime.
  - 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
  - 4. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Stone Masonry: Comply with ASTM C 270, Proportion Specification.
  - 1. Mortar for Setting Stone: Type S.
  - 2. Mortar for Pointing Stone: Type N.
- D. Latex-Modified Portland Cement Setting Mortar: Proportion and mix portland cement, aggregate, and latex additive to comply with latex-additive manufacturer's written instructions.
- E. Cement-Paste Bond Coat: Mix either neat cement and water or cement, sand, and water to a consistency similar to that of thick cream.
  - 1. For latex-modified portland cement setting-bed mortar, substitute latex admixture for part or all of water, according to latex-additive manufacturer's written instructions.
- F. Mortar for Scratch Coat over Metal Lath: 1 part portland cement, 1/2 part lime, 5 parts loose damp sand, and enough water to produce a workable consistency.
- G. Mortar for Scratch Coat over Unit Masonry: 1 part portland cement, 1 part lime, 7 parts loose damp sand, and enough water to produce a workable consistency.

- H. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
  - 1. Pigments shall not exceed 10 percent of portland cement by weight.
  - 2. Pigments shall not exceed 5 percent of masonry cement by weight.
  - 3. Mix to match Architect's sample.
- I. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
  - 1. Mix to match Architect's sample.

## 2.11 FABRICATION

- A. Fabricate stone to comply with sizes, shapes, and tolerances recommended by applicable stone association or, if none, by stone source, for faces, edges, beds, and backs.
  - 1. For granite, comply with recommendations in NBGQA's "Specifications for Architectural Granite."
  - 2. For limestone, comply with recommendations in ILI's "Indiana Limestone Handbook."
- B. Cut stone to produce pieces of thickness, size, and shape indicated, including details on Drawings. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated.
- C. Cut and drill sinkages and holes in stone for anchors and supports.
- D. Carefully inspect stone at quarry or fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units before shipment.
  - 1. Clean sawed backs of stone to remove rust stains and iron particles.
- E. Gage backs of stones for adhered veneer if more than 81 sq. in. (522 sq. cm) in area.
- F. Thickness of Stone: Provide thickness indicated, but not less than the following:
  - 1. Thickness: 4 inches (100 mm) plus or minus 1/4 inch (6 mm). Thickness does not include projection of pitched faces.
- G. Shape stone for type of masonry (pattern) as follows:
  - 1. Sawed-bed, range ashlar with uniform course heights and uniform lengths as indicated on Drawings.
- H. Finish exposed faces and edges of stone to comply with requirements indicated for finish and to match approved samples and mockups.
  - 1. Foundation/Plinth Finish: Split face As indicated.
  - 2. Finish for Sills: Smooth.
  - 3. Finish for Lintels: Smooth.
  - 4. Finish for Copings: Smooth.
  - 5. Finish for Arches and stringer courses: Smooth.
    - a. Finish exposed ends of copings same as front and back faces.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine surfaces indicated to receive stone masonry, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine substrate to verify that dovetail slots, inserts, reinforcement, veneer anchors, flashing, and other items installed in substrates and required for or extending into stone masonry are correctly installed.
- C. Examine wall framing, sheathing, and weather-resistant sheathing paper to verify that stud locations are suitable for spacing of veneer anchors and that installation will result in a weatherproof covering.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Accurately mark stud centerlines on face of weather-resistant sheathing paper before beginning stone installation.
- B. Coat concrete and unit masonry backup with asphalt dampproofing.
- C. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before setting. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

### 3.3 SETTING OF STONE MASONRY, GENERAL

- A. Perform necessary field cutting and trimming as stone is set.
  - 1. Use power saws to cut stone that is fabricated with saw-cut surfaces. Cut lines straight and true, with edges eased slightly to prevent snipping.
  - 2. Use hammer and chisel to split stone that is fabricated with split surfaces. Make edges straight and true, matching similar surfaces that were shop or quarry fabricated.
  - 3. Pitch face at field-split edges as needed to match stones that are not field split.
- B. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication, or that is otherwise unsuitable for intended use.
- C. Arrange stones in range ashlar pattern with course heights as indicated, **[uniform]** **[random]** lengths, and uniform joint widths, with offset between vertical joints as indicated.
- D. Arrange stones in broken-range ashlar pattern with uniform course heights, random lengths, and uniform joint widths.
- E. Arrange stones in three-course, random-range ashlar pattern with random course heights, random lengths (interrupted coursed), and uniform joint widths.
- F. Arrange stones in **[coursed]** **[uncoursed]** rubble pattern with joint widths within tolerances indicated. **[ Insert small stones into spaces between larger stones as needed to produce joints as uniform in width as practical.]**
- G. Arrange stones in polygonal (mosaic) pattern with uniform joint widths.
- H. Arrange stones with color and size variations uniformly dispersed for an evenly blended appearance.

- I. Set stone to comply with requirements indicated on Drawings. Install supports, fasteners, and other attachments indicated or necessary to secure stone masonry in place. Set stone accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
- J. Maintain uniform joint widths except for variations due to different stone sizes and where minor variations are required to maintain bond alignment if any. Lay walls with joints not less than **3/8 inch (10 mm)** at narrowest points or more than **1/2 inch (13 mm)** at widest points.
- K. Provide sealant joints of widths and at locations indicated.
  - 1. Keep sealant joints free of mortar and other rigid materials.
  - 2. Sealing joints is specified in Division 07 Section "Joint Sealants."
- L. Install metal expansion strips in sealant joints at locations indicated. Build flanges of expansion strips into masonry by embedding in mortar between stone masonry and backup wythe. Lap each joint **4 inches (100 mm)** in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
- M. Install embedded flashing and weep holes at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
  - 1. At stud-framed walls, extend flashing through stone masonry, up the face of sheathing at least **16 inches (400 mm)**, and behind weather-resistant sheathing paper.
  - 2. At multiwythe masonry walls, including cavity walls, extend flashing through stone masonry, turned up a minimum of **16 inches (400 mm)**, and extend into or through inner wythe to comply with requirements in Division 04 Section "Unit Masonry."
  - 3. At concrete backing, extend flashing through stone masonry, turned up a minimum of **8 inches (200 mm)**, and insert in reglet. Reglets are specified Division 07 Section "Sheet Metal Flashing and Trim."
  - 4. At lintels and shelf angles, extend flashing full length of angles but not less than **6 inches (150 mm)** into masonry at each end.
  - 5. At sills, extend flashing not less than **4 inches (100 mm)** at ends.
  - 6. At ends of head and sill flashing turn up not less than **2 inches (50 mm)** to form end dams.
  - 7. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than **1-1/2 inches (38 mm)** or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Division 07 Section "Joint Sealants" for application indicated.
  - 8. Install metal drip edges and sealant stops with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Division 07 Section "Joint Sealants" for application indicated.
  - 9. Extend sheet metal flashing **1/2 inch (13 mm)** beyond face of masonry at exterior and turn flashing down to form a drip.
  - 10. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing **1/2 inch (13 mm)** back from outside face of wall and adhere flexible flashing to top of metal drip edge.
  - 11. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing **1/2 inch (13 mm)** back from outside face of wall and adhere flexible flashing to top of metal flashing termination.
  - 12. Cut flexible flashing flush with face of wall after masonry wall construction is completed.
- N. Coat limestone with cementitious dampproofing as follows:
  - 1. Stone at Grade: Beds, joints, and back surfaces to at least **12 inches (300 mm)** above finish-grade elevations.
  - 2. Stone Extending below Grade: Beds, joints, back surfaces, and face surfaces below grade.
  - 3. Allow cementitious dampproofing formulations to cure before setting dampproofed stone. Do not damage or remove dampproofing in the course of handling and setting stone.
- O. Place weep holes and vents in joints where moisture may accumulate, including at base of cavity walls, above shelf angles, and at flashing.
  - 1. Use round plastic tubing open head joints to form weep holes.

2. Use wicking material to form weep holes above flashing in stone sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
  3. Space weep holes **16 inches (400 mm)** o.c.
  4. Space weep holes formed from plastic tubing **16 inches (400 mm)** o.c.
  5. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.
  6. Place pea gravel in cavities as soon as practical to a height of not less than **2 inches (50 mm)** above top of flashing, to maintain drainage.
  7. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.
- P. Install vents in vertical head joints at the top of each continuous cavity at spacing indicated. Use round plastic tubing open head joints to form vents.
1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

### 3.4 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces, do not exceed **1/4 inch in 10 feet (6 mm in 3 m)**, or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed **1/4 inch in 20 feet (6 mm in 6 m)** or more.
- B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed **1/4 inch in 20 feet (6 mm in 6 m)** or more.
- C. Variation of Linear Building Line: For position shown in plan, do not exceed **1/2 inch in 20 feet (13 mm in 6 m)** or more.
- D. Measure variation from level, plumb, and position shown in plan as variation of the average plane of the face of each stone from level, plumb, or dimensioned plane.
- E. Variation in Mortar-Joint Thickness: Do not vary from joint size range indicated.
- F. Variation in Plane between Adjacent Stones: Do not exceed one-half of tolerance specified for thickness of stone.

### 3.5 INSTALLATION OF ANCHORED STONE MASONRY

- A. Anchor stone masonry to concrete with corrugated-metal veneer anchors unless otherwise indicated. Secure anchors by inserting dovetailed ends into dovetail slots in concrete.
- B. Anchor stone masonry to unit masonry with individual wire veneer anchors unless otherwise indicated. Embed anchors in unit masonry mortar joints or grouted cells for distance at least one-half of unit masonry thickness.
- C. Anchor stone masonry to unit masonry with wire anchors unless otherwise indicated. Connect anchors to masonry joint reinforcement by inserting pintles into eyes of masonry joint reinforcement projecting from unit masonry.
- D. Anchor stone masonry to unit masonry with wire anchors unless otherwise indicated. Connect anchors to masonry joint reinforcement with vertical rods inserted through anchors and through eyes of masonry joint reinforcement projecting from unit masonry.
- E. Anchor stone masonry to unit masonry with seismic veneer anchors unless otherwise indicated. Fasten anchors to unit masonry with two screws.

- F. Anchor stone masonry to stud framing with seismic veneer anchors unless otherwise indicated. Fasten anchors through sheathing to framing with two screws.
- G. Anchor stone masonry to stud framing with screw-attached veneer anchors unless otherwise indicated.
- H. Anchor stone masonry to wood stud framing with corrugated-metal veneer anchors unless otherwise indicated. Fasten anchors through sheathing to studs with corrosion-resistant roofing nails.
- I. Anchor stone masonry to wood stud framing with wire anchors unless otherwise indicated. Fasten anchors through sheathing to wood studs with corrosion-resistant roofing nails.
- J. Anchor stone masonry to metal stud framing with wire anchors unless otherwise indicated. Tie anchors to studs.
- K. Embed veneer anchors in mortar joints of stone masonry at least halfway, but not less than **1-1/2 inches (38 mm)**, through stone masonry and with at least **5/8-inch (16-mm)** cover on outside face.
  - 1. Install continuous wire reinforcement in horizontal joints and attach to seismic veneer anchors as stone is set.
- L. Space anchors to provide not less than 1 anchor per **2 sq. ft. (0.2 sq. m)** of wall area. Install additional anchors within **12 inches (300 mm)** of openings, sealant joints, and perimeter at intervals not exceeding **12 inches (300 mm)**.
- M. Space anchors not more than **16 inches (400 mm)** o.c. vertically and **24 inches (600 mm)** o.c. horizontally. Install additional anchors within **12 inches (300 mm)** of openings, sealant joints, and perimeter at intervals not exceeding **12 inches (300 mm)**.
- N. Anchor stone trim with stone trim anchors where indicated. Install anchors by fastening to substrate and inserting tabs and dowels into kerfs and holes in stone units. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with mortar.
- O. Set stone in full bed of mortar with full head joints unless otherwise indicated. Build anchors into mortar joints as stone is set.
- P. Fill space between back of stone masonry and weather-resistant sheathing paper with mortar as stone is set.
- Q. Provide **1-inch (25-mm)** cavity between stone masonry and backup construction unless otherwise indicated. Keep cavity free of mortar droppings and debris.
  - 1. Place mortar spots in cavity at veneer anchors to maintain spacing.
  - 2. Slope beds toward cavity to minimize mortar protrusions into cavity.
  - 3. Do not attempt to trowel or remove mortar fins protruding into cavity.
- R. Rake out joints for pointing with mortar to depth of not less than **1/2 inch (13 mm)** before setting mortar has hardened. Rake joints to uniform depths with square bottoms and clean sides.

### 3.6 INSTALLATION OF ADHERED STONE MASONRY VENEER

- A. Install flashing over sheathing and behind weather-resistant sheathing paper by fastening through sheathing into framing.
- B. Install lath over weather-resistant sheathing paper by fastening through sheathing into framing to comply with ASTM C 1063.
- C. Install lath over unit masonry and concrete to comply with ASTM C 1063.

- D. Install scratch coat over metal lath **3/8 inch (10 mm)** thick to comply with ASTM C 926.
- E. Coat backs of stone units and face of scratch coat with cement-paste bond coat, then butter both surfaces with setting mortar. Use sufficient setting mortar so a slight excess will be forced out the edges of stone units as they are set. Tap units into place, completely filling space between units and scratch coat.
- F. Rake out joints for pointing with mortar to depth of not less than **1/2 inch (13 mm)** before setting mortar has hardened. Rake joints to uniform depths with square bottoms and clean sides.

### 3.7 POINTING

- A. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar in layers not more than **3/8 inch (10 mm)** deep until a uniform depth is formed.
- B. Point stone joints by placing and compacting pointing mortar in layers not more than **3/8 inch (10 mm)** deep. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.
- C. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the following joint profile:
  - 1. Joint Profile: Flush, with a **3/8-inch (10-mm)** half-round raised bead in middle of joint.

### 3.8 ADJUSTING AND CLEANING

- A. Remove and replace stone masonry of the following description:
  - 1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.
  - 2. Defective joints.
  - 3. Stone masonry not matching approved samples and mockups.
  - 4. Stone masonry not complying with other requirements indicated.
- B. Replace in a manner that results in stone masonry matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:
  - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  - 2. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before cleaning stone masonry.
  - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
  - 4. Wet wall surfaces with water before applying cleaner; remove cleaner promptly by rinsing thoroughly with clear water.
  - 5. Clean stone masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20 Revised II, using job-mixed detergent solution.
  - 6. Clean stone masonry with proprietary acidic cleaner applied according to manufacturer's written instructions.
  - 7. Clean limestone masonry to comply with recommendations in ILLI's "Indiana Limestone Handbook."

3.9 EXCESS MATERIALS AND WASTE

- A. Excess Stone: Stack excess stone where directed by Owner for Owner's use.
- B. Disposal as Fill Material: Dispose of clean masonry waste, including mortar and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.
  - 1. Crush masonry waste to less than 4 inches (100 mm) in greatest dimension.
  - 2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Division 31 Section "Earth Moving."
  - 3. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other waste, and legally dispose of off Owner's property.

END OF SECTION 044300

## SECTION 066260 - FIBERGLASS COLUMN COVERS

### PART 1 GENERAL

#### 1.1 SUMMARY

- A. Products Supplied But Not Installed Under This Section
  - 1. Column covers and half-round pilasters

#### 1.2 REFERENCES

- A. [American Society For Testing And Materials](#)
  - 1. ASTM D 570-98, 'Standard Test Method for Water Absorption of Plastics'
  - 2. ASTM D 635-00, 'Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position'
  - 3. ASTM D 638-00, 'Standard Test Method for Tensile Properties of Plastics'
  - 4. ASTM D 790-00, 'Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials'
  - 5. ASTM D 2583-95, 'Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor'
  - 6. ASTM D 3841-97, 'Standard Specification for Glass-Fiber-Reinforced Polyester Plastic Panels'
  - 7. ASTM E 84-99, 'Standard Test Method for Surface Burning Characteristics of Building Materials'

#### 1.3 SYSTEM DESCRIPTION

- A. Performance Requirements
  - 1. Laminate Standards -
    - a. Meet requirements of MIL-R-21607D, Grade 1 and MIL-R-7575C, Grade B.
    - b. Finished laminate shall be as free as commercially practical from defects such as foreign inclusions, dry spots, air bubbles, blisters, pinholes and de-lamination.
    - c. Laminate shall have Barcol hardness of 45 minimum when tested in accordance with ASTM D 2583 on Gelcoated surface and on inner surface.
    - d. Cured and sealed material shall have water absorption of not greater than one-tenth of one percent when tested in accordance with ASTM D 570.
    - e. Cured material shall have minimum tensile strength as indicated below when tested in accordance with ASTM D 638.
      - 1) 3/16 Inch - 9,000 psi
      - 2) 1/4 Inch - 12,000 psi
      - 3) 3/8 Inch - 15,000 psi
    - f. Cured material shall have minimum flexural strength as indicated below when tested in accordance with ASTM D 790.
      - 1) 3/16 Inch - 16,000 psi
      - 2) 1/4 Inch - 19,000 psi
      - 3) 3/8 Inch - 22,000 psi
    - g. Flexural Modulus of Elasticity (Tangent) when tested in accordance with ASTM D 790.
      - 1) 3/16 Inch - 700,000
      - 2) 1/4 Inch - 800,000
      - 3) 3/8 Inch - 1,000,000
  - 2. Combined Laminate And Gelcoat shall meet following requirements -
    - a. Self-extinguishing Tests - (on unfilled 25 percent glass laminates)
      - 1) ASTM D 635, Non-Burning.

- 2) HLT-15 Rating (Intermittent Flame Test) - 100
- b. ASTM E 84 -
  - 1) Unfilled - 45
  - 2) 3 percent Antimony Oxide (Class II) - 15
  - 3) 5 percent Antimony Oxide (Class I) - 15
- c. Up to 3 percent by weight of thixotropic agent may be added to resin for viscosity control.

#### 1.4 SUBMITTALS

- A. Shop Drawings
  - 1. Detail as required for proper handling and erection.
  - 2. Show mechanical attachment to structure.
- B. Quality Assurance / Control - Manufacturer's erection instructions and drawings.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect components during shipment by means of crates or padding so they arrive at project undamaged.
- B. Unload and inspect each element of fiberglass for imperfections or for damage incurred during shipping and transit procedures.
- C. Store fiberglass in covered area out of weather, direct sun, and other elements.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURED UNITS

- A. Column Covers, Half-Round Pilasters, Caps, And Bases
  - 1. Tapered Tuscan plain shaft design with 3/16 inch wall thickness minimum, flared to 1/4 inch minimum at edges.
  - 2. Approved Manufacturers -
    - a. Composite Coatings, Woods Cross, UT (801) 298-4787
    - b. Decoform, Etobicoke, ON (416) 745-4970 [www.decoform.com](http://www.decoform.com)
    - c. DEI Systems Inc, Salt Lake City, UT (800) 532-7592 or (801) 977-0095 [www.deisystemsinc.com](http://www.deisystemsinc.com)
    - d. Edon Corp, Horsham, PA (800) 523-2539 or (215) 672-8050 [www.edon.com](http://www.edon.com)
    - e. Fibertech Corporation, Pendleton, SC (803) 646-9990 [www.fibertech-corp.com](http://www.fibertech-corp.com)
    - f. Stromberg Architectural Products, Greenville, TX (903) 454-8682 [www.strombergarchitectural.com](http://www.strombergarchitectural.com)
    - g. Unlimited Design, Lehi, UT (801) 768-2124 [www.unlimiteddesign.com](http://www.unlimiteddesign.com)
    - h. WCI Fabrications, North Salt Lake, UT (801) 299-9000 [www.wcillc.com](http://www.wcillc.com)

#### 2.2 FABRICATION

- A. Fiberglass reinforced plastic components shall be manufactured by hand-lay-up method (no chopper gun allowed) using high quality resin, reinforced with matt, cloth, and woven roving glass fibers.
- B. Seal inside of fiberglass on backside with resin or gel coat material 10 to 15 mils thick.
- C. Manufacture column covers, half-round pilasters, caps, and bases of following materials -
  - 1. Resins -
    - a. Base resin for laminate shall be brominated or chlorinated polyester formulated by resin manufacturer and shall not be modified by Fabricator except as specified. Physical characteristics of laminate resin -
      - 1) Viscosity, Gardner-Holt at 77 deg F - 4.0 + 0.1 stokes

- 2) Viscosity, Brookfield 77 deg F - 6 poises
  - 3) Specific Gravity at 77 deg F - 1.30
  - 4) Pounds / Gallon (approx) - 10.8
  - 5) Acid Number, base resin - Less than 30
- b. Base resin for gelcoat shall be one-to-one isophthalic polyester resin formulated by resin manufacturer and shall not be modified by Fabricator except as specified. Gelcoat resin shall provide optimum weathering properties and shall meet requirements of MIL-R-21607D, Grade 1.
2. Laminate -
- a. Laminate shall consist of gel-coated surface, and successive layers of mat and woven cloth and roving to build laminate thickness of at least 3/16 inch. Minimum thickness of laminate at point of connection shall be 1/4 inch.
  - b. Where separate layers such as mat are used, lap layers 4 inches minimum. Stagger laps as much as possible.
  - c. Non-mold surface shall be smooth with no glass exposed.
  - d. Connecting flange shall be integral part of complete laminate and not secondarily bonded.
  - e. Laminate shall consist of outer weather resistant surface and interior layer.
    - 1) Outer surface (Gel-Coat) shall be free of cracks and crazing with smooth finish.
    - 2) Provide between 0.010 and 0.020 inch of reinforced resin rich surface. This surface shall be backed with glass surfacing mat.
3. Gel-Coat -
- a. Gel-Coat shall be 18 to 20 mils.
  - b. Base resin used in manufacture of gel-coat shall meet or exceed MIL-R-21607B Grade A.
  - c. Finish gel-coat shall be light stabilized (1.2 percent Tinuvin 'P' or equal based on weight of resin) for optimum ultra-violet resistance.
4. Reinforcement -
- a. Chopper strand mat (no chopper gun allowed) shall be Type E glass, 2 oz per sq ft with silane finish and styrene soluble binder.
  - b. Woven roving (18 oz 60 end maximum) shall be Type E glass with R methacrylate chromic chloride or silane type finish.
  - c. Do not use successive layers of roving-on-roving. First layer against gel-coat shall not be roving.
  - d. Minimum glass content shall be 25 percent.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify substrates and structural framing are ready to receive work and that dimensions are as shown on shop drawings.

END OF SECTION

## **SECTION 071000 VEGETATED ROOFING SYSTEMS**

### **PART 1: GENERAL**

#### **1.1. SCOPE**

Provide equipment, materials, tools, and labor to install vegetated roofing modules. Modules to include growth media and plants. This work shall also include edge treatments, custom shaping of modules, and installing paver stones or ballast, slip sheet/root barrier and irrigation system, if specified.

#### **1.2 SUBMITTALS**

- A. Product data for vegetated roofing systems.
- B. Planting mix design indicating species.
- C. Shop Drawings: Indicating layout of modules, pavers, irrigation, and square footage.
- D. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- E. Maintenance instructions for inclusion into owner's manuals.

#### **1.3 QUALITY ASSURANCE**

- A. No deviation should be made from this specification. Installer assumes liability for any deviations from specification.
- B. Only manufacturer's certified installer personnel shall complete all work.
- C. Prior to installing vegetated roofing modules, the following procedures are to be conducted:
  - 1. The building Owner, Architect, or Engineer shall verify that the roof is properly designed and constructed to adequately support the load of the vegetated roofing module system.
  - 2. The roof is to be flood tested for water tightness for 24 hours. Water testing shall be witnessed and confirmed in writing by Owner's Representative and/or Design Professional, Waterproofing Contractor, Membrane Manufacturer, and Installation Contractor.
  - 3. Slipsheet/root barrier to be properly installed, seams overlapped and bonded, in accord with architect's and manufacturer's specifications.
  - 4. The roof is to be inspected and determined ready to accept the vegetated roofing modules by a Technical Representative of the Installer.
- D. Once the vegetated roofing installation is completed, an inspection is to be conducted by a Technical Representative of the installer to verify that the vegetated roofing modules have been installed tight against each other, in straight rows, corners aligned, properly oriented, and tight against the edging.

#### **1.4 PRE-INSTALLATION MEETING**

- A. Convene one week before starting work of this section. Review manufacturers standardized procedures with supervisory staff.

#### **1.5 DELIVERY, STORAGE, HANDLING, PROTECTION**

- A. Vegetated roof modules are to be delivered in good condition free from shipping damage.
- B. Vegetated roof modules are to be kept out of the sun if plastic wrapped to prevent overheating.
- C. Modules are to be installed on the roof top within 4 hours of delivery.
- D. On the job site, Modules are to be handled to prevent damage to the modules themselves and all roofing components.
- E. Vegetated roof modules are to be conveyed to roof surface with equipment designed to carry the collective load of the roof modules and transport vehicle. Account for decreasing load limits when boom (of crane or fork lift) is extended. Use crane stabilizers and take all necessary precautions to protect building and personnel.
- F. Never exceed the load capacity of the roof deck when placing roof modules on the roof.
- G. When suspending roof modules and conveyance vehicle above deck, take precautions to stabilize and prevent twisting of conveyance vehicle. Four tires or two four inch thick sheets of styrofoam is recommended.
- H. During installation, protect the roof deck and membranes with appropriate material such as plywood sheeting. Never scrape or puncture slip sheet or membranes. Keep roof surfaces free of soil, grit, or debris at all times with broom. Never set roof modules on top of soil, dirt or grit.
- I. Transport conveyors to be run parallel to the line of installation.
- J. Transport carts to have pneumatic tires, to be wheeled about only upon protective plywood sheeting, and to be loaded so as not to exceed weight capacity of roof deck.

## **PART 2: PRODUCTS**

### **2.1 VEGETATED ROOFING MANUFACTURER – BASIS OF DESIGN**

- A. Provide vegetated roofing systems from the following manufacturer, or equal as approved by Landscape Architect and Architect.
  - 1. LiveRoof, LLC  
Subsidiary of Hortech, Inc.  
P.O. Box 533  
Spring Lake, MI 49456  
(800) 875-1392  
Fax: (616) 842-1392
- B. 100 mil. thick (sidewall) recycled polypropylene and colored black or gray. 1 foot x 2 feet outside diameter, 3 inches tall. The LiveRoof® Soil Elevator™, the insert collar that allows for growing soil above the container edge, is approximately 3½” tall for the Standard System, and composed of recycled polyethylene or suitable biodegradable material. Each module is to be filled to the top of the Soil Elevator™. Soil height from container bottom is approximately 4¼ inches, although normal settling is to be expected and will reduce this height somewhat.
- C. Saturated weight with mature vegetation: approximately 27-29 lb. per square ft.
- D. Module clearance above roof deck: ½ inch.
- E. When prevegetated at a Nursery, the Nursery is to execute the following:
  - 1. LiveRoof® Soil Elevator™, or approved equal, is to be properly inserted into fasteners inside vegetated roof module.
  - 2. Vegetated roof module is to be filled with LiveRoof®, or approved equal, soil, and appropriately settled either by mechanical vibration or flooding with water. Any settled soil

is to be replaced so that LiveRoof® soil extends to top of Soil Elevator™ at time of planting.

- F. Vegetated roof module is to be filled with LiveRoof®, or approved equal, plants, selected by purchaser. Plants are to be grown to maturity (approx. 95%+ soil coverage).
- G. System/manufacturer substitutions as approved by Architect prior to bid.

## 2.2 GROWING MEDIUM

Growing medium is an engineered blend of inorganic and organic components based upon German FLL granulometric guidelines modified so as to contain ecologically sustainable levels of organic content.

## 2.3 PLANTS

Manufacturer recommended plant mixes consisting of highly drought resistant ground covers.

## 2.4 ACCESSORIES

### A. Pavers/Ballast

- 1. To be of compatible size, design and appropriate weight. co-engineered pavers recommended.

### B. Edging: L-shaped extruded aluminum RoofEdge®, or approved equal, with perforations for drainage. For LiveRoof Standard, RoofEdge® is 4 1/2" x 3" with a minimum gauge of 210 mil.

- 2. Edging required between modules and stone ballast or pavers. System, however, requires no edging.
- 3. If edging is attached to LiveRoof, or approved equal, modules, use TEKS 10-24 x 1" wafer head self-tapping screws in gray spex finish.

### B. Irrigation System

- 1. System to be used only to keep vegetated roof modules in optimal condition during prolonged periods of heat and drought and to optimize the evaporative cooling effect of vegetated roof modules during such weather events.
- 2. LiveRoof® recommends either a standard SCH 40 PVC subterranean, or surface applied SCH 40 PVC GreenPipe® (Polyvinyl Chloride Plastic) pipe for irrigation lines, with SCH 80 solvent weld PVC fittings. MP Rotator or equivalent irrigation head recommended.
- 3. Consult a qualified irrigation specialist to determine appropriate design configuration of irrigation, including pipe diameter, layout, head style and spacing.
  - a. Function: fully automatic or manual.
  - b. Controls:
    - 1. Automatic rain sensor optional.
    - 2. Irrigation controller shall be outdoor-type.
    - 3. All sprinklers will have matched precipitation on the same zone.
  - c. Piping:
    - 1. Surface applied irrigation pipe and fittings must be UV resistant, preferably colored green to blend in with the plants. LiveRoof® recommends GreenPipe™ for surface applications. Brace irrigation lines as needed using T-fittings.
    - 2. Subterranean irrigation lines should be laid between modules or within Permaloc® rooftop conduit. Modules should be spaced to accommodate

fittings and irrigation head. Drainage board with a minimum flow rate of 14 gpm/sf should be cut into strips and underlay irrigation pipe so that drainage is not impeded by pipe. Use a chalk line to ensure straight rows. Lay filter fabric over pipe assembly and cut to height of modules. Cut holes in filter fabric as needed to fit over irrigation heads. Fill with LiveRoof® Engineered soil, or approved equal, then remove soil elevators. For subterranean irrigation against a parapet or building wall, place irrigation lines between modules and parapet or wall. Lay filter fabric over pipe assembly and cut to height of modules. Cut holes in filter fabric as needed to fit over irrigation heads. Fill with LiveRoof®, or approved equal, engineered growing medium or stone ballast. Remove soil elevators unless advised that they are biodegradable.

d. Valves:

1. A master valve shall be installed on the mainline after the backflow device.
2. All valves to be covered by a 6" valve box.
3. All wire connections to be waterproof, UL approved.
4. To be a manual drain type. Install automatic freeze protection drain valves on all main and lateral piping.

4. Irrigation System Maintenance

1. System to be blown out with compressed air no greater than 60 psi annually in fall prior to reaching freezing temperatures.

### **PART 3: EXECUTION**

#### **3.1 LIVEROOF® INSTALLATION MUST BE CONDUCTED BY LIVEROOF® CERTIFIED INSTALLER**

#### **3.2 PREPARATION OF ROOF SURFACE**

A. Slip sheet/root barrier, specified by architect and approved by manufacturer, of 40-60 mil. thickness with overlapped and effectively bonded seams to ward against root penetration and to keep waterproofing layer safe and clean from soil during installation. Slip sheet/root barrier typified as follows:

1. Welded Seam Types (40 mil or greater thickness)

- a. TPO, with seams heat welded
- b. PVC, with seams heat welded
- c. Polypropylene, with seams heat welded
- d. HDPE, with seams heat welded

2. Glued Seam Types (40 mil or greater thickness)

-EPDM, with seams overlapped a minimum of 3 inches and glued with roll out adhesive or double sided tape adhesive of the type that is impervious to and not affected by moisture, and recommended by the manufacturer.

-Low profile drain board such as Stevens (appx. 17 mil. thickness), with edges overlapped 3 inches

and glued with manufacturer approved adhesive.

3. Confirm compatibility of slip sheet and waterproofing membrane with manufacturer.
4. Never use duct tape or any other adhesive not recommended by the manufacturer.
5. Never use moisture holding fabric, such as needle punched polyethylene or felt, under the vegetated roof module system. Such materials:

-Are impossible to sweep during installation.

-Stay wet and encourage root growth and root penetration, and could lead to impeded drainage; especially detrimental if a woody plant were to become established; such plants have woody root systems and potentially could cause roof leaks.

- B. Experienced Contractor to install slip sheet/root barrier in accordance with manufacturer's recommendations.
- C. All surfaces to be smooth, free of debris, soil, and grit prior to placing modules. All materials to be tested water tight and free draining prior to module placement.
- D. All surfaces to be maintained clean and free of debris, soil, and grit during installation process via use of broom. Never walk upon such materials as they may damage membranes.

### **3.3 INSTALLATION SEASON**

Module Installation to be conducted when plants are:

- A. Properly adapted and acclimatized to local weather conditions.
- B. When weather is above 35° F and there is no ice on the roof and vegetated roof module soil is unfrozen.

### **3.4 DELIVERY, STORAGE, HANDLING, PROTECTION**

Before working on roof, all Installers and Laborers to be:

- A. Vegetated roof modules are to be delivered in good condition free from shipping damage.
- B. Vegetated roof modules are to be installed on the roof top within 4 hours of delivery.
- C. Keep vegetated roof modules out of sun on job site if plastic wrapped to avoid overheating.
- D. On the job site, vegetated roof modules are to be handled to prevent damage to the modules themselves and all roofing components.
- E. Vegetated roof modules are to be conveyed to roof surface with equipment that is designed to carry the collective load of the vegetated roof modules and transport vehicle. Account for decreasing load limits when boom (of crane or fork lift) is extended. Use crane stabilizers and take all necessary precautions to protect building and personnel.
- F. Never exceed the load capacity of the roof deck when placing vegetated roof modules on the roof.
- G. When suspending vegetated roof modules and conveyance vehicle above deck, take precautions to stabilize vehicle and prevent twisting of conveyance vehicle. 4 to 8 tires layed on the deck are recommended.
- H. Surround area below conveyance vehicle and/or crane with caution/stay clear tape to prevent potential injury.

- I. During installation, protect the roof deck and membranes with appropriate material such as plywood sheeting. Never scrape or puncture slip sheet or membranes. Keep roof surfaces free of soil, grit, or debris at all times with broom not blower. Never set vegetated roof modules on top of soil, dirt or grit.
- J. Transport carts to have pneumatic tires, to be wheeled about only upon protective plywood sheeting, and to be loaded so as not to exceed weight capacity of roof deck.

### **3.5 SAFEGUARDING SYSTEM INTEGRITY**

**Before working on roof, all Installers and Laborers to be:**

- A. Properly instructed in safety procedures and provided manufacturer Guide to Standardized Installation Procedures.
- B. Instructed to keep all work surfaces clean and debris free.
- C. To report immediately any damage to membranes, protective sheeting, or drain elements to supervisor, and to make appropriate repairs before proceeding.
- D. Instructed in proper methods of vegetated roof module installation by certified representative of installation company.

### **3.6 LAYING (PLACING) MODULES**

- A. Vegetated roof module installation to follow behind installation of slip sheet/root barrier, irrigation system, pavers, ballast, and edging.
- B. Vegetated roof installation to be conducted in strict accordance with vegetated roof module installation guidelines. Rows to be straight, modules to be tight against each other with edges overlapping and arranged in proper directional orientation. LiveRoof® Soil Elevators™ removed only when individual modules are completely surrounded by L-shaped edging RoofStone edging, or other vegetated roof modules, so as to prevent soil spillage. NOTE: If biodegradable Soil Elevator™, or approved equal, is used, then Soil Elevator™ is left in place.
- C. Vegetated roof module installation to be conducted in accordance with green roof design.
- D. Vegetated roof modules to be placed directly on top of appropriate slip sheet/root barrier.
- E. It is recommended that any custom cutting/fitting be oriented on the high side (top), or sides of the roof. It is recommended that the cut side of the module be set tight against the edging or toward the side of an intact module so as to prevent soil spillage. If custom cutting must be done on the low, draining, side of the roof, it is imperative that no filter cloth be inserted as it could impede drainage. It is best to orient the cut side against another module, facing upstream.
- F. After installing modules, they should be immediately watered so as to thoroughly moisten the media from top to bottom. Water shall be of suitable quality for plant growth and irrigation system or hoses and sprinklers may be used for such purpose. Note: it takes approximately 1 inch of water, or 1 1/4 gallons per module to moisten each module thoroughly.

### **3.7 MAINTENANCE**

- A. Documentation

Record all green roof maintenance events. Include name of person, date and activity.

- 1. If fertilizer, record type and amount applied per 1000sf

2. If soil test, record lab
  3. If irrigation, record duration and quantity
- B. Annual Maintenance

1. Soil Testing and Fertilization.

During April 1 to 15 of each year, administer an annual soil test for PH and fertility levels.

- a. Maintain pH in the range of 6.5 to 8.0. In the event that pH is outside of the 6.5 to 8.0 range, consult LiveRoof, LLC for the appropriate amendment.
- b. Maintain fertility in the normal range using a typical field soil fertility test as provided by A&L labs. When indicated, apply a single springtime application of Nutricote 14 14 14, Type 180 (180 day release period), at 20lbs per 1000sf. Follow the Nutricote labeled directions for application rate, which take priority over any recommendations listed here. Runoff potential does exist and should be evaluated by the applicator in accord with the site specifics; the greater the runoff sensitivity, the lower the application rate. All applications of fertilizer are the sole responsibility of the applicator.

C. Irrigation

1. Watering

Even in the northern temperate zone of North America, successive watering may sometimes be needed to keep vegetated roof modules alive. Protracted hot dry weather can result in plant thinning or death. In warmer climates, depending upon rainfall and exposure, regular irrigation will probably be required. Regardless of geography, LiveRoof® recommends the installation of an irrigation system that is appropriate to the scale of the project and able to allow for rapid and efficient irrigation when needed as a “temporary” management tool under the following conditions:

Prolonged hot dry weather, in the northern temperate zone, is generally defined as periods of 75 degree weather, with less than 1” of rainfall persisting for 4 weeks or longer, approximately 2 weeks for LiveRoof Lite, or approved equal, system. This time period will likely be less if the temperatures are hotter, the climate warmer, on sloping rooftops, or roofs exposed to strong winds. Such conditions can dry out the green roof substrate and cause the plants to go dormant or to dry up and die. Dormant plants tend to shrink to a smaller size and expose soil, which can predispose the system to weed encroachment.

**NOTE:** There are no absolutes when it comes to irrigation. Check the plants for wilting in the morning rather than midday. Irrigate thoroughly to runoff to remoisten entire soil profile if the plants show signs of wilting in the morning.

In areas of reflected light, such as next to south facing walls, more frequent irrigation should be applied to keep the soil from becoming excessively dry.

D. Inspections and Plant Care Protocol

Conduct the following EVERY 2 WEEKS (twice per month) During the entire Spring through Fall Growing Season

1. Conduct hand weeding during the twice monthly inspection. Pull all weeds, never allow any weed to flower, set seed and complete its life cycle. Weeding should be conducted spring through fall in areas where the roof becomes frozen and snow-covered in winter. In warmer climates, it should be continued year round.

The interval may be adjusted in accord with seasonal variations in weed growth, but the interval should never exceed 2 weeks or be long enough to allow for weeds to flower and set seed. Never allow woody plants to establish in a green roof system as their root systems are extensive and can damage roof membranes.

Herbicides, whether pre-emergent or post-emergent, are not recommended as they are not healthy for the environment and can contaminate runoff. A need for pre-emergent herbicides is a sign of weeding too infrequently.

2. Displaced Soil  
Any displaced soil, typically due to nesting birds, should be immediately replaced.
  3. Drainage Inspection  
Roof drains should be cleared of any debris, pebbles, leaves, etc. during the twice monthly inspection to keep drains flowing freely.
  4. Debris / Trash Removal  
Remove immediately debris or trash during twice monthly inspection. Especially during fall and spring, rake vegetated roof modules planting clean of any matted tree leaves to prevent smothering.
  5. Pesticides  
Pesticide use is discouraged and should always be considered secondary to cultural and biological control measures, as pesticides can get into runoff water and cause environmental damage. Pesticide use should only be conducted by qualified and licensed applicators, and on an "as needed" basis. All applications of pesticides are the sole responsibility of the applicator.
  6. Optional Mowing  
If desired, around April 1, mow the green roof to a height of 2" or less. The clippings should stay on the roof. Do not bag and remove. USE PROTECTIVE EQUIPMENT.
  7. Wintertime  
Avoid applying salt and other deicing agents to vegetated roof module plantings. Avoid walking on frozen plants and roof surfaces.
- E. Apply slow release fertilizer as needed in accord with manufacturer's directions. Avoid runoff into sensitive areas.

### **3.8 ACCEPTANCE**

- A. Conduct post installation inspection to determine acceptance of modules. Inspection to be made by General Contractor's Representative or by Owner's Representative upon General Contractor's request; five working days notice required.
- B. Upon acceptance, Owner assumes responsibility for module/plant maintenance.

### **3.9 CLEAN UP**

- A. Throughout installation, keep all work surfaces clean and free of grit, dirt, or debris. Use broom not blower, do not sweep soil under modules or slip sheet. Following installation, remove all excess materials and tools from job site. Ensure that any damage that occurs as a result of installation is appropriately and immediately repaired.

SECTION 075550 – PRECAST CONCRETE PAVERS & AMENITIES OPEN JOINT, PEDESTAL  
INSTALLATION

**PART ONE: GENERAL**

1.01 RELATED DOCUMENTS:

A. Drawings and general provision of contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to work of this Section.

1.02 SCOPE

A. Related Work Specified Elsewhere:

1. Concrete work (Sections of Division 3)
2. Waterproofing membrane (Section 07105)
3. Drains in waterproofed concrete slabs above heated spaces (Section 07105)
4. Drains in concrete slab on grade (Section 02500)
5. Deck Pedestals Section 077600

B. Work Included This Section:

1. Precast concrete paver systems for slab on grade application and for application on structural concrete slab above heated spaces.
2. Work of this Section shall include the specified rigid board insulation, precast concrete pavers and all accessory materials specified herein or required for complete and proper installation of the pavers system shown on the drawings and specified herein.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. All products covered under this Section shall be produced by a single manufacturer unless otherwise specified.
2. Manufacturer shall submit evidence of having not less than fifteen (15) years successful production of this product.
3. The paver manufacturer shall demonstrate, either by proven field performance of the laboratory freeze-thaw test that the paving units have adequate durability if they are to be subjected to a freeze-thaw environment.
  - a. Satisfactory field performance is indicated when units similar in composition and made with the same manufacturing process as those to be supplied to the purchaser, do not exhibit objectionable deterioration after at least 3 years.
  - b. The units used as the basis for proven field performance shall have been exposed to the same general type of environment, temperature range and traffic volume as is contemplated for the units supplied to the purchaser.

B. Subcontractor Qualifications:

1. Subcontractor shall submit evidence of skill and not less than five (5) years specialized experience with this product.

C. Pre-Installation Conference: As directed by the Architect.

1.04 SUBMITTALS

A. Shop Drawings: Submit showing all components required for the paver installation requirements. Shop drawings shall include plan drawings showing layout of all paver areas and detail drawings showing how the various components of the systems fit together. Include manufacturer's literature completely describing all components of the paver systems and giving detailed installation recommendations and instructions. Also included detailed installation drawings for all precast.

B. Samples for Verification Purposes:

1. Submit samples made up of actual selected precast pavers for type, color and texture required. Include in set of samples the full range of exposed color and texture to be expected in the completed work.

### 1.05 DELIVERY, STORAGE AND HANDLING

- A. Protect concrete pavers and accessory materials during shipment, storage and construction against damage.
- B. Protect cementitious materials from deterioration by moisture and temperature. Store in a dry location.

### 1.06 PROJECT CONDITIONS

- A. Comply with manufacturer's requirement regarding weather, substrate and other project conditions.
- B. Field Constructed Mock-Up: Prior to beginning production work, construct a mock up approximately 4 foot by 4 foot for approval by the architect. Mock up may be located so as to be incorporated in the work after approval. Mock up shall be located above a heated space and shall include the specified waterproofing membrane, rigid board insulation, and the precast paver system.

### 1.07 MANUFACTURERS

- A. Basis-of-Design: The paver systems specified herein are based upon products manufactured by Wausau Tile Inc., Wausau, WI .
- B. Paver systems equal in appearance and function and meeting these specifications, will be acceptable when the specified submittals are approved in writing by the Architect prior to bid.

## PART 2: PRODUCTS

### 2.01 PAVER SYSTEM

- A. TERRA PAVERS: The paver system shall include the following components and all other accessory materials required for a complete and proper installation.
  - 1. Precast Concrete Pavers: Paver units shall be 23 13/16" x 23 13/16" x 2" thick (Note: other sizes are available) and color/texture to be :  
Surface Type : to be selected from manufacturer's full range of colors and finishes. See drawings for layouts and patterns.
    - a. **Portland Cement:** ASTM Specifications C150.
    - b. **Aggregates:** All aggregates used will be normal weight aggregate, conforming to ASTM Specifications C33.
    - c. **Coloring:** Coloring used shall conform to ASTM Standards where applicable.
    - d. **Compression Strength:** Each unit shall have a compression strength of 8,000 psi with no individual unit less than 6,500 psi when tested in accordance with ASTM C140.
    - e. **Flexural Strength:** Each unit shall have a flexural strength of 700 PSI when tested in accordance with ASTM C293.
    - f. **Water absorption:** Shall not be greater than 6% according to ASTM C140.
    - g. **Freeze/thaw:** Durability of the paver shall meet the freeze/thaw tests in accordance with Section 8 of ASTM C67. Specimens, when tested, shall have no breakage and not greater than 1% loss in dry weight of any individual unit when subject to 50 cycles of freeze/thaw.
    - h. **Center load:** Pavers shall support a minimum concentrated load of 1,850 lbs. When pressure is applied to a paver supported on four (4) corners. WT CL96
    - i. **Sizing:** Permissible variations in dimensions shall not differ by more than 1/16" from width, height, length or thickness. Standard units are manufactured with a 3/16" bevel on all four (4) sides of finished surface. Unit shall conform to a true plane and not differ by more than 1/16" in either concave and/or convex warpage.

## PART 3: EXECUTION

### 3.01 INSTALLATION OF PAVER SYSTEM

- A. Inspection of deck and fixed elevation locations. All height or location problems to be corrected before installation.
- B. Compare layout of deck to shop drawings or architect drawings. All variances of field conditions to drawings to be reviewed and corrected prior to starting installation.

- C. Terra-Tabs and shim plates are placed, maximum of 2 shims per location, at intersection of grid line if finished surface is to follow slope of substrates. Paver size center lines must be adhered to.
- D. Level surface installation using Terr-Adjust adjustable or Terra-Stand pedestal systems to follow manufacturers installation procedures. No variances to system allowed.
- E. Minor height and pitch adjustments are handled with 1/8" rubber shim plates.
- F. Extender unit is inserted into extended Terr-Adjust to provide heights from 5 1/2" to 10".
- G. Reducer unit is used for height adjustments of between 1/2" and 2".

### 3.02 TOLERANCES

- A. Maximum of 1/16" height variation between adjacent pavers.
- B. Individual pavers shall not vary more than 1/16" from level across width of the paver.
- C. Paved areas shall not vary more than 1/4" from level in a distance of 10' measured at any location and in any direction.
- D. Joints between pavers to be 3/16" or 1/8"

### 3.03 INSTALLATION OF PRECAST STEPS

- A. Install in accordance with written instructions of the manufacturer and approved shop drawings.
- B. Include all accessory materials required for a complete and proper installation.

### 3.04 CLEANING AND PROTECTION

- A. Remove and replace pavers which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment to eliminate evidence of replacement.
- B. Cleaning: Remove mortar stains and all other types of soiling from exposed paver surfaces, wash and scrub clean.
- C. Provide final protection and maintain conditions in a manner acceptable to installer, which ensures paver work being without damage or deterioration at time of substantial completion.

## SECTION 323119 – DECORATIVE METAL FENCES AND GATES

### 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 exterior fences, railings and enclosures.
- B. Related Sections include the following:
  - 1. Division 03 "Cast in-place Concrete"
  - 2. Division 31 "Earthwork"

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
  - 1. Product Data for Credit MR 4.0: For products having recycled content, documentation indicating percentages by weight of post-consumer and pre-consumer recycled content.
    - a. Include statement indicating costs for each product having recycled content.
  - 2. Product Data for Credit MR 5.0: Product data indicating location of material manufacturer for regionally manufactured materials. Include statement indicating cost for each regionally manufactured material and for each regionally extracted and manufactured material.
    - b. Include statement indicating distance from manufacturer to Project for each regionally manufactured material.
    - c. Include statement indicating location of and distance from Project to point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials.
    - d. Include statement indicating costs for each product having regional content.
- C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
  2. For illuminated railings, include wiring diagrams and roughing-in details.
- D. Samples for Initial Selection: For products involving selection of color, texture, or design.
- E. Samples for Verification: For each type of exposed finish required.
1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
  2. Fittings and brackets.
  3. Welded connections.
- F. Welding certificates.
- G. Qualification Data: For professional engineer.
- H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according ASTM E 894 and ASTM E 935.

#### QUALITY ASSURANCE

- I. The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.
- J. Source Limitations: Obtain each component, including pickets, rails, posts, gates and hardware from one source with resources to provide materials and products of consistent quality in appearance and physical properties.
- K. Mockups: Install mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- L. Product Options: Drawings indicate size, profiles, and dimensional requirements of railings and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."
1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- M. Welding: Qualify procedures and personnel according to the following:
1. AWS D1.1, "Structural Welding Code--Steel."
- N. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockups as shown on Drawings.
2. Build mockups for each form and finish of railing consisting of two posts, top rail, infill area, and anchorage system components that are full height and are not less than 24 inches (600 mm) in length.

### 1.3 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.
  1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating fence without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
  2. Provide allowance for trimming and fitting at site.

### 1.4 COORDINATION AND SCHEDULING

- A. Coordinate installation of anchorages for fencing. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- B. Schedule installation so wall attachments are made only to completed walls. Do not support fencing temporarily by any means that do not satisfy structural performance requirements.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fencing materials in unopened cartons or bundles.
- B. Protect metal from exposure to moisture.
- C. Store metal fencing materials in a dry, warm, ventilated, weathertight location.
- D. Upon receipt at the job site, all materials shall be checked to ensure that no damages occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage and to protect against damage, weather, vandalism and theft.

### 1.6 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Provide exterior railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base

engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

## PART 2 - PRODUCTS

### 2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails, unless otherwise indicated.
1. Provide cast-metal brackets with flange tapped for concealed anchorage to threaded hanger bolt.
  2. Provide either formed- or cast-metal brackets with predrilled hole for exposed bolt anchorage.
  3. Provide formed-steel brackets with predrilled hole for bolted anchorage and with snap-on cover that matches rail finish and conceals bracket base and bolt head.
  4. Provide extruded-aluminum brackets with interlocking pieces that conceal anchorage. Locate set screws on bottom of bracket.

### 2.2 FASTENERS

- A. General: Provide the following:
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

### 2.3 MISCELLANEOUS MATERIALS

- A. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  2. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Benjamin Moore & Co.; Epoxy Zinc-Rich Primer CM18/19.
    - b. Carboline Company; Carbozinc 621.

- c. ICI Devoe Coatings; Catha-Coat 313.
  - d. International Coatings Limited; Interzinc 315 Epoxy Zinc-Rich Primer.
  - e. PPG Architectural Finishes, Inc.; Aquapon Zinc-Rich Primer 97-670.
  - f. Sherwin-Williams Company (The); Corothane I GalvaPac Zinc Primer.
  - g. Tnemec Company, Inc.; Tneme-Zinc 90-97.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- C. High-Performance Coating for Steel, Intermediate Coat: High-build urethane or epoxy coating recommended by manufacturer for application over specified zinc-rich primer under specified polyurethane enamel.
- 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Products: Subject to compliance with requirements, provide one of the following:
    - a. Benjamin Moore & Co.; M73/M75 Aliphatic Acrylic Urethane Semi-Gloss.
    - b. Carboline Company; Carboguard 890 2-Component Epoxy.
    - c. ICI Devoe Coatings; Devthane378 Aliphatic Urethane Semi-Gloss Enamel.
    - d. International Coatings Limited; Interthane 870.
    - e. PPG Architectural Finishes, Inc.; Aquapon 97-130 Epoxy.
    - f. Sherwin-Williams Company (The); Macropoxy HS High Solids Epoxy.
    - g. Tnemec Company, Inc.; Series 27 Hi-Build Epoxy.
- D. High-Performance Coating for Steel, Topcoat: High-build, semigloss polyurethane enamel.
- 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Products: Subject to compliance with requirements, provide one of the following:
    - a. Benjamin Moore & Co.; M73/M75 Aliphatic Acrylic Urethane Semi-Gloss.
    - b. Carboline Company; Carbothane 133 HB Aliphatic Polyurethane.
    - c. ICI Devoe Coatings; Devthane378 Aliphatic Urethane Semi-Gloss Enamel.
    - d. International Coatings Limited; Interthane 870.
    - e. PPG Architectural Finishes, Inc.; Aquapon 95-612 Semi-Gloss Polyurethane.
    - f. Sherwin-Williams Company (The); Corothane II Satin B65-200 Series.
    - g. Tnemec Company, Inc.; Series 1075 Endura-Shield.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- G. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.
- H. Steel material for fence framework (i.e. tubular pickets, rails and posts), when galvanized prior to forming, shall conform to the requirements of ASTM A924/A924M, with a minimum yield strength of 50,000 psi (344 MPa). The steel shall be hot-dip galvanized to meet the requirements of ASTM A653/A653M with a minimum zinc coating weight of 0.90 oz ft<sup>2</sup> (276 g/m<sup>2</sup>). Coating Designation g-90.
- I. The manufactured galvanized framework shall be subjected to the thermal stratification coating process (high-temperature, in-line, multi-stage pretreatment/wash with zinc phosphate), an electrostatic spray application of any epoxy base, and a separate electrostatic spray application of a polyester finish. The base coat shall be a zinc-rich thermosetting epoxy powder coating (gray in color) with a minimum thickness of 2 mils. Color as selected by Architect.

## 2.4 FABRICATION

- A. General: Fabricate fencing to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage.
- B. Assemble fencing in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  2. Obtain fusion without undercut or overlap.
  3. Remove flux immediately.
  4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- H. Close exposed ends of hollow fencing members with prefabricated end fittings welded plate of same gage and thickness.

- I. For railing posts set in concrete, provide steel sleeves not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (12 mm) greater than outside dimensions of post, with steel plate forming bottom closure.

## 2.5 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Site applied finishes must comply with LEED requirements for VOC content. See section 018113/01352 sustainable Design Requirements.

## 2.6 STEEL AND IRON FINISHES

- A. Apply shop primer to prepared surfaces of railings, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
  1. Do not apply primer to galvanized surfaces.
  2. Stripe paint corners, crevices, bolts, welds, and sharp edges.
- B. High-Performance Coating Finish: Comply with Division 09 Section "High-Performance Coatings."
- C. High-Performance Coating Finish: Apply intermediate and finish coats to surfaces of railings primed with zinc-rich primer. Comply with coating manufacturer's written directions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
  3. Apply intermediate coat at spreading rate recommended by manufacturer to achieve a dry film thickness of 3.0 to 8.0 mils (0.076 to 0.203 mm) for epoxy intermediate coats and 1.5 to 4.0 mils (0.038 to 0.102 mm) for aliphatic urethane intermediate coats.
  4. Apply topcoat at spreading rate recommended by manufacturer to achieve a dry film thickness of 1.5 to 4.0 mils (0.038 to 0.102 mm).
  5. Match approved Samples for color, texture, and coverage. Remove and refinish, or recoat work that does not comply with specified requirements.

### **PART 3 – EXECUTION**

#### **3.1 INSTALLATION, GENERAL**

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
  - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
  - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).
- C. Corrosion Protection: Coat concealed surfaces of aluminum and copper alloys that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

#### **3.2 FENCING CONNECTIONS**

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- B. Welded Connections: Use fully welded joints for permanently connecting fencing components. Comply with requirements for welded connections in Part 2 "Fabrication" Article whether welding is performed in the shop or in the field.
- C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches (50 mm) beyond joint on either side, fasten internal sleeve securely to 1 side, and locate joint within 6 inches (150 mm) of post.

#### **3.3 PROTECTION**

- A. Protect finishes of fencing from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in field to shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 323119

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## SECTION 328400 - IRRIGATION 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 piping, valves, sprinklers, specialties, controls, and wiring for automatic-control irrigation system.

#### 1.3 WORK TO BE DONE

- A. Work to be done includes furnishing all labor, materials, equipment and services required to complete all irrigation work indicated on the Drawings, as specified herein, or both. The work to be performed under this Section shall consist of furnishing all labor and materials necessary to construct a complete working and tested sprinkler irrigation system as per all drawings and specifications, providing 100 percent head to head coverage on all lawns and planting areas on the site. Included also will be maintenance and warranties.
- B. The Contractor shall perform, but not be limited to, all of the following functions: Paying all connection fees, deposits and all other charges related to the connection to the water source. Obtain all permits, complete all excavation, backfill, provide backflow device, tapping saddle, yoke, stop and waste, concrete vaults and miscellaneous pipe fitting. Make necessary road repairs, provide safety barrier, and make connection to water source. All in compliance to applicable codes and requirements of the utility companies involved.
- C. The electrical point of connection for the irrigation system shall be 120-volt building electrical supply.
- D. The Drawings and Specifications must be interpreted and are intended to complement each other. The Contractor shall furnish and install all parts, which may be required by the Drawings and omitted by the Specifications, or vice versa, just as though required by both. Should there appear to be discrepancies or question of intent, the Contractor shall refer the matter to the Owner's representative for decision, and his interpretation shall be final, conclusive and binding.
- E. All necessary changes to the Drawings to avoid any obstacles shall be made by the Contractor with the approval of the Owner's representative.
- F. Trench excavation, back filling and bedding materials, together with the testing of the completed installation shall be included in this work.

- G. The work shall be constructed and finished in every respect in a good, workmanlike and substantial manner, to the full intent and meaning of the Drawings and Specifications. All parts necessary for the proper and complete execution of the work, whether the same may have been specifically mentioned or not, or indicated on the Drawings, shall be done or furnished in a manner corresponding with the rest of the work as if the same were specifically herein described.
- H. Record Drawing as well as Operating & Maintenance Manual generation, in accordance to these specifications shall also be included in this work.
- I. If electrical service is not already in place, the Contractor will be required to make all necessary arrangements with Utah Power & Light Company including, but not limited to, paying fees, making power connections, providing poles, weatherhead and meter, etc., as specified on the plans. All permits, fees, and compliance with electrical company requirements, shall be the Contractor's responsibility.

#### 1.4 SCOPE

- A. The irrigation system shown on the Drawings and described within these Specifications represents an automatic controller irrigation system supplied from the Snow College water system. The system is designed for a minimum operating pressure at the main connection of 75 PSI. The irrigation contractor shall verify water pressure prior to construction and report any differences to owner's representative.

#### 1.5 EXISTING UTILITIES

- A. Before any trenching, excavation, or digging below the surface for any reason is begun, the contractor shall obtain a "Digging Permit" (see Ordinance, Permits, and Fees section below) and have the site "Blue Staked" in order to determine as close as possible the location of all underground utilities and structures. Although identified, underground utilities and structures will be assumed to be in approximate locations. The contractor will conduct the work in such a manner to protect all utilities and structures from damage. It is the responsibility of the contractor to repair or replace any damage incurred by the contractor or the contractor's employees with identical materials to match the existing, at no expense to the owner. Any such repairs must be inspected by the Snow College Project Manager.

#### 1.6 PROTECTION OF EXISTING SITE IMPROVEMENTS

- A. The contractor shall take necessary precautions to protect site improvements to remain, including, but not limited to buildings, grounds, or utilities. Should damage be incurred by the contractor or the contractor's employees, the contractor shall repair the damage to its original condition at the contractor's own expense.

### 1.7 ORDINANCES, PERMITS AND FEES

- A. The Work under this Section shall comply with all ordinances and regulations of authorities having jurisdiction.
- B. The Contractor shall obtain and pay for any and all permits, tests and certifications required for the execution of Work under this Section.
- C. Furnish copies of Permits, Certifications and Approval Notices to the Owner's Representative prior to requesting payment.
- D. The Contractor shall obtain a "Digging Permit" from the College before beginning any trenching, excavation, or digging as outlined in the College's General Conditions.
- E. The Contractor shall initiate a "Request for Shutdown" any time a utility must be shut off to allow work progress. See the General Conditions for "Request for Shutdown" requirements.

### 1.8 EXAMINATION OF CONDITIONS

- A. The Contractor shall fully inform himself of existing conditions on the site before submitting his bid, and shall be fully responsible for carrying out all work required to fully and properly execute the work of the Contract, regardless of the conditions encountered in the actual Work. No claim for extra compensation or extension of time will be allowed on account of actual conditions inconsistent with those assumed, except those conditions described in the General Conditions.
- B. Verify available water supply pressure and flow characteristics.

### 1.9 QUALITY ASSURANCE

- A. **Installer:** A firm that has at least five (5) years experience in work of the type and size required by this Section and which is acceptable to the Owner's Representative. The firm must have at least one direct employee with current Certified Irrigation Contractor (CIC) certification from the Irrigation Association. A registered CIC is to be included in the contractor's work crew and is required to meet weekly with the irrigation foreman of the Snow College Grounds Department to walk the work site and review the progress of the work.
- B. **References:** The Contractor must supply three references for work of this type and size with their bid including names and phone numbers of contact person(s).
- C. Applicable requirements of accepted Standards and Codes shall apply to the Work of this Section and shall be so labeled or listed:
  - 1. American Society for Testing & Materials (ASTM)
  - 2. National Plumbing Code (NPC)
  - 3. National Electric Code (NEC)
  - 4. National Sanitary Foundation (NSF)

5. American Society of Agricultural Engineers (ASAE)
6. Underwriters Laboratories, Inc. (UL)
7. Occupational Safety and Health Regulations (OSHA)

#### 1.10 TESTS AND INSPECTIONS

- A. Observation: The Owner's Representative will be on site at various times to insure the system is being installed according to the Specifications and Drawings.
- B. Pipe Testing and Inspection: The irrigation piping shall be inspected for compliance with the specifications and drawings and tested in the presence of the College's Project Manager prior to backfilling of the trenches. The Contractor shall provide the Owner's representative 48 hours advance notice prior to the irrigation pipe testing.
- C. Operational Test: After completion of the system, test the operation of entire system in the presence of the Owner's representative, the Grounds Department, and the Snow College Project Manager to insure complete head to head coverage of all areas watered. This test must be performed by using an OSMAC hand held radio. Any deficiencies identified at this time will require revisions and adjusting by the Contractor at the Contractor's expense. Any deficient irrigation head will be adjusted for proper coverage and set to proper depth at this time.

#### 1.11 SUBMITTALS

- A. List of Materials: Submit for approval SEVEN (7) copies of the complete list of materials proposed for use. Quantities of materials and equipment need not be included. No deviations from the specification shall be allowed, except as provided for in these documents.
- B. Product Data: Submit manufacturer's technical product data and installation instructions for all irrigation system materials and products to be installed to the Owner's Authorized Representative for approval prior to the start of work, in accordance with the parameters of Division-1. Work on the irrigation system may not commence until product data submittal is received and approved. Submittals shall be marked up to show proper sizes, flows, etc.
- C. Record Irrigation Drawings: The Contractor shall maintain complete Record Drawings showing all deviations from the contract documents made during construction affecting the sleeves, main line pipe, controller locations, isolation valves, remote control valves, quick coupler locations, and other equipment indicated on the drawings. All wire routing, wire size, and splices shall be indicated. These Record Drawings shall be kept on a clean set of prints of the contract documents and will be reviewed by the Owner's representative throughout construction to verify that changes are being recorded. Main line pipe and wire route shall have two (2) distinctly different graphic symbols (line types). These record drawings shall be submitted to the Owner's representative before the time of the Systems Inspection/Substantial Completion Inspection. The Substantial Completion Certificate Date will not be issued until the Owner's representative receives the Record Irrigation Drawings.

- D. Maintenance Data and Operating Instructions: Submit a minimum of three (3) three ring, hard cover binders titled MAINTENANCE AND OPERATING INSRUCTIONS FOR THE SNOW COLLEGE LIBRARY BUILDING IRRIGATION SYSTEM to the Owner's representatives office prior to application for acceptance and final payment. After review and approval, the copies will be forwarded to the Owner. Included in the Maintenance and Operating Manual shall be:
1. Table of Contents
  2. Written description of Irrigation System.
  3. System drawings:
    - a. One (1) copy of the original irrigation plan.
    - b. One (1) copy of the Record Drawing.
    - c. One (1) copy of the controller valve system-wiring diagram.
  4. Listing of Manufacturers.
  5. Manufacturers' data where multiple model, type and size listings are included, clearly and conspicuously indicating those that are pertinent to this installation.
    - a. "APPROVED" submittals of all irrigation equipment.
    - b. Operation.
    - c. Maintenance: including complete troubleshooting charts.
    - d. Parts list.
    - e. Names, addresses and telephone numbers of recommended repair and service companies. A copy of the suggested "System Operating Schedule" which shall call out the controller program required (zone run time in minutes per day and days per week) in order to provide the desired amount of water to each area under "no-rain" conditions.
  6. One (1) color-coded laminated zone sheets per controller showing zones as built and the areas that they water.
  7. Winterization and spring start-up procedures.
  8. Guarantee data.

#### 1.12 DELIVERY, STORAGE AND HANDLING

- A. Store and handle all materials in compliance with manufacturer instructions and recommendations. Protect from all possible damage. Minimize on-site storage.

#### 1.13 GUARANTEE

- A. The Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities that the Contractor may have by law.

- B. In addition to the manufacturer's guarantees the Contractor shall guarantee the entire irrigation system, both parts and labor for a period of one (1) year from the date of Substantial Completion.
- C. As part of the one-year guarantee the Contractor shall perform the first year-end winterization and spring start-up for the irrigation system. Winterization shall be coordinated with the Grounds Department Sprinkler Shop and shall be completed no later than October 15<sup>th</sup>.
- D. The Contractor shall correct any deficiencies when notified during the guarantee period, and additionally correct, to the satisfaction of the Owner, any damage to buildings or grounds caused by deficient work at no cost to the Owner.
- E. All guarantees shall be in writing and submitted to the Owner's representative for review and approval on or before the date of Substantial Completion.

#### 1.14 COORDINATION

- A. The Contractor shall at all times coordinate his work closely with the Owner's representative to avoid misunderstandings and to efficiently bring the project to completion. The Owner's representative shall be notified as to the start of work, progression and completion, as well as any changes to the drawings before the change is made. The Contractor shall also coordinate his work with that of all other associated fields.
- B. The Contractor shall be held responsible for and shall pay for all damage to other work caused by his work, workmen or sub-contractors. Repairing of such damage shall be done by the Contractor who installed the work, as directed by the Owner's representative.

#### 1.15 PROCEDURE

- A. Notify all city departments and/or public utility owners concerned, of the time and location of any work that may affect them. Cooperate and coordinate with them in the protection and/or repairs of any utilities.
- B. Provide temporary support, adequate protection and maintenance of all structures, drains, sewers, and other obstructions encountered. Where grade or alignment is obstructed, the obstruction shall be permanently supported, relocated, removed or reconstructed as directed by the Owner's representative.
- C. **SUBSTITUTION OF MATERIALS** The Contractor shall use only Rainbird heads, control valves, and other equipment as specified. All other materials and equipment shall be only as specified where a brand name is listed. No substitutions of materials will be approved on the sprinkler irrigation system.
- D. **SYSTEM PRESSURE** The sprinkler irrigation system is designed for 75 pounds per square inch static pressure unless otherwise specified and is schematic only, with the

intent to convey full head to head coverage of the lawn and planting areas affected. The system must also provide the manufacturer's recommended minimum operating pressure or greater to every head while maintaining sufficient pressure to overcome the losses due to friction in the piping, fittings, and all other equipment.

#### 1.16 SUBSTANTIAL COMPLETION

- A. The date of Substantial Completion for the irrigation system will be when the Maintenance and Operating Manual has been approved, the As-Built Record Drawings have been submitted, and the irrigation system is working as intended as demonstrated during final inspection. This will be determined by observation by the Landscape Architect and Owner's Representative.

### PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. All materials to be incorporated in this system shall be new and without flaws or defects and of quality and performance as specified and meeting the requirements of the system. All material overages at the completion of the installation are the property of the Contractor and shall be removed from the site.
- B. No material substitutions from the irrigation products described in these specifications and shown on the drawings shall be made without prior approval and acceptance from the Owner's Representative. If there is an existing sprinkler irrigation system on the site, the Contractor shall remove any lines being abandoned, and cap or plug the ends of lines remaining in service with proper fittings and thrust blocks. The Contractor shall remove or relocate existing heads and/or connect new lines to existing lines, as indicated on the plans.
- C. Any existing head, valve, valve marker, valve box, or other existing equipment located where there will be a grade or surface material change, shall be adjusted up or down to its proper position in relation to the new finished grade, at no additional cost to the owner, unless the plans show it to be relocated.

#### 2.2 IRRIGATION PIPE

- A. All pipe, main and laterals, (except Flex Swing Pipe) shall be Schedule 40 pressure rated PVC with ratings printed on pipe. No pipe shall be less than 3/4" inside diameter. Do not use galvanized fittings of any kind on any PVC lines or fittings.
- B. Flex swing pipe shall be THICK-WALLED POLY PIPE as manufactured by TORO or RAINBIRD. This pipe is to be used only between spray heads and lateral lines and shall not exceed a distance of 2 ft. for use on heads of 7 GPM or less.

### 2.3 PVC IRRIGATION FITTINGS

- A. Main Line Piping - Schedule 40 pressure rated PVC, plastic socket fittings ASTM D 2464 & 2467.
  - 1. Schedule 40 socket fittings shall be solvent welded joints.
- B. Valve Assemblies – Schedule 40 pressure rated PVC socket fittings as manufactured by Spears, Dura, Lasco or equal. PVC threaded connections shall be made using SCH 80 tee nipples and Schedule 40 Couplers. Schedule 40 male threads will not be approved for installation.
- C. Lateral Line Piping - Schedule 40 pressure rated PVC as manufactured by Spears, Dura, Lasco or equal. The first two fittings (tee or elbow) on the lateral side of the valve shall be Schedule 80 pressure rated PVC.
- D. Flex Swing Piping – Schedule 80 “barbed insert elbows” by threaded 1/2" or 3/4", as manufactured by Toro or Rainbird only.
- E. Mainlines shall be connected by solvent welded joints. Use IPS Weld-on-Line, P-70 Primer and No. 711 cement. All connections on main lines must be allowed to set for 24 hours prior to pressurization.
- F. Lateral lines shall be connected by either solvent welded or threaded connections. Use IPS Weld-on-Line, P-70 Primer and No. 711 cement for solvent welded connections and Teflon tape for threaded connections. Lateral Lines shall be allowed to set for a minimum 2 hours prior to pressurization.
- G. All nipples to be schedule 80 PVC.
- H. Any fitting used on a manual drain or sprinkler head will be at a 90 degree angle from the top of the pipe.
- I. Any fitting that is being used for an Automatic Drain shall be installed at a 45 degree angle down. Automatic drains shall not be placed at the lowest point of a line.
- J. No Galvanized fittings shall be allowed on any PVC lines or fittings

### 2.4 SLEEVES

- A. Sleeves shall be installed for all irrigation pipe and wire under non-soil areas and where indicated on the Drawings. Minimum sleeve size shall be 4 inch except where noted. Schedule 40 PVC pipe shall be used except where noted. The Contractor shall mark the location of all sleeves by duct taping a “Deep-1” Sleeve Magnet on both ends of the sleeve, and mark their locations on the Record Drawings.

### 2.5 WIRE CONDUIT

- A. Conduit for wiring to controllers or sensors shall be SCH-80 PVC, size as indicated chart.

<u>Number of Wires</u>	<u>Minimum Conduit Size</u>
1-7	1"
8-11	1 1/2"
12-22	2"
23-31	2 1/2"
32-36	3"

## 2.6 STOP AND WASTE VALVES

- A. Stop and Waste type valves shall be solid bronze meeting Federal Specification WW-V-54, CLASS A, Type 1. Size shall be the same as the mainline of the sprinkler system which it is installed on. This valve must be installed at the same depth as the water source, the stop and waste will be installed in a curb box as herein specified. Valve shall be key operated, and of Mueller and/or Ford Type Valves.

## 2.7 ELECTRONIC CONTROL VALVES

All electric remote control valves shall be of the size and type as specified on the drawings. Do not mix lawn and shrub zones. Do not mix zone on north and south sides of the building.

## 2.8 DRIP CONTROL VALVE ASSEMBLIES

- A. Drip Control Valve Assembly includes:
  - 1. Rainbird Drip Control Valve Assembly (size and type as indicated on the drawings including valve, filter, and pressure regulator).

## 2.9 VALVE BOXES

- A. Valve box for electric control valves, isolation valve, and quick coupling valves shall be a rectangular valve box with metal detection and bolt down cover as manufactured by Carson, model 1730-12 or approved equal.
- B. Valve boxes for drip flush valves shall be 10" round valve box as manufactured by Carson, model 910-10 or approved equal.
- C. Valve boxes for approved wire splices shall be 10" round valve box as manufactured by Carson, model 910-10 or approved equal...
- D. Valve box extensions shall be provided as required for proper box depth.

## 2.10 AUTOMATIC CONTROLLER

- A. Provide Automatic Controller(s) as specified on the drawings.

## 2.11 CONTROL WIRE

- A. All valve control and common wire shall be a single strand direct burial cable PE insulated type not smaller than #14 solid copper meeting all state and local codes for this service. Individual wires must be used for each zone valve. Common wire to the valves and ground wire shall be white in color. Control wires for turf areas shall be red in color. Control wires for shrub beds shall be blue. Spare wires shall be white.
- B. All wires shall be direct runs with no splices. Wires can not be spliced without approval of Owner's representative or Project Manager.
- C. Splices in electric control wires shall be soldered first and then fitted with a 3M DBY Direct Bury Splice Kit. No exceptions. All splices shall be contained in a valve box with extra length equal to 12" above the top of the valve box...
- D. Add two extra control wires along each leg of the irrigation mainline and loop through each valve box back to the controller and mark in the control box as an extra wire.
- E. Wire shall be pulled into controller with 12" minimum tail, and labeled to each valve. Any wire that comes from the ground to the controller must be housed in PVC conduit or flex conduit.

## 2.12 BACKFLOW PREVENTER

- A. Provide Backflow Preventer as specified on the drawings.

## 2.13 BACKFLOW PREVENTER ENCLOSURE

- A. Backflow Preventer Enclosure shall be a BPGI Gaurdshak and a BPGI Frost Guard Insulated Blanket, or approved equal, sized to fit specified backflow preventer and meet all state and local codes.

## 2.14 ISOLATION VALVE

- A. Mainline Isolation Valves: Provide Resilient Wedge gate valves on irrigation mainline as indicated on the drawings.
- B. Ball Valves: shall be domestic solid brass by Watts or Appollo meeting meeting Federal Specification WW-V-54, CLASS A, TYPE 1. Size shall be the same size as the electric valve that it is isolating. Valves shall be installed on the upstream side of the electric control valve and in the same valve box.

## 2.15 QUICK COUPLER VALVES

- A. Quick coupler valves shall be as note on the irrigation schedule.
- B. A Quick Coupler valve shall be installed on the downstream side of the ball isolation valve.

## 2.16 MANUAL DRAINS

- A. Manual drains shall be  $\frac{3}{4}$ " Mueller or Ford Ball valve and shall be installed on all main lines and lateral lines 2" in size or larger. Manual drains shall be placed at any low point only in the irrigation lines.
- B. Manual drains should be put in the same valve box as the Ball Isolation Valve and Control Valve where possible. If not possible, install as detailed.

## 2.17 AUTOMATIC DRAINS

- A. Automatic drains shall be as manufactured by King Bros. or approved equal.
- B. No automatic drains shall be placed at the end of any line. Low spots that occur at the end of a line shall have an irrigation head.
- C. Automatic Drains **shall not** be installed on irrigation main lines.

## 2.18 CRUSHED STONE

- A. Crushed stone shall be  $\frac{3}{4}$ " x #8 washed gravel. Crushed stone shall be used under valve boxes.

## 2.19 TRENCH BEDDING MATERIAL

- A. Bedding material shall be mortar sand material.

## 2.20 IRRIGATION HEADS

- A. Pop-up spray and rotor heads to match existing irrigation to remain in all irrigation repair areas. Coordinate with the Snow College grounds department.
- B. Pop-up spray and rotor heads as specified on the drawings for all new irrigation areas.

## 2.21 INLINE EMITER DRIP TUBING

- A. Inline Emitter tubing shall be as specified on the drawings.
- B. Inline Emitter Tubing Fittings: Approved compatible inline emitter tubing insert fittings.
- C. Soil Staples: Netafim TLS6 or approved equal.
- D. Line Flushing Valves: Netafim # TLFV-1 Automatic Flushing Valve and # TLSOV manual Flushing valve.
- E. Drip Operation Indicator: As specified on the drawings.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Examine all contract documents applying to this Section noting any discrepancies and bringing the same to the attention of the Owner's Representative for timely resolution.
- B. The contractor, prior to installing the system, must verify existing water pressure. If there is a failure to obtain the needed pressure or if an excess of pressure exists for normal operation, the contractor shall contact the Owner's representative for any adjustments to the system. Failure to report any discrepancies in pressure due to whatever reason, and installation done prior to notification of the Owner's representative shall be done at the expense of the contractor.
- C. Make all field measurements necessary for the work noting the relationship of the irrigation work to the other trades. Coordinate with other trades (landscaping and other site work trades). Project shall be laid out as accurately as possible as indicated on the Irrigation Plans. The drawings, though carefully drawn, are generally diagrammatic to the extent that swing joints, offsets and all fittings are not shown.
- D. Irrigation heads, valves and quick coupler locations are shown on the drawings diagrammatically. It shall be the contractor's responsibility to determine the exact location of each irrigation head, valve and quick coupler to accommodate the conditions as found on the site in order to provide COMPLETE head to head coverage of all areas. Avoid installing valves in areas where curbs and sidewalks come together or at any intersection of two or more walkways. Do NOT exceed the manufacturer's recommended spacing or as shown on the drawings for the irrigation heads. Minor adjustments in the system will be permitted to clear existing fixed obstructions subject to the approval of the Owner's representative. All deviations from the drawings will be noted on the "As-Built" drawings.
- E. At all times, protect existing irrigation, landscaping, paving, structures, walls, footings, etc. from damage. Any inadvertent damage to the work of another trade shall be reported at once.

- F. The points of reference shall be the existing walks, buildings, and curbs. The staking shall be approved by the Owner's representative prior to commencing installation operations. Any changes in the system which appear necessary, due to field conditions, must be called to the attention of the Owner's representative and approved at the time.
- G. Install all irrigation systems as per State and Local codes.

### 3.2 TRENCHES AND EXCAVATION

- A. Excavation work shall be as deep and as wide as will be required to safely perform the work, such as making mainline connections or forming vaults. Trenches shall be deep and wide enough to provide working space for placing 6 inches of mortar sand bedding to all sides of all new mainline pipe and fittings, and wiring and 3" of mortar sand bedding to all sides of lateral piping. 18 to 24 inches of cover shall be placed over the top of all pipe and fittings on main lines (lines which maintain a constant water pressure). If the existing main line is deeper than 24 inches, the Contractor shall install a riser to a depth of 18 to 24 inches and then install the new line at the required 18-24" depth. At no time will the mainline be installed deeper than 24" unless prior approval by Owner's representative. Each pipe lying in a mainline or lateral line trench shall not touch any other pipe. Maintain a pipe separation distance of 6" between each pipe.
- B. There shall be a six inch (6") minimum distance between irrigation trenches and a twelve inch (12") minimum distance between any irrigation trench and trenches of other trades
- C. Trenches for lines supplying pop-up spray heads shall be deep enough to maintain a minimum of 12 to 16 inches of cover over the top of all pipe and fittings.
- D. Trenches for lines supplying rotors shall be deep enough to maintain a minimum of 12 to 16 inches of cover over the top of all pipe and fittings. Trenches shall also be deep enough to guarantee that all swing joints drain back to the lateral and supply lines.
- E. The contractor, in placing the irrigation lines, etc. may uncover material not suitable for finished grading. This material shall be removed from the site. After the installation of the lines, the finished grading shall be smoothed over and restored to its original condition, using additional topsoil where necessary.

### 3.3 PIPE AND FITTINGS INSTALLATION

- A. The plans show the general arrangement of all piping. Should local conditions necessitate the rearrangement of some, or if piping can be run to better advantage, the contractor, before proceeding with the work, shall prepare and submit drawings of such to the Owner's representative and obtain written approval before commencing work shown on these drawings.

- B. Using proper width trencher chain, excavate a straight and true trench to a depth of 6-inches below pipe invert elevation for mainlines and 3-inches below pipe invert elevation for lateral lines.
- C. Loam encountered within the limits of trench excavation for irrigation mains and branch lines shall be carefully removed to the lines and depths as shown on the Drawings and stockpiled for subsequent replacement in the upper 6 inches of the trench from which it is excavated. Such removal and replacement of the quantities of loam shall be considered incidental to the irrigation system and no additional compensation will be allowed therefore.
- D. A mortar sand bedding material shall be placed a minimum of 6" in all directions around all mainline pipes prior to backfilling. Lateral line pipes shall have a minimum of 3" in all directions.
- E. Back filling shall be accomplished as follows: the first 10-inch of backfill material shall contain no foreign matter and no rock larger than 1 inch in diameter. Any material that is to come in contact with the pipes shall be less than 1/4" in diameter and shall be imported for this specific use. Carefully place material around pipe and wire and water sock in place. Remainder of backfill shall be laid-up in 6-inch (maximum) lifts and water socked to compaction matching adjacent undisturbed area. Frozen material shall not be used for backfill.
- F. All excavation under walks and roadways shall be compacted to 95% and all excavation in lawn and shrub areas shall be compacted to no less than 90%.
- G. All joints will be solvent welded, or made with threaded fittings. Use Teflon tape for threaded fittings. Any fitting 1 1/2' and larger shall be installed with Teflon tape and paste.
- H. Make all solvent-weld joints in strict accordance with manufacturer's recommendations, making certain not to apply an excess of primer or solvent, and wiping off excess solvent from each connection. Allow connections to set minimum 24 hours before pulling or pressure is applied to the system. Provide for expansion and contraction as recommended. Wire shall be laid in same trench as mainline and at pipe invert (see Wire Installation). All pipe joints shall be solvent welded together using IPS 70 Primer and IPS 711 cement. All pipe shall be pushed the maximum distance into fitting and held in place for 30 seconds for each 1 inch of diameter of pipe.
- I. Mainline pipe shall have minimum 18 inches of cover (excavate to invert as required by pipe size). Lateral pipe shall have minimum 12 inches of cover (excavate to invert as required by pipe size).
- J. Cut plastic pipe with handsaw or pipe-cutting tool, removing all burrs at cut ends. All pipe cuts are to be square and true. Bevel cut end as required to conform to Manufacturer's Specifications.
- K. Lines bordering curbs, buildings, or sidewalks shall be 12 inches away to allow for maintenance and access to the lines.

- L. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. At times, when installation of the piping is not in progress, the open end(s) of the pipe shall be closed by a watertight plug or other means. All piping, which cannot temporarily be joined, shall be sealed to make as watertight as possible. This provision shall apply during the lunch hour as well as overnight. Pipe not to be installed that day shall not be laid out. Should water enter the trench during or after installation of the piping, no additional piping may be installed or back filled until all water is removed from the trench. Pipe shall not be installed when water is in the trench, when precipitation is occurring, or when the ambient temperature is at 42 degrees F or below. PVC pipe shall be snaked in the trench to accommodate for expansion and contraction due to changes in temperature.
- M. When the pipe lines are connected but before any heads are installed, the control valves shall be opened and flushed with a full head of water to clean out the system.
- N. Before trenches are backfilled all lines shall be pressurized and checked for leaks.
- O. Before any pipes are covered, the owner's authorized representative shall inspect the system for compliance with the specifications and drawings. Any required changes will be made at this time at no expense to the owner.

#### 3.4 ELECTRONIC CONTROL VALVE INSTALLATION

- A. Install valves as detailed. Control valves shall be installed on a level crushed stone base. Grade of base shall be consistent throughout. Valves shall be set plumb with adjusting handle and all bolts, screws and wiring accessible through the valve box opening.
- B. Adjust zone valve operation after installation using flow control device on valve.
- C. Do not install valves in areas where curbs and side walk come together or at any intersection of two or more walkways.
- D. All electronic control valves shall be installed with an Apollo ball valve installed upstream from each electronic control valve.

#### 3.5 PIPE SLEEVING INSTALLATION

- A. Sleeving shall be installed wherever piping is going under a non-soil area, generally where indicated on the Drawings. Minimum cover over all sleeving pipe shall be 18 inches as shown on the detail except where noted otherwise.

#### 3.6 BACKFLOW PREVENTER INSTALLATION

- A. Install specified backflow preventer as detailed and in compliance with state and local codes.

### 3.7 BACKFLOW PREVENTER ENCLOSURE INSTALLATION

- A. Install enclosure and insulation blanket according to manufacturer's installation instructions and in compliance with state and local codes.

### 3.8 ISOLATION VALVE INSTALLATION

- A. Mainline Isolation Valves: Install mainline isolation valves as detailed in locations shown on the drawings.
- B. Ball Valves: Install isolation ball valve on mainline as detailed on the upstream side of each valve. Install isolation valve on a level crushed stone base so that they can be easily opened or closed with the appropriate valve wrench. Install standard valve box over mainline isolation valve. Valve shall be installed on the up-stream side of the electric remote control valve in a standard valve box with a garden valve as detailed.

### 3.9 VALVE BOX INSTALLATION

- A. Furnish and install valve access boxes for electric valves, quick coupling valve, isolation valve, flushing valves, wire splices, etc.
- B. Valve access boxes shall be installed on a minimum 6-inch crushed stone base. Finish elevation of all boxes shall be at grade except where noted. All crushed stone shall be supplied by the Contractor and installed before valve box. Crushed stone shall not be poured into previously installed valve boxes.
- C. Valve boxes shall be set on a pressure treated wood frame or brick foundation which is placed on undisturbed soil. A 2" clearance must be maintained between the base of the valve and the crushed stone base.
- D. Valve manifolds shall be set a minimum of 2" below top of the box including ball valves and quick couplers where called for. See the chart below for the number of valves allowed in each valve box. All valves must have ample room and access for repair.

Standard Valve Box	One Valve Per Box
Jumbo Valve Box	One 2" Valve or Two 1" or 1 ½ Valves
Little Giant	Two 2" Valves or Three 1" or 1 ½" Valves
Giant	Three 2" Valves or Four 1" or 1 ½" Valves

- E. Install valve boxes no closer than three feet from sidewalks, curbs, and all hard surfaced areas. Do not install valve boxes at the low point of the landscaping.

### 3.10 IRRIGATION HEAD INSTALLATION

- A. All irrigation heads will be set perpendicular to the finished grade unless otherwise designated on the drawings and specifications. Rotor heads on hillsides will be adjusted to avoid cutting into the hill with the stream of water and causing excessive erosion.
- B. All pop-up spray heads shall be installed on Flex swing pipe with 1/2" spiral barbed ells and one street ell as detailed.
- C. All pop-up rotor heads will be installed on pre-manufactured swing joints.

### 3.11 INLINE EMITTER DRIP TUBING

- A. Install inline emitter tubing as detailed in locations shown on drawings.
- B. Inline Emitter Tubing Fittings: All connections shall be made with approved compatible inline emitter tubing insert fittings.
- C. Soil Staples: All inline emitter tubing installations shall be held in place with inline emitter tubing soil staples as specified spaced evenly every 2' on center and with two staples on each change of direction.
- D. Line Flushing Valves: Install as detailed in locations shown on the drawings and as needed to allow proper flushing of all sections of inline emitter drip tubing.
- E. Drip Operation Indicators: Install as detailed in locations shown on drawings or approved by College Irrigation Maintenance personnel.

### 3.12 ELECTRICAL WIRE CONDUIT INSTALLATION

- A. Electrical conduit shall be installed to the existing controller as necessary to house new control wires.

### 3.13 SLEEVING INSTALLATION

- A. Sleeving shall be installed wherever piping is going under a non-soil area, generally where indicated on the Drawings. Minimum cover over all sleeving pipe shall be 18 inches for all mainline and 12 inches for all lateral lines as shown on the detail except where noted otherwise.

### 3.14 ELECTRICAL CONTROL WIRE INSTALLATION

- A. Wiring shall be installed in the same trench as the main line wherever possible. Wires shall be laid beneath the pipe with multiple wire bundles cinched together at maximum 12-foot centers using plastic cable cinches and shall be laid at the same invert as the irrigation lines. Attach electrical wires every 15 feet with duct tape to the mainline. Provide an additional 8 inches to 12 inches slack at all changes of direction. Wiring in valve boxes shall be left with two feet of wire so that the valve solenoid, splice, and all connections can be brought above grade for servicing without disconnecting the wires. This additional slack shall be coiled for neatness in the valve box.
- B. Run two (2) extra wires along each leg of the irrigation mainline and loop through each valve box back to the controller and label as "extra".
- C. Splices in electric control wires shall be soldered first and then fitted with a 3M DBY-6 direct Bury Splice Kit. All splices shall be contained in a valve box, preferably the same box as the electric control valves. Do not run short pieces of wire.
- D. It is important that the splice is absolutely waterproof so that there is no chance for leakage of water and corrosion build-up on the connection. All wiring shall be accomplished with as few splices as possible. Splice locations shall be shown on the Record Drawings.
- E. All wire shall be laid in trenches and shall be carefully back-filled to avoid any damage to the wire insulation or wire conductors themselves. In areas of unsuitable material, the trench shall have a 2 inches layer of sand on the bottom before the wires are laid into the trench and back-filled. The wires shall have a minimum of 12 inches of cover. Wire not to be installed that day shall not be laid out.
- F. An expansion curl shall be provided within 6 inches of each wire connection to a solenoid and at least every 100 feet of wire length on runs more than 100 feet in length. Expansion curls can be formed by wrapping five (5) turns of wire around a 1-inch diameter or larger pipe and then withdrawing the pipe.
- G. Contractor shall provide a complete wiring diagram showing wire routing for the connections between the controller and valves. See section one for the inclusion of wiring diagram in operation and maintenance manuals.

### 3.15 CONTROLLER INSTALLATION

- A. Install controller as detailed in locations shown on the drawings and as approved by the Snow College Irrigation Maintenance personnel.
- B. Contractor shall wire valves into controller and set proper program.

### 3.16 CHECK / TEST / START-UP / ADJUST

- A. Before any pipes are covered, the Owner's representative shall inspect the system for compliance with specifications and drawings. Any required changes will be made at this time at no expense to the owner.
- B. Flushing: After all piping, and valves are in place and connected, flush piping under a full head of water.
- C. Testing:
  - 1. Leakage test: test all lines for leaks under operating pressure. Main lines shall be tested before backfill for a period of not less than one hour, and shall have no leakage or loss of pressure. If leakage is present, repair all leaks and re-test.
  - 2. Coverage test: perform a coverage test in the presence of the Owner's Representative (notify Owner's representative at least seven (7) days in advance of scheduled coverage test). Representative will determine if the water coverage is complete and adequate. Readjust heads and/or head locations as necessary or directed to achieve proper coverage.
  - 3. All testing shall be at the expense of the Contractor.

### 3.17 CLEANING AND ADJUSTING

- A. At the completion of the work, all parts of the installation shall be thoroughly cleaned. All equipment, pipe, valves and fittings shall be cleaned of grease, metal cuttings and sludge that may have accumulated by the operation of the system for testing.
- B. Upon completion of all installation work, Contractor shall remove all leftover materials, equipment and debris resulting from work of this section from the site in a safe and legal manner.
- C. Adjust valve boxes to grade as required.
- D. After completion of grading, planting, and mulching, carefully adjust irrigation heads for proper watering.
- E. Each control zone shall be operated for a minimum of 15 minutes and checked for consistency of delivering water. Valves, timing devices or other mechanical or electrical components, which fail to meet manufacturer's standards, shall be rejected, replaced and tested until they meet the manufacturer's standards.

### 3.18 ACCEPTANCE AND OPERATION BY OWNER

- A. Upon completion of the work and acceptance by the Owner, the Contractor shall be responsible for the training of the Owner's Representative(s) in the operation of the system (provide minimum 48 hours written notice in advance of test). The Contractor shall furnish the Record Drawings and operational manuals prior to acceptance by the

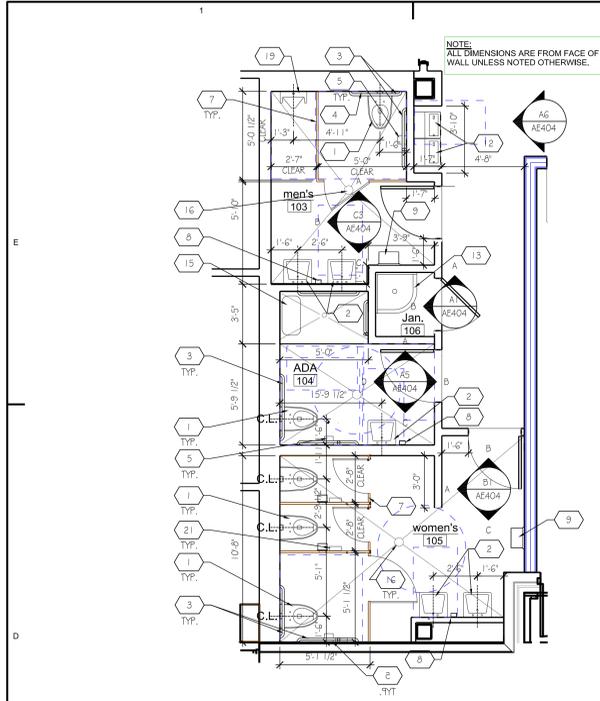
Owner. The Contractor shall guarantee all parts and labor for a minimum period of one (1) year from date of acceptance.

- B. It will be the responsibility of the Contractor to work with the Grounds Department and Sprinkler Shop to drain and winterize the system in the fall. It will also be their responsibility to help activate system in the spring and make sure there are no problems.

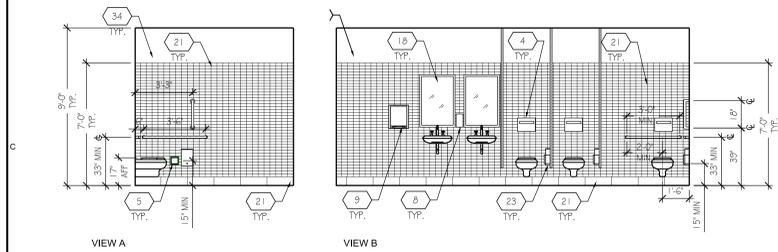
### 3.19 GUARANTEE

- A. All work shall be guaranteed for compliance with the drawings and specifications for a period of one year after the date of substantial completion. The contractor shall correct any deficiencies when notified during the warrantee period and correct in satisfactory condition any damage to the buildings or grounds, without cost to the owner. All guarantees shall be in writing and approved by the Owner's representative before submitting to the owner.
- B. RECORD IRRIGATION DRAWINGS maintained by the contractor shall be furnished to the Owner's representative before the time of the Systems Inspection and before any Substantial Completion Date will be issued.
- C. Provide first year backflow testing and certification to the owner.

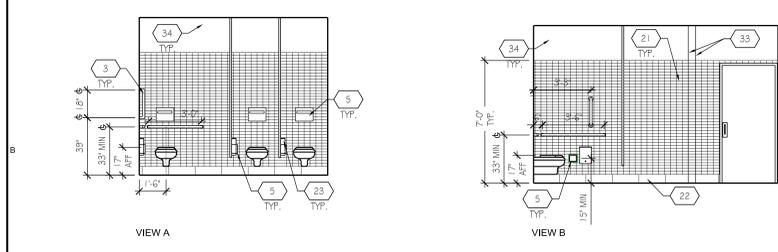
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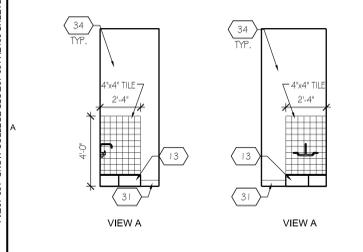
**D1 Restrooms Level 2**  
SCALE: 1/4" = 1'-0"



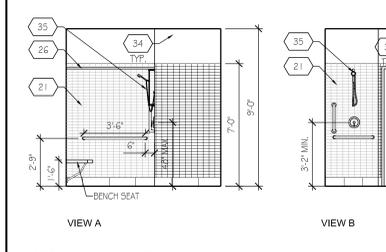
**C1 WOMEN'S 021**  
SCALE: 1/4" = 1'-0"



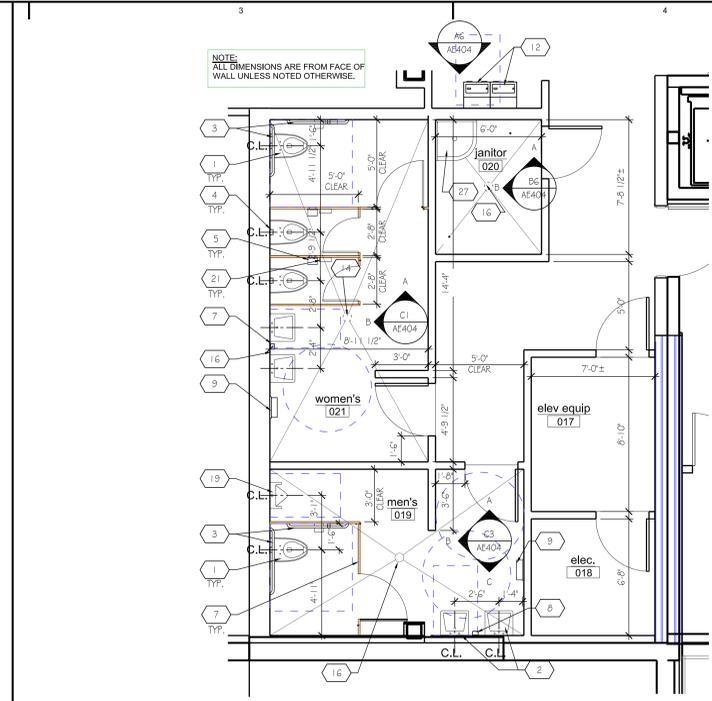
**B1 WOMEN'S 105**  
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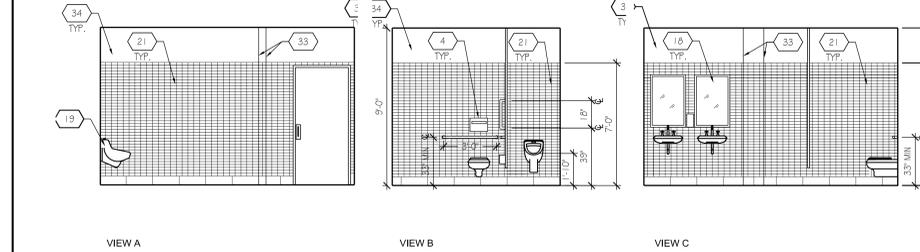
**A1 106 JANITOR**  
SCALE: 1/4" = 1'-0"



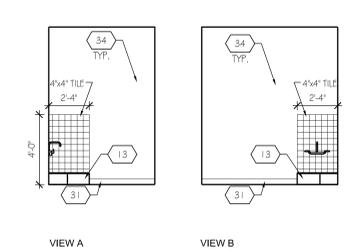
**A2 104 ADA**  
SCALE: 1/4" = 1'-0"



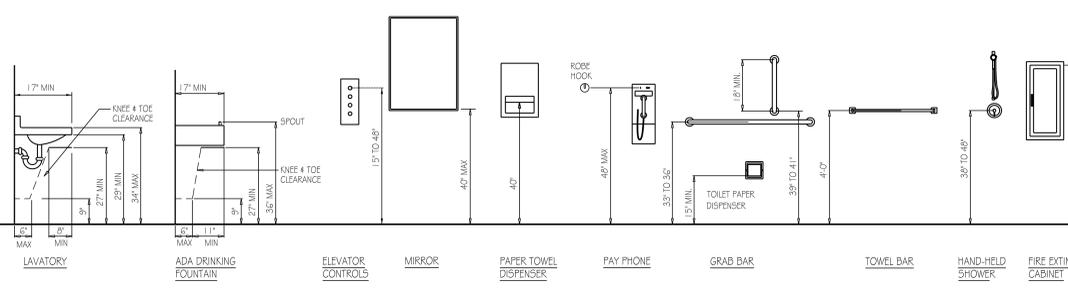
**D3 Restrooms Level 1**  
SCALE: 1/4" = 1'-0"



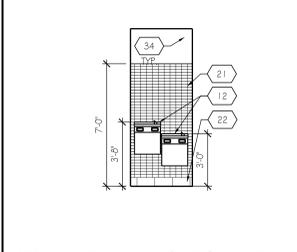
**C3 MEN'S 019**  
SCALE: 1/4" = 1'-0"



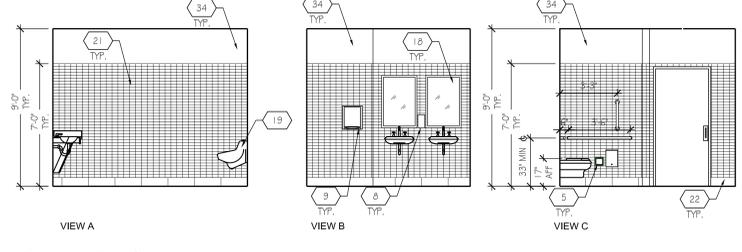
**B6 JANITOR 020**  
SCALE: 1/4" = 1'-0"



**B4 TYPICAL MOUNTING HEIGHTS**  
SCALE: 3/8" = 1'-0"



**A6 DRINKING FOUNTAIN**  
SCALE: 1/4" = 1'-0"



**A5 MEN'S 103**  
SCALE: 1/4" = 1'-0"

- REFER TO ADA404 FOR TYPICAL MOUNTING HEIGHTS FOR ALL FIXTURES, TYP. U.O.A. IN FLEV.**  
**B. ALL FIXTURES TO BE CENTERED IN THEIR ASSOCIATED STALLS WHERE APPLICABLE.**
- PLAN REFERENCE NOTES**
1. WALL HUNG TOILET.
  2. SINK.
  3. GRAB BAR.
  4. SEAT COVER DISPENSER, TYP. AT EACH TOILET.
  5. TOILET PAPER DISPENSER.
  6. CONCEALED BLOCKING AS REQUIRED.
  7. PARTITION WALL TYP. BLOCKING AS REQUIRED.
  8. SOAP DISPENSER.
  9. WALL MOUNTED PAPER TOWEL DISPENSER.
  10. CHILD CHANGING STATION.
  11. BLOCKING AS REQUIRED.
  12. DRINKING FOUNTAIN.
  13. UTILITY SINK.
  14. MOP RACK AND SHELF.
  15. ADA SHOWER WITH BENCH AND GRAB BARS.
  16. FLOOR DRAIN.
  17. TILE STARTS.
  18. 2'-0" X 3'-0" MIRROR, TYP. AT EACH SINK.
  19. URINAL.
  20. 40 GALLON TRASH CAN, BY OWNER.
  21. 2'x4" TILE WITH 3% OF TILES AN ACCENT COLOR, RANDOMLY PLACED.
  22. C'X I'8" TILE BASE.
  23. SANITARY NAPKIN DEPOSITORY.
  24. PAINTED GYPSUM BOARD.
  25. REMOVABLE SHOWER-HEAD.
  26. SHOWER CURTAIN AND ROD.
  27. SOAP TRAY.
  28. SHOWER SEAT.
  29. UTILITY SINK.
  30. MOP RACK AND SHELF.
  31. 4" VINYL BASE.
  32. WALL HUNG SHELVING UNIT.
  33. LINE OF WALL.
  34. GYP BOARD FINISH AS PER SCHEDULE.
  35. ADA COMPLIANT SHOWER HEAD.

**COOPER  
ROBERTS  
SIMONSEN  
ASSOCIATES**

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State of Utah Department of Administrative Services  
DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT

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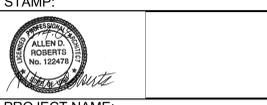
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andrea@madcinc.com



**PROJECT NAME:**  
**Snow College Library**  
**150 College Avenue**  
**Ephraim, Utah 84627**

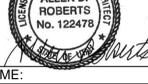
**REVISIONS:**

▲	DECEMBER 18, 2008
▲	DECEMBER 9, 2008
▲	DECEMBER 2, 2008
▲	NOVEMBER 25, 2008
▲	100% CD Review, August 4, 2008
▲	50% CD Review, May 27, 2008
▲	CD Review Set, May 2, 2008
▲	DD Set, April 18, 2008
▲	DD Review, April 4, 2008

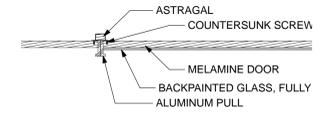
**ISSUE DATE:**  
AUGUST 4, 2008, 100% CD  
**ARCHITECT'S PROJECT NUMBER:**  
B07-051  
**DFCM PROJECT NUMBER:**  
07258700  
**SHEET TITLE:**

**ENLARGED PLANS,  
INTERIOR ELEVATIONS**

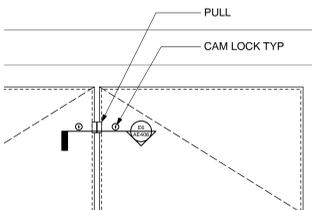
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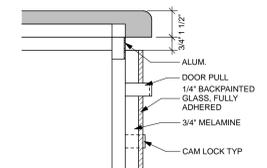
▲	DECEMBER 18TH, 2008
▲	DECEMBER 9TH, 2008
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▲	NOVEMBER 25TH, 2008
▲	100% CD, SEPTEMBER 15, 2008
▲	100% CD REVIEW, AUGUST 4, 2008



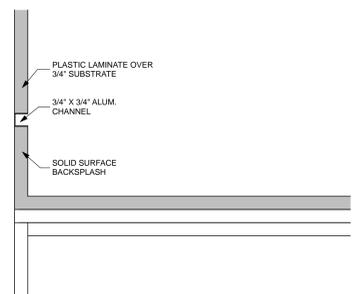
**E6** PULL DETAIL  
SCALE: 1 1/2" = 1'-0"



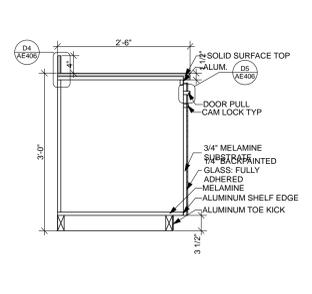
**D6** PULL DETAIL  
SCALE: 1 1/2" = 1'-0"



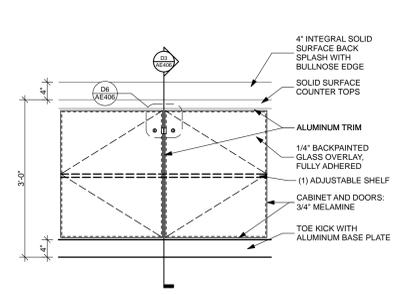
**D5** COUNTERTOP DETAIL  
SCALE: 3" = 1'-0"



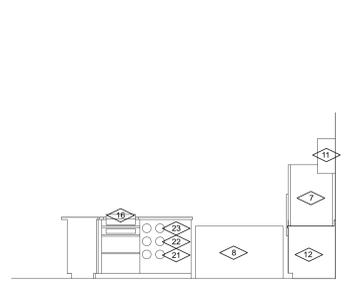
**D4** BACKSPLASH DETAIL  
SCALE: 3" = 1'-0"



**D3** TYP CAFE CASEWORK SECT  
SCALE: 3/4" = 1'-0"

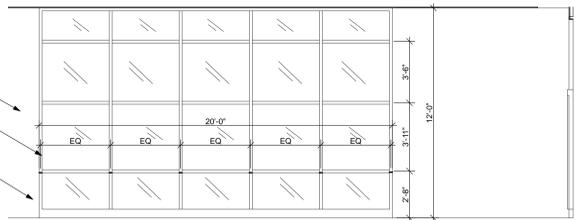


**D2** TYP CAFE CASEWORK ELEV  
SCALE: 3/4" = 1'-0"

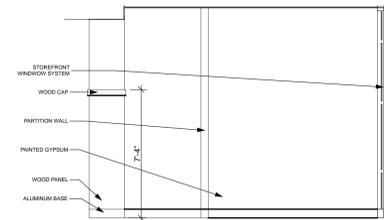


**D1** CAFE ELEV 12  
SCALE: 1/4" = 1'-0"

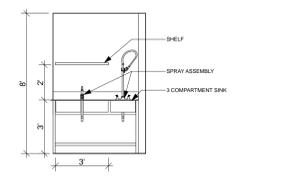
EQUIPMENT SCHEDULE												
ITEM NO.	QTY	DESCRIPTION	WIDTH	DEPTH	HEIGHT	WATER	DRAIN	MANUFACTURER	MODEL NO.	PROVIDED BY OWNER	INSTALLED BY OWNER	NOTES
1	1	FOOD PREP TABLE	5'-0 3/8"	2'-4 1/8"	3'-6 3/4"	NO	NO	TRUE	TSS40-16	●	●	ALLOW FOR 6" LEGS-TOP AIR DISCHARGE-HALF CUBE
2	1	ICE TUB	30"	31"	21"	YES	YES	HUBERT	ICE500A	●	●	COUNTER TOP
3	1	THIST SOFT SERVE ICE CREAM/OGURT	24"	34 1/2"	33 1/8"	YES	YES	SANSERV	501	●	●	STAINLESS STEEL
4	1	3 COMPARTMENT SINK	19"	2'-10"	19"	YES	YES	HUBERT		●	●	STAINLESS STEEL
4A	1	SPRAY ASSEMBLY FOR SINK	19"	2'-10"	19"	YES	NO	W. WALL BRACKET	B-2013	●	●	W/ WALL BRACKET
5	1	HAND SINK	15 1/2"	16 1/2"	13"	YES	YES	HUBERT		●	●	STAINLESS STEEL
6	1	SWING GLASS DOOR REFRIGERATOR	30"	29 7/8"	78 5/8"	NO	NO	TRUE	GOM-26	●	●	NON-HUMIDIFIED SERVICE MERCHANTS
7	1	SWING GLASS DOOR REFRIGERATOR	30"	29 7/8"	78 5/8"	NO	NO	TRUE	GOM-26F	●	●	NON-HUMIDIFIED SERVICE MERCHANTS
8	2	REFRIGERATED OPEN AIR DISPLAY CASE	47"	38 1/8"	50 1/8"	NO	NO	STRUCTURAL CONCEPTS	GS	●	●	NON-HUMIDIFIED SERVICE MERCHANTS
9	2	COUNTER TOP BLENDER	5 7/8"	7 7/8"	17"	NO	NO	BLENOTEC		●	●	64 OZ.
9A	4	BLENDER JAR	7 5/8"	7 7/8"	9 5/8"	NO	NO	BLENOTEC		●	●	64 OZ.
10	2	SOUL STEAMER OVEN	---	---	---	NO	NO	PAWSONIC	NE380	●	●	SIZE AS DETERMINED
10A	2	MICROWAVE FLATSTONE	---	---	---	NO	NO	SILAR	SOULMET WARE SOLUTIONS	●	●	ON CASTERS- SOLID DOOR
11	3	MENU BOARD	48" MIN.	3"	36" MIN.	NO	NO	TRUE	TUC-48	●	●	ON CASTERS- SOLID DOOR
12	1	UNDER COUNTER REFRIGERATOR	48 3/8"	30 1/8"	35"	NO	NO	TRUE	TUC-48F	●	●	VERIFY SIZE OF CUP DISPENSER BEFORE ORDERING RING BEZELS
13	1	UNDER COUNTER REFRIGERATOR	48 3/8"	30 1/8"	35"	NO	NO	TRUE	TUC-48F	●	●	VERIFY SIZE OF CUP DISPENSER BEFORE ORDERING RING BEZELS
14	1	ARBOOT COFFEE BREWER	---	---	---	YES	YES	BUNN	CWTF15-APS	●	●	VERIFY SIZE OF CUP DISPENSER BEFORE ORDERING RING BEZELS
15	2	SOUP WARMER KETTLE TYPE	---	---	---	NO	NO	WELLS	LLSC-11	●	●	LOCATION AS DETERMINED
16	1	CASH REGISTER	15-1/4"	1-7/8"	8"	NO	NO	SHARP	3110	●	●	LOCATION AS DETERMINED
17	8	THERMAL KARAFFE	---	---	---	NO	NO	BUNN-ARPOOT	LEVER ACTION	●	●	102 OZ STAINLESS STEEL
18	1	PAPER TOWEL DISPENSER	10-13/16"	4-11/16"	13-1/4"	NO	NO	BOBRICK	B-5362	●	●	SURFACE MOUNT- 525 MULTI-FOLD
19	1	LIQUID SOAP DISPENSER	---	---	---	NO	NO	BOBRICK	B-9250	●	●	SURFACE MOUNT- 40 OZ.
20	4	WALL MOUNT SHELF	3'-0"	1'-0"	---	NO	NO	ADVANCE TABCO		●	●	VERIFY SIZE OF CUP DISPENSER BEFORE ORDERING RING BEZELS
21	2	SOUP CUP DISPENSER	22-29/16"	22-29/16"	12 OZ + 1/4 OZ	NO	NO	DISPENSE-RITE	ADJ-RITE-1	●	●	VERIFY SIZE OF CUP DISPENSER BEFORE ORDERING RING BEZELS
22	2	SMOOTHIE CUP DISPENSER	22-29/16"	22-29/16"	12 OZ + 1/4 OZ	NO	NO	DISPENSE-RITE	ADJ-RITE-1	●	●	VERIFY SIZE OF CUP DISPENSER BEFORE ORDERING RING BEZELS
23	2	COFFEE CUP DISPENSER	22-29/16"	22-29/16"	12 OZ + 1/4 OZ	NO	NO	DISPENSE-RITE	ADJ-RITE-1	●	●	VERIFY SIZE OF CUP DISPENSER BEFORE ORDERING RING BEZELS
24	1	WATER FILTER SYSTEM	3'-0"	7"	2'-4"	YES	YES	EVERPURE	HIGH FLOW TRIPLE 50250	●	●	LOCATION AS DETERMINED
25	1	TRASH BIN	24"	22-1/4"	41"	NO	NO	RUBBERMAID	50 GAL. 2851	●	●	LOCATION AS DETERMINED



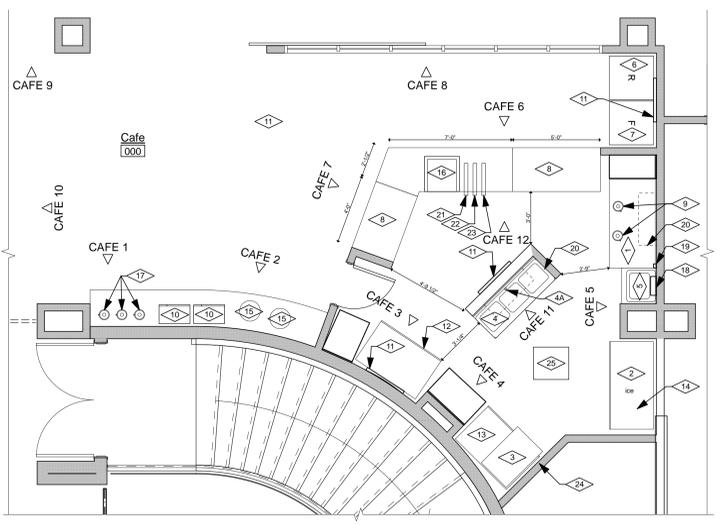
**C3** CAFE ELEV 9  
SCALE: 1/4" = 1'-0"



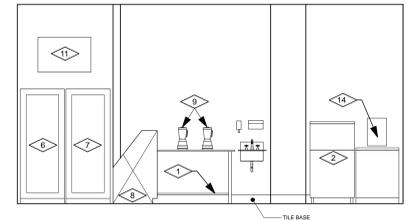
**C5** CAFE ELEV 10  
SCALE: 1/4" = 1'-0"



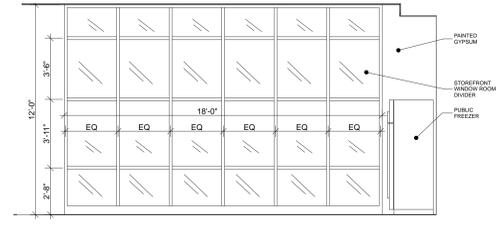
**C6** CAFE 11  
SCALE: 1/4" = 1'-0"



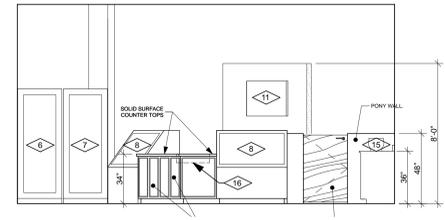
**A1** ENLARGED CAFE PLAN  
SCALE: 1/4" = 1'-0"



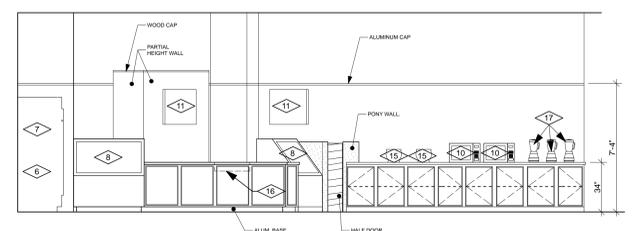
**B3** CAFE ELEV 5  
SCALE: 1/4" = 1'-0"



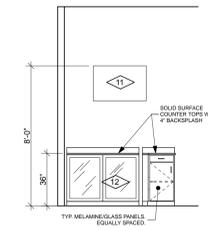
**B4** CAFE ELEV 8  
SCALE: 1/4" = 1'-0"



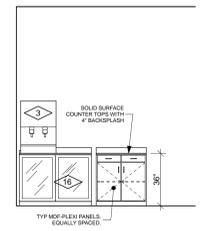
**B5** CAFE ELEV 7  
SCALE: 1/4" = 1'-0"



**A3** CAFE ELEV 1, 2, & 6  
SCALE: 1/4" = 1'-0"



**A5** CAFE ELEV 3  
SCALE: 1/4" = 1'-0"



**A6** CAFE ELEV 4  
SCALE: 1/4" = 1'-0"



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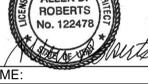
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STAMP:



PROJECT NAME:

**Snow College Library**

**150 College Avenue**

**Ephraim, Utah 84627**

REVISIONS:

▲ DECEMBER 18TH, 2008

▲ DECEMBER 9TH, 2008

▲ DECEMBER 2ND, 2008

▲ NOVEMBER 25TH, 2008

▲ 100% CD, SEPTEMBER 15, 2008

100% CD REVIEW, AUGUST 4, 2008

ISSUE DATE:

SEPTEMBER 15, 2008, 100% CD

ARCHITECT'S PROJECT NUMBER:

B07-051

DFCM PROJECT NUMBER:

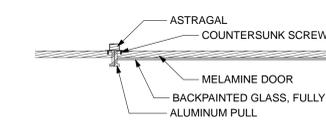
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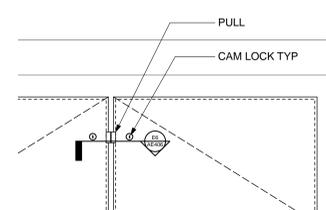
**Enlarged Floor Plans 5**

SHEET NUMBER:

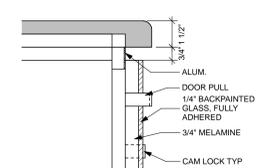
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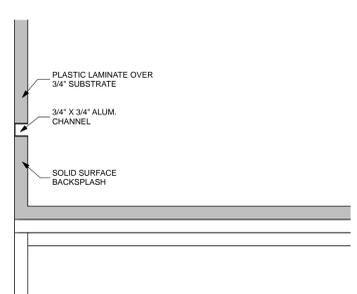
**E6 PULL DETAIL**  
SCALE: 1 1/2" = 1'-0"



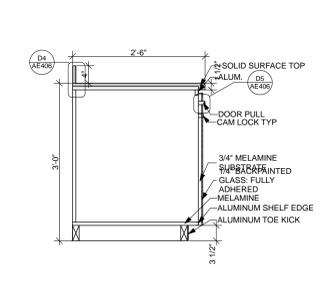
**D6 PULL DETAIL**  
SCALE: 1 1/2" = 1'-0"



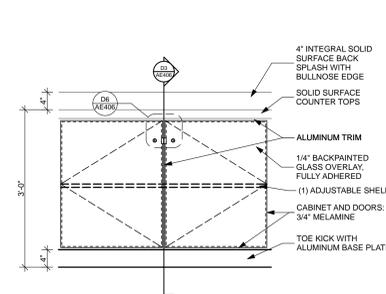
**D5 COUNTERTOP DETAIL**  
SCALE: 3" = 1'-0"



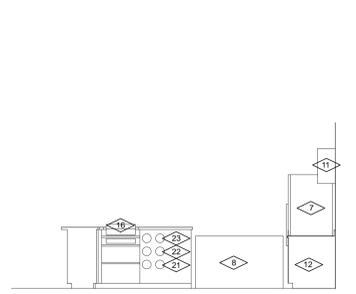
**D4 BACKSPLASH DETAIL**  
SCALE: 3" = 1'-0"



**D3 TYP CAFE CASEWORK SECT**  
SCALE: 3/4" = 1'-0"

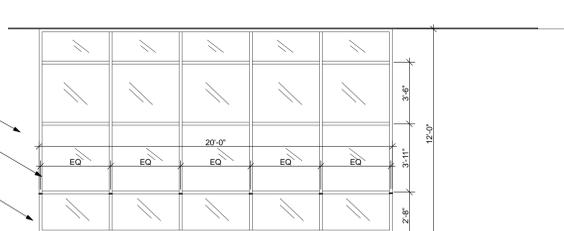


**D2 TYP CAFE CASEWORK ELEV**  
SCALE: 3/4" = 1'-0"

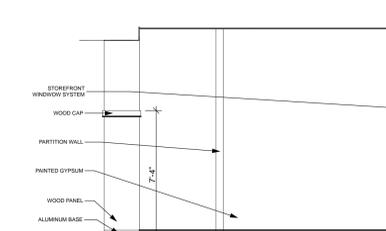


**D1 CAFE ELEV 12**  
SCALE: 1/4" = 1'-0"

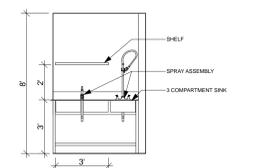
EQUIPMENT SCHEDULE												
ITEM NO.	QTY	DESCRIPTION	WIDTH	DEPTH	HEIGHT	WATER	DRAIN	MANUFACTURER	MODEL NO.	PROVIDED BY OWNER	INSTALLED BY OWNER	NOTES
1	1	FOOD PREP TABLE	5'-0 3/8"	2'-4 1/8"	3'-6 3/4"	NO	NO	TRUE	TSS40-16	●	●	ALLOW FOR 6" LEGS-TOP AIR DISCHARGE-HALF CUBE
2	1	ICE TUB	30"	31"	21"	YES	YES	HUBERT	ICE500A	●	●	COUNTER TOP
3	1	THIST SOFT SERVE ICE CREAM/OGURT	24"	34 1/2"	33 1/8"	YES	YES	SANSERV	501	●	●	STAINLESS STEEL
4	1	3 COMPARTMENT SINK	19"	2'-10"	19"	YES	YES	HUBERT		●	●	STAINLESS STEEL
4A	1	SPRAY ASSEMBLY FOR SINK				YES	NO	W. BRASS/BLACK BRASS/BRASS	B-2013	●	●	W/ WALL BRACKET
5	1	HAND SINK	15 1/2"	16 1/2"	13"	YES	YES	HUBERT		●	●	STAINLESS STEEL
6	1	SWING GLASS DOOR REFRIGERATOR	30"	29 7/8"	78 5/8"	NO	NO	TRUE	GOM-26	●	●	NON-HUMIDIFIED SERVICE MERCHANTS
7	1	SWING GLASS DOOR REFRIGERATOR	30"	29 7/8"	78 5/8"	NO	NO	TRUE	GOM-26F	●	●	NON-HUMIDIFIED SERVICE MERCHANTS
8	2	REFRIGERATED OPEN AIR DISPLAY CASE	47"	38 1/8"	50 1/8"	NO	NO	STRUCTURAL CONCEPTS	GS	●	●	NON-HUMIDIFIED SERVICE MERCHANTS
9	2	COUNTER TOP BLENDER	5 7/8"	7 7/8"	17"	NO	NO	BLENOTEC		●	●	64 OZ.
9A	4	BLENDER JAR	7 5/8"	7 5/8"	9 5/8"	NO	NO	BLENOTEC		●	●	64 OZ.
10	2	SOUL STEAMER OVEN				NO	NO	PAWSONIC	NE380	●	●	
10A	2	MICROWAVE FLATSTONE				NO	NO	SILAR		●	●	
11	3	MENU BOARD	48" MIN.	3"	36" MIN.	NO	NO	COULMAGE SOLUTIONS		●	●	SIZE AS DETERMINED
12	1	UNDER COUNTER REFRIGERATOR	48 3/8"	30 1/8"	35"	NO	NO	TRUE	TUC-48	●	●	ON CASTERS- SOLID DOOR
13	1	UNDER COUNTER REFRIGERATOR	48 3/8"	30 1/8"	35"	NO	NO	TRUE	TUC-48F	●	●	ON CASTERS- SOLID DOOR
14	1	ARBOOT COFFEE BREWER				YES	YES	BUNN	CWTF15-APS	●	●	
15	2	SOUP WARMER KETTLE TYPE				NO	NO	WELLS	LLSC-11	●	●	W/ INSERT
16	1	CASH REGISTER	15-1/4"	1'-7"	8"	NO	NO	SHARP	3110	●	●	VERIFY W/ CAFE OPERATOR
17	8	THERMAL KARAFFE				NO	NO	BUNN-ARPOOT	LEVER ACTION	●	●	102 OZ STAINLESS STEEL
18	1	PAPER TOWEL DISPENSER	10-13/16"	4-11/16"	13-1/4"	NO	NO	BOBRICK	B-5362	●	●	SURFACE MOUNT- 525 MULTI-FOLD
19	1	LIQUID SOAP DISPENSER				NO	NO	BOBRICK	B-9250	●	●	SURFACE MOUNT- 40 OZ.
20	4	WALL MOUNT SHELF	3'-0"	1'-0"		NO	NO	ADVANCE TABCO		●	●	
21	2	SOUP CUP DISPENSER	ONE CUP PER DISPENSER	22-29/16"	12 OZ + 1/4 OZ	NO	NO	DISPENSE-RITE	ADJ-RITE-1	●	●	VERIFY SIZE CUP PER SIZE BEFORE ORDERING-RITE BEBELS
22	2	SMOOTHIE CUP DISPENSER	ONE CUP PER DISPENSER	22-29/16"	12 OZ + 1/4 OZ	NO	NO	DISPENSE-RITE	ADJ-RITE-1	●	●	VERIFY SIZE CUP PER SIZE BEFORE ORDERING-RITE BEBELS
23	2	COFFEE CUP DISPENSER	ONE CUP PER DISPENSER	22-29/16"	12 OZ + 1/4 OZ	NO	NO	DISPENSE-RITE	ADJ-RITE-1	●	●	VERIFY SIZE CUP PER SIZE BEFORE ORDERING-RITE BEBELS
24	1	WATER FILTER SYSTEM	3'-0"	7"	2'-4"	YES	YES	EVERPURE	HIGH FLOW TRIPLE 50250	●	●	LOCATION AS DETERMINED
25	1	TRASH BIN	24"	22-1/4"	41"	NO	NO	RUBBERMAID	50 GAL. 2851	●	●	



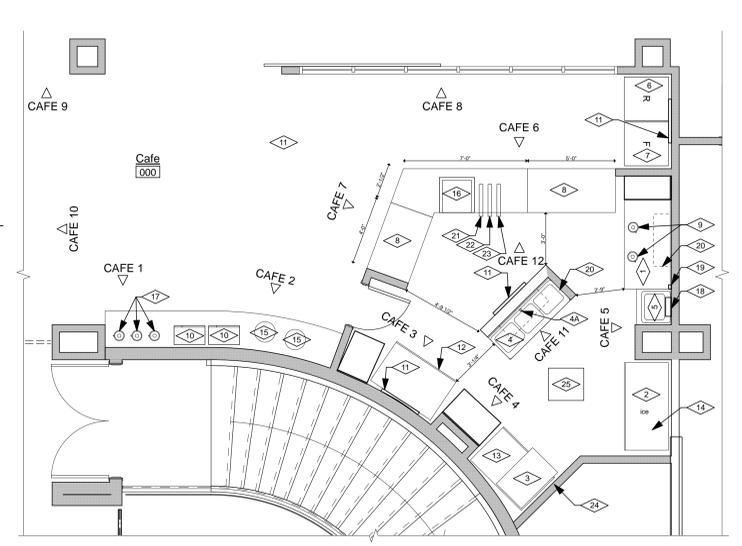
**C3 CAFE ELEV 9**  
SCALE: 1/4" = 1'-0"



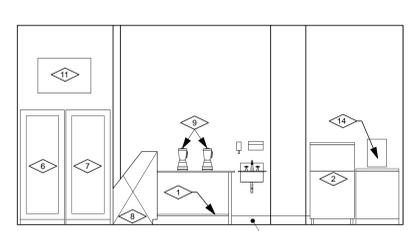
**C5 CAFE ELEV 10**  
SCALE: 1/4" = 1'-0"



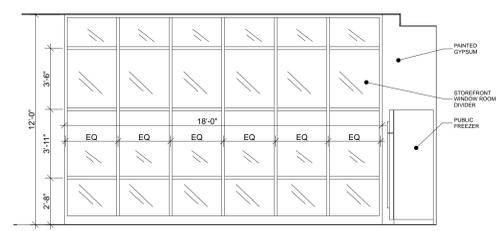
**C6 CAFE 11**  
SCALE: 1/4" = 1'-0"



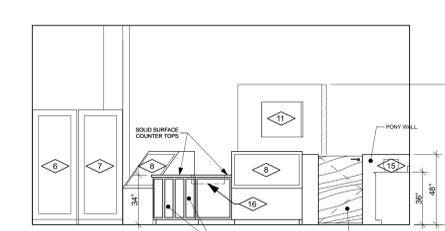
**A1 ENLARGED CAFE PLAN**  
SCALE: 1/4" = 1'-0"



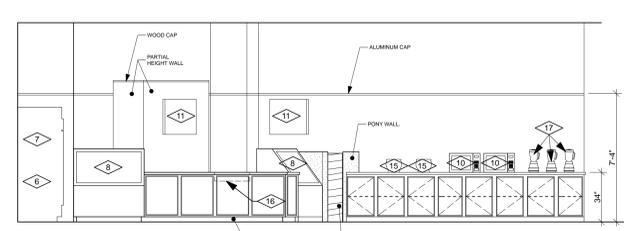
**B3 CAFE ELEV 5**  
SCALE: 1/4" = 1'-0"



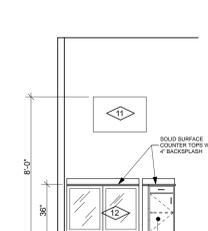
**B4 CAFE ELEV 8**  
SCALE: 1/4" = 1'-0"



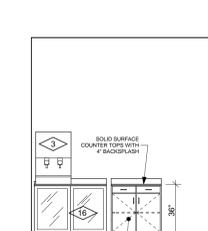
**B5 CAFE ELEV 7**  
SCALE: 1/4" = 1'-0"



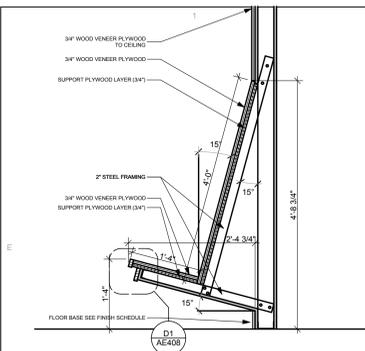
**A3 CAFE ELEV 1, 2, & 6**  
SCALE: 1/4" = 1'-0"



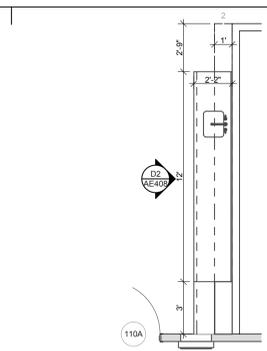
**A5 CAFE ELEV 3**  
SCALE: 1/4" = 1'-0"



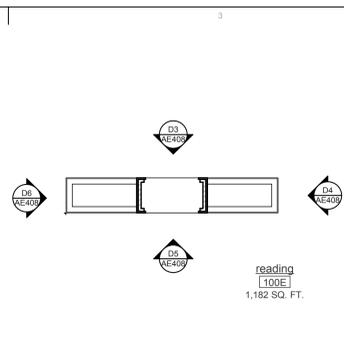
**A6 CAFE ELEV 4**  
SCALE: 1/4" = 1'-0"



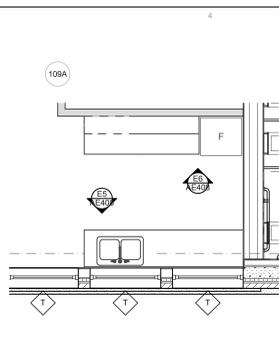
**E1 BENCH SECTION DETAIL**  
SCALE: 3/4" = 1'-0"



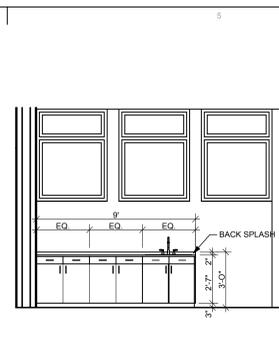
**E2 110 ENLARGED A**  
SCALE: 1/4" = 1'-0"



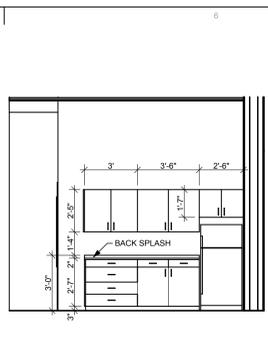
**E3 FIREPLACE**  
SCALE: 1/4" = 1'-0"



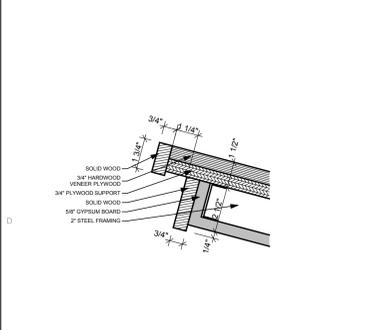
**E4 107 ENLARGED**  
SCALE: 1/4" = 1'-0"



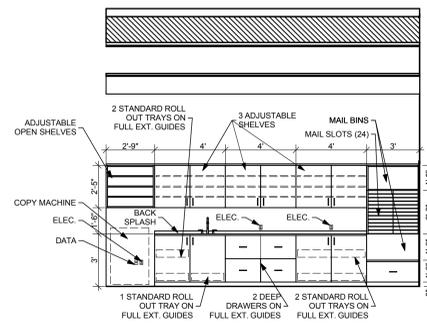
**E5 109 A ENLARGED**  
SCALE: 1/4" = 1'-0"



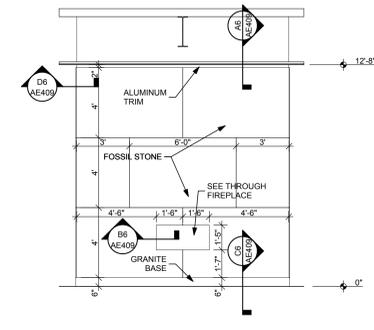
**E6 109 B ENLARGED**  
SCALE: 1/4" = 1'-0"



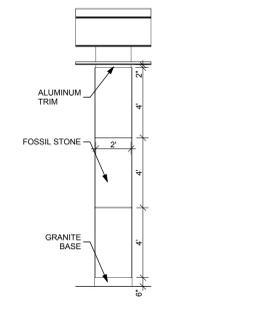
**D1 BENCH SECTION FRONT**  
SCALE: 3/4" = 1'-0"



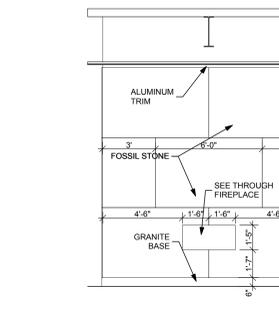
**D2 110 B Elevation**  
SCALE: 1/4" = 1'-0"



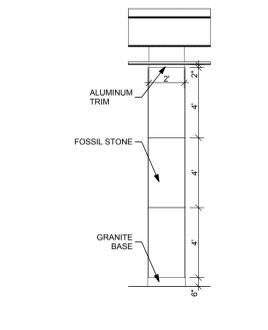
**D3 NORTH ELEVATION**  
SCALE: 1/4" = 1'-0"



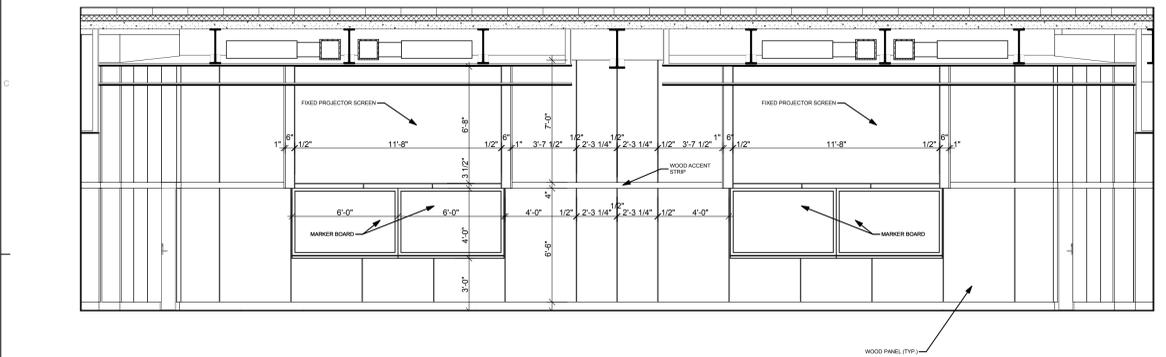
**D4 EAST ELEVATION**  
SCALE: 1/4" = 1'-0"



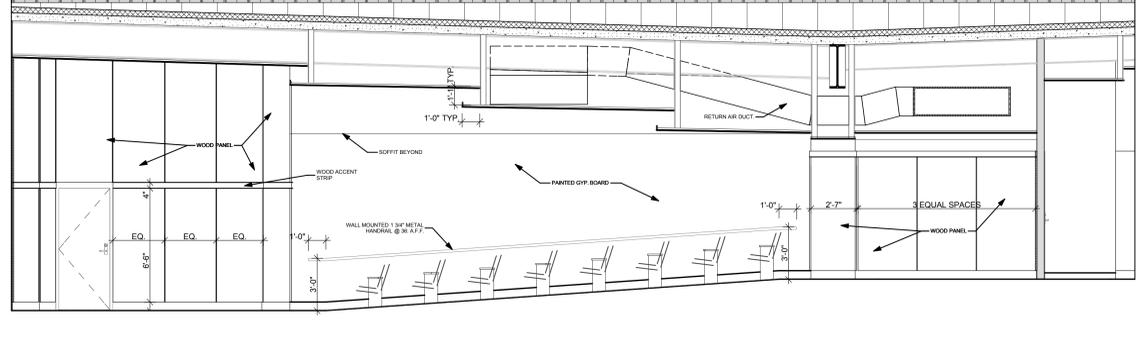
**D5 SOUTH ELEVATION**  
SCALE: 1/4" = 1'-0"



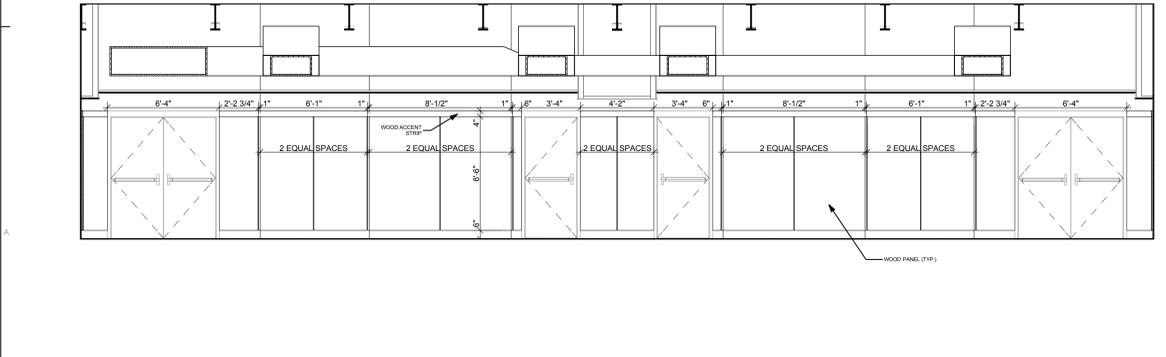
**D6 WEST ELEVATION**  
SCALE: 1/4" = 1'-0"



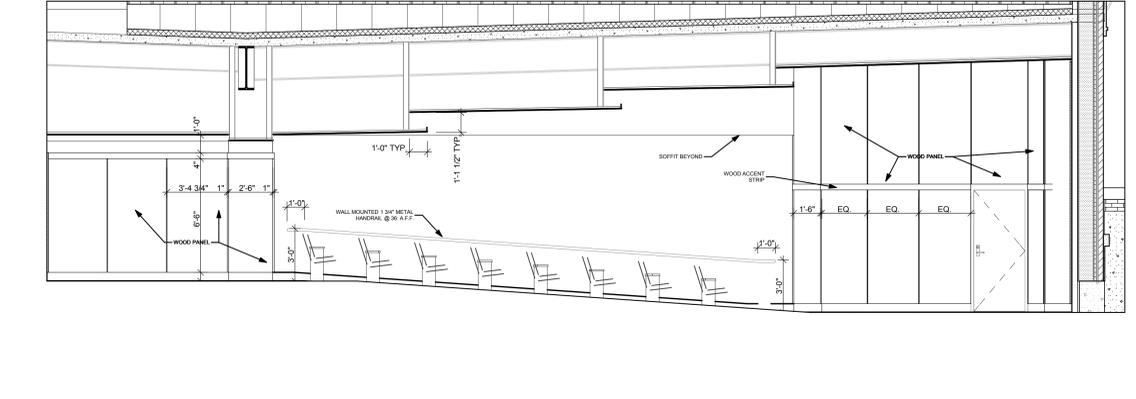
**B1 South Elevation**  
SCALE: 1/4" = 1'-0"



**B4 West Elevation**  
SCALE: 1/4" = 1'-0"



**A1 North Elevation**  
SCALE: 1/4" = 1'-0"



**A4 East Elevation**  
SCALE: 1/4" = 1'-0"

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STAMP:

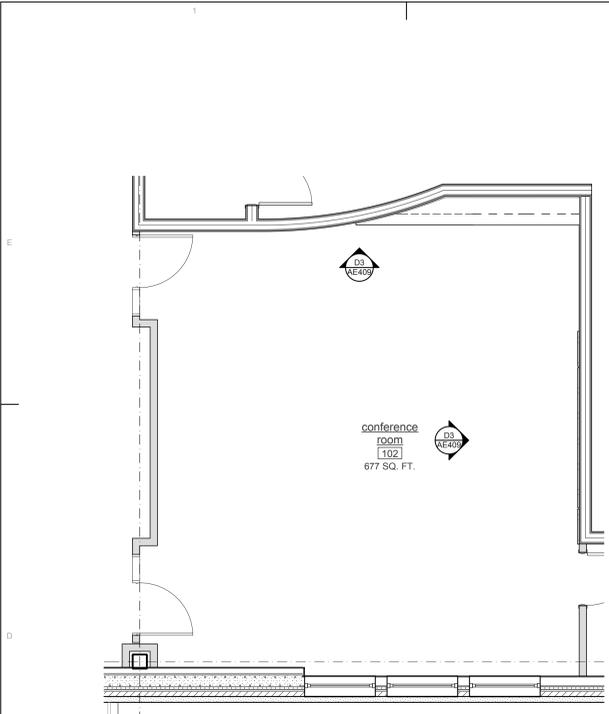
PROJECT NAME:  
**Snow College Library**  
**150 College Avenue**  
**Ephraim, Utah 84627**

REVISIONS:  
▲ DECEMBER 18TH, 2008  
▲ DECEMBER 9TH, 2008  
▲ DECEMBER 2ND, 2008  
▲ NOVEMBER 25TH, 2008  
100% CD, September 15, 2008  
100% CD Review, August 4, 2008  
ISSUE DATE:

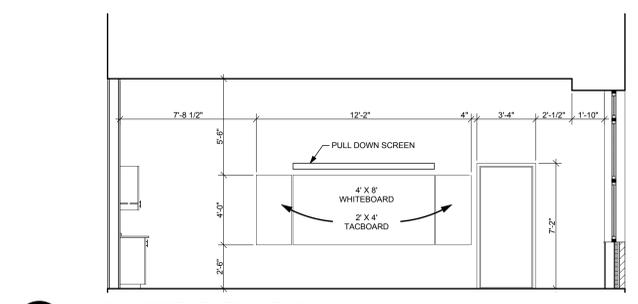
SEPTEMBER 15 2008, 100% CD  
ARCHITECT'S PROJECT NUMBER:  
B07-051  
DFCM PROJECT NUMBER:  
07258700  
SHEET TITLE:

**ENLARGED PLANS,**  
**INTERIOR ELEVATIONS**

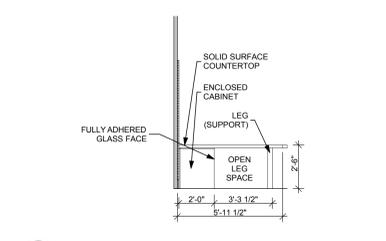
SHEET NUMBER:  
**AE408**



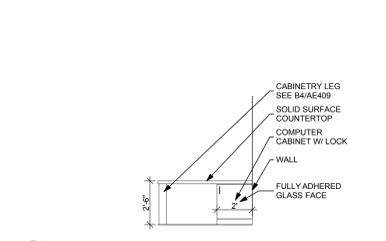
**D1 ROOM 102 ENLARGED**  
1/4" = 1'-0"



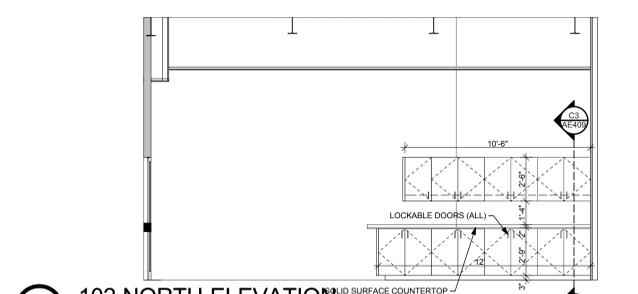
**E3 102 WEST ELEVATION**  
1/4" = 1'-0"



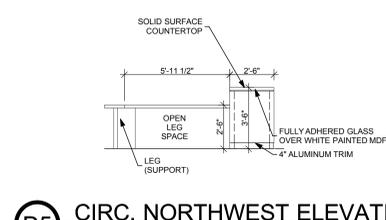
**E5 CIRC. NORTH ELEVATION**  
1/4" = 1'-0"



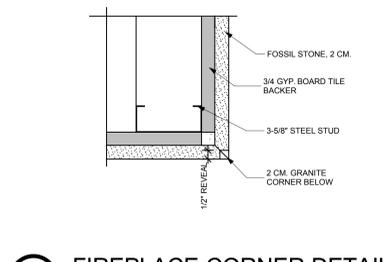
**E6 DESK 4**  
1/4" = 1'-0"



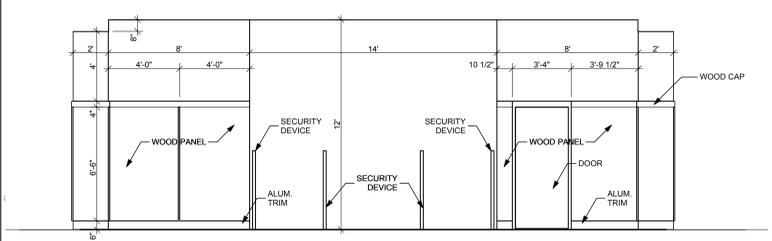
**D3 102 NORTH ELEVATION**  
1/4" = 1'-0"



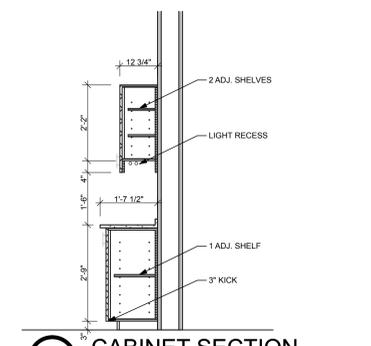
**D5 CIRC. NORTHWEST ELEVATION**  
1/4" = 1'-0"



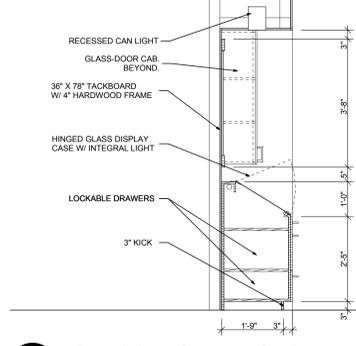
**D6 FIREPLACE CORNER DETAIL**  
3" = 1'-0"



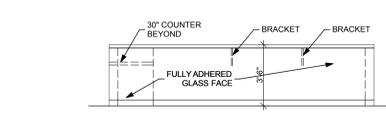
**C1 100 F SOUTH ELEVATION**  
1/4" = 1'-0"



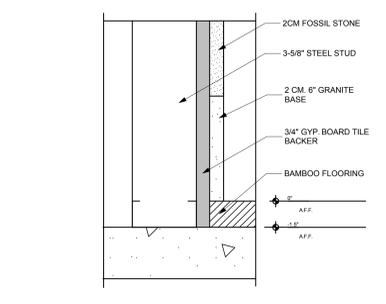
**C3 CABINET SECTION**  
1/2" = 1'-0"



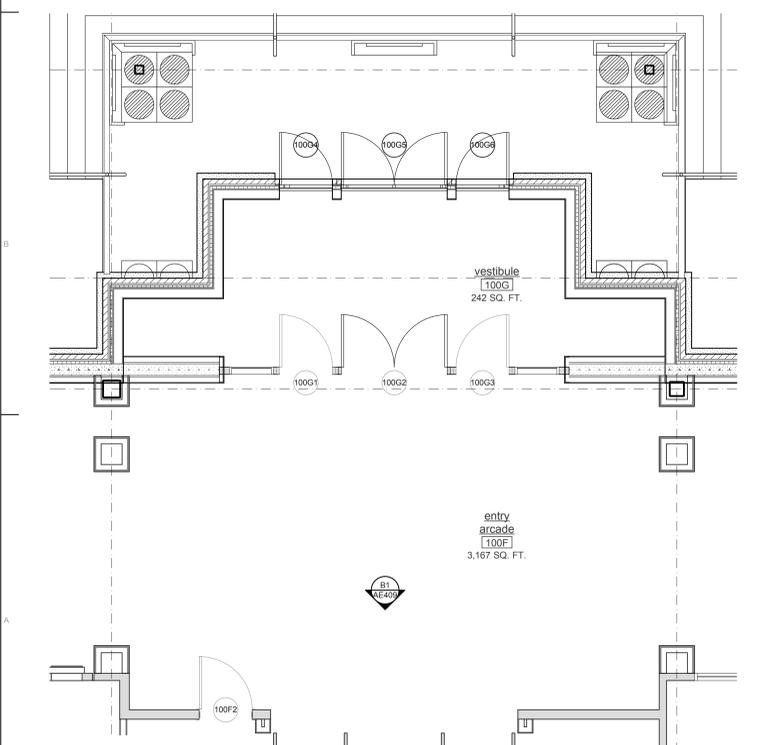
**C4 GLASS DISPLAY CASE**  
1/2" = 1'-0"



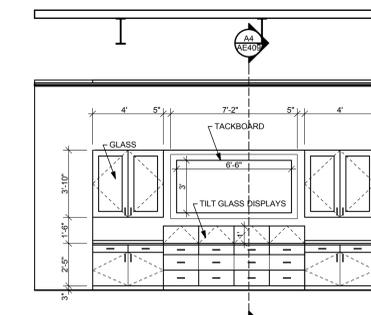
**C5 CIRC. SOUTHWEST ELEVATION**  
1/4" = 1'-0"



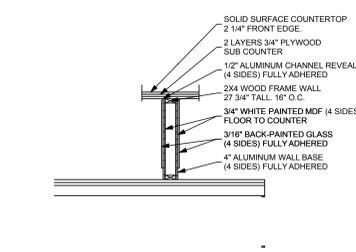
**C6 FIREPLACE BASE DETAIL**  
3" = 1'-0"



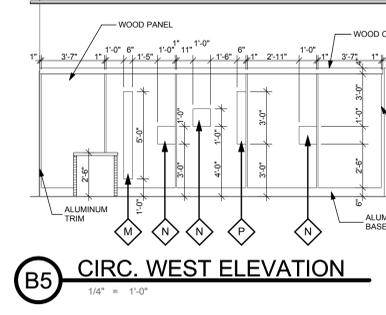
**A1 ROOM 100 F ENLARGED**  
1/4" = 1'-0"



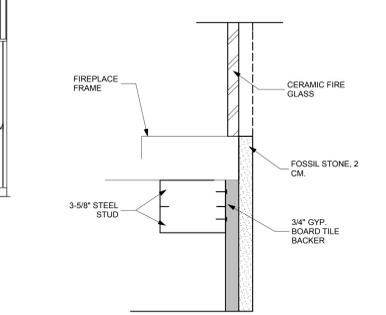
**B3 207 NORTH**  
1/4" = 1'-0"



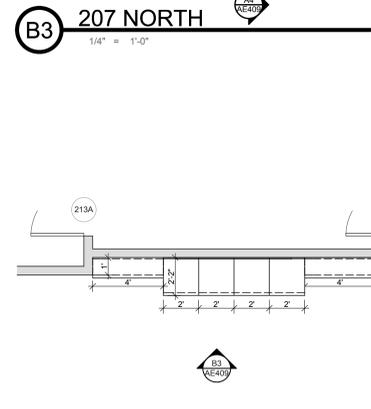
**B4 CIRC. CABINERY LEG**  
1/2" = 1'-0"



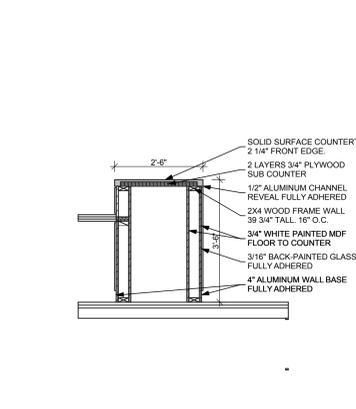
**B5 CIRC. WEST ELEVATION**  
1/4" = 1'-0"



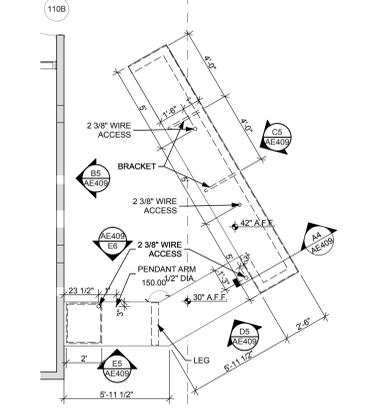
**B6 FIREPLACE INSERT DETAIL**  
3" = 1'-0"



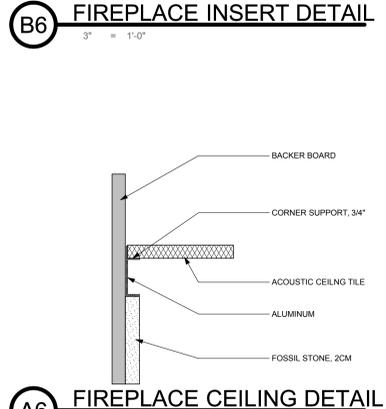
**A3 207 A ENLARGED**  
1/4" = 1'-0"



**A4 CIRC. CABINERY SECTION**  
1/2" = 1'-0"



**A5 CIRCULATION DESK**  
1/4" = 1'-0"

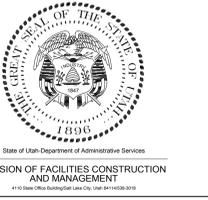


**A6 FIREPLACE CEILING DETAIL**  
3" = 1'-0"

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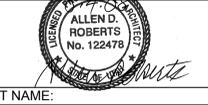
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PROJECT NAME:  
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150 College Avenue  
Ephraim, Utah 84627

REVISIONS:  
▲ DECEMBER 18TH, 2008  
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SEPTEMBER 15 2008, 100% CD

ARCHITECT'S PROJECT NUMBER:  
B07-051  
DFCM PROJECT NUMBER:  
07258700  
SHEET TITLE:

**ENLARGED PLANS,  
INTERIOR ELEVATIONS**

SHEET NUMBER:  
**AE409**

P:\007\031 Snow College Library\Drawings\Architect\007\_051 Interior\addenda model.dgn  
2008-12-18



**GENERAL NOTES**

- A. REFER TO SNOW COLLEGE STANDARDS
- B. REFER TO LANDSCAPE & CIVIL DRAWINGS FOR EXTENT OF SELECTED DEMOLITION FOR ALL ADD. ALTERNATIVES

**KEYED NOTES**

- 1. NEW SIDEWALK
- 2. BIKE RACK LOCATION
- 3. ELECTRICAL EQUIPMENT ENCLOSURE
- 4. DUMPSTER ENCLOSURE, SEE AS103 FOR DETAILS
- 5. CHILLER ENCLOSURE, SEE AS103 FOR DETAILS
- 6. TUNNEL, SEE MECHANICAL
- 7. ADA RAMP, SEE DETAIL A2/AS104
- 8. PARKING SPOTS RESERVED FOR ALTERNATIVE FEUL VEHICLES, SEE SIGN DETAIL A6/AS104 AND B4/AS104
- 9. PARKING SPOTS RESERVED FOR CARPOOL VEHICLES, SEE SIGN DETAIL A6/AS104 AND B4/AS104
- 10. BOUNDARY, BASE PROJECT SCOPE
- 11. BOUNDARY, ADD ALTERNATE A
- 12. RETAINING WALLS - SEE SHEET C1.1 FOR DETAILS
- 13. DOWNSPOUT LOCATIONS - SEE ROOF PLANS
- 14. ROOF DRAINS - SEE ROOF PLANS
- 15. LAND DRAINS - SEE SHEET C3.1 FOR DETAILS
- 16. CATCH BASINS - SEE SHEET C3.1 FOR DETAILS
- 17. FIRE HYDRANT
- 18. FLOOR DRAINS - SEE SHEET C3.1 FOR DETAILS
- 19. LIGHT BOLLARD - SEE ES101 FOR DETAILS
- 20. SIDEWALK TO BE REMOVED
- 21. TREES TO BE REMOVED

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ROBERTS  
SIMONSEN  
ASSOCIATES

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**SNOW**  
COLLEGE



State of Utah Department of Administrative Services  
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dew@spectrum-engineers.com

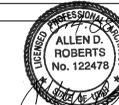
**AV Consultant**

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andrea@madcinc.com

**STAMP:**



**PROJECT NAME:**

**Snow College Library**

**150 College Avenue  
Ephraim, Utah 84627**

**REVISIONS:**

- ▲ DECEMBER 18TH, 2008
- ▲ DECEMBER 9TH, 2008
- ▲ DECEMBER 2ND, 2008
- ▲ NOVEMBER 25TH, 2008

100% CD, September 15, 2008  
100% CD Review, August 4, 2008

**ISSUE DATE:**

SEPTEMBER 15 2008, 100% CD

**ARCHITECT'S PROJECT NUMBER:**

B07-051

**DFCM PROJECT NUMBER:**

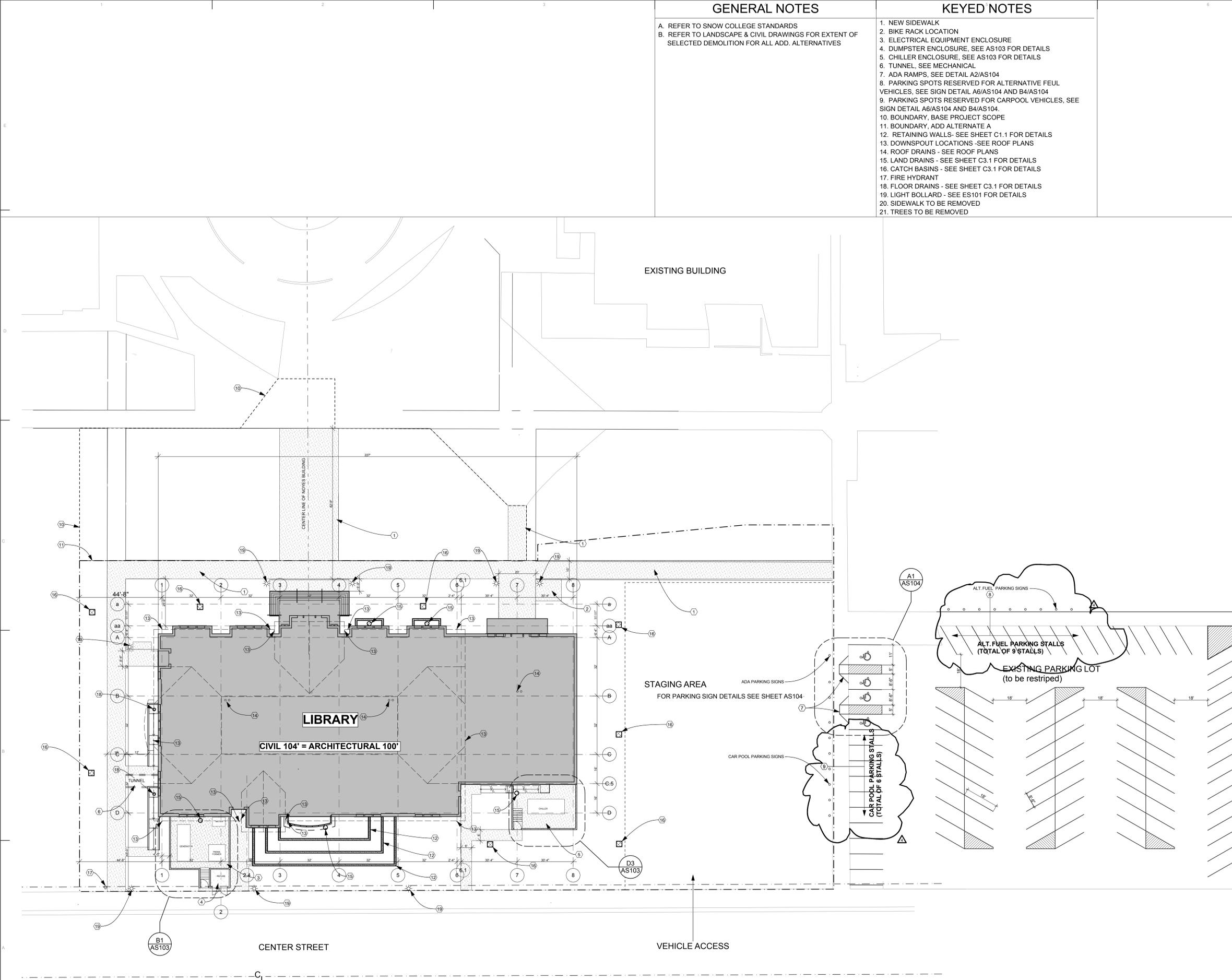
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**SHEET TITLE:**

**Architectural Site Plan, Add.  
Alt Scheme A**

**SHEET NUMBER:**

**AS101**



**1** Architectural Site Plan, Add Alt. 1, Scheme A  
SCALE: 1" = 20'



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2008-12-17

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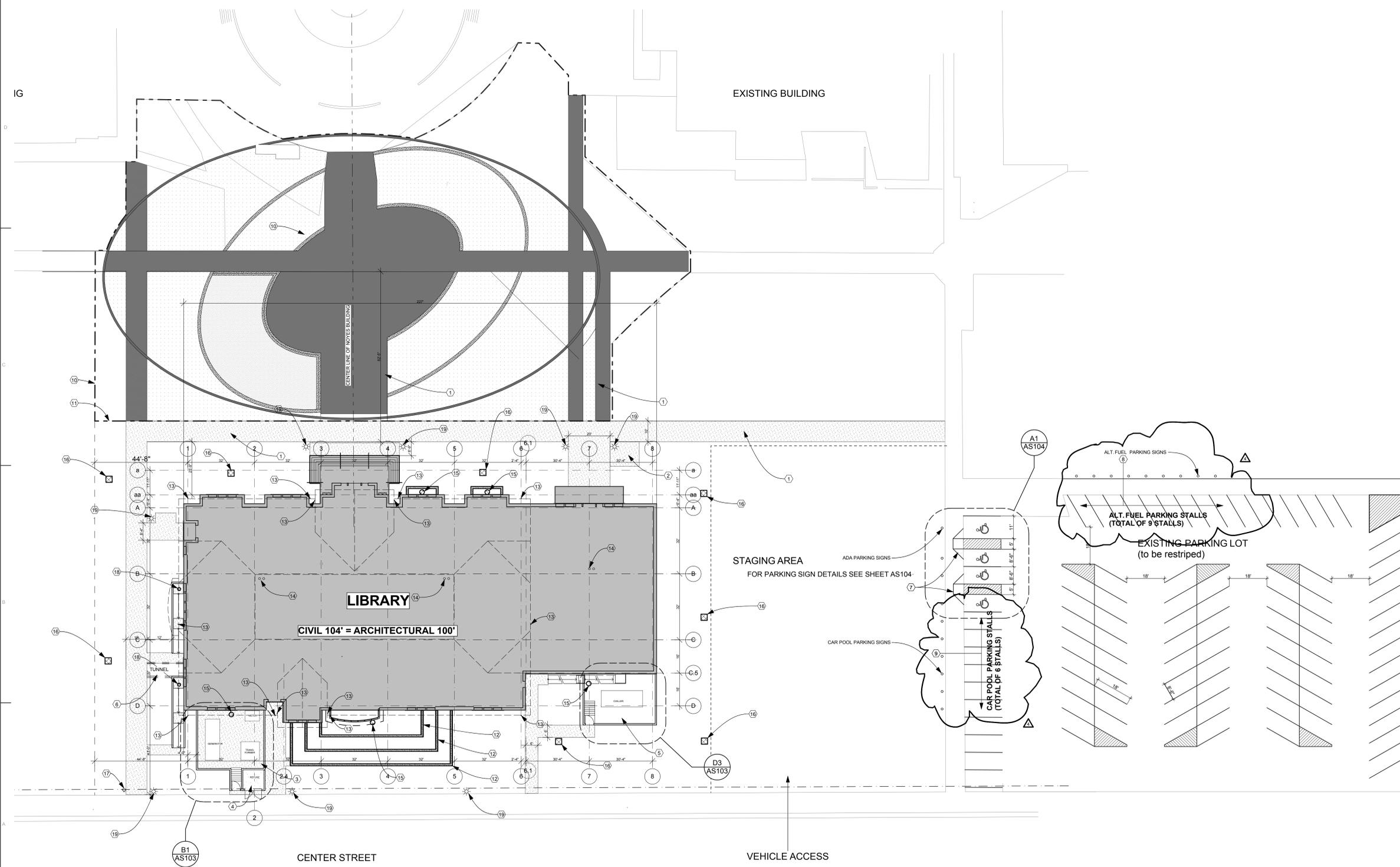
PROJECT NAME:  
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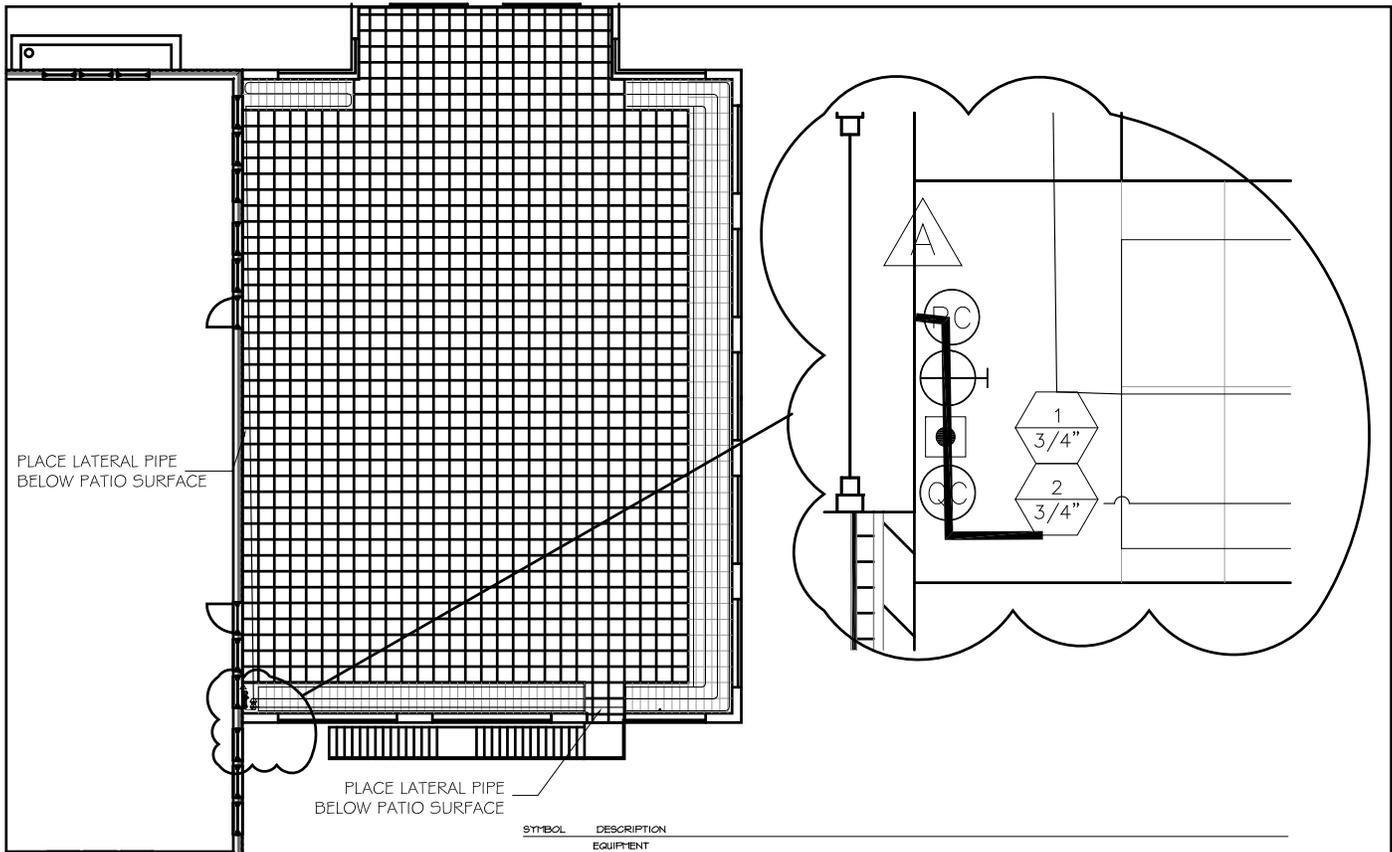
**Architectural Site Plan, Add.**  
**Alt Scheme B**

SHEET NUMBER:  
**AS102**



**1** Architectural Site Plan, Add. Alt 1, Scheme B  
 SCALE: 1" = 20'

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 2008-12-17



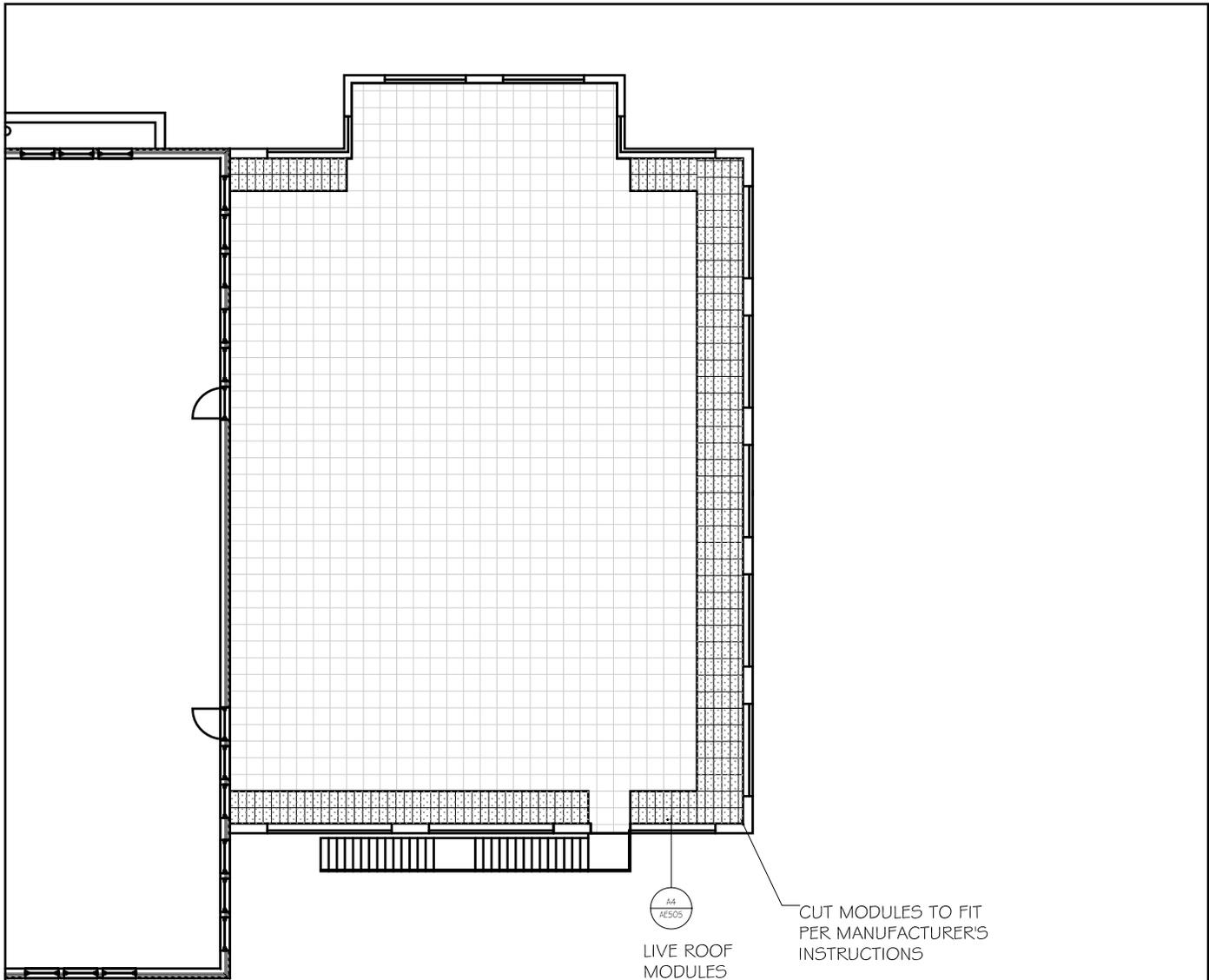
SYMBOL	DESCRIPTION	EQUIPMENT
⊕	POINT OF CONNECTION	SEE MECHANICAL DRAWING FOR CONNECTION INFORMATION
⊕	BACKFLOW PREVENTOR	RAINBIRD XGZ-15 PRF-BF
⊕	MANUAL DRAIN VALVE	RAINBIRD ESP-41 (CONTACT OWNER FOR EXACT LOCATION)
⊕	QUICK COUPLER VALVE	2" IRRIGATION MAINLINE
⊕	REMOTE CONTROL DRIP VALVE	IRRIGATION LATERAL LINE - SIZE AS NECESSARY
⊕	CONTROLLER	
⊕	VALVE NUMBER	
⊕	VALVE SIZE	

DRIP EQUIPMENT  
 LANDSCAPE DRIFLINE  
 COMPRESSION FLUSH CAP  
 DRIFLINE STAKE  
 BARG TEE

**DRIP IRRIGATION NOTES**  
 EACH DRIP IRRIGATION ZONE HAS BEEN DESIGNED SCHEMATICALLY TO ACCOMMODATE UP TO 800 LINEAR FEET OF LANDSCAPE DRIFLINE. CONTRACTOR SHALL VERIFY THAT EACH DRIP ZONE DOES NOT EXCEED THE QUANTITY OF DRIFLINE AT WHICH THE SYSTEM WILL OPERATE PROPERLY.  
 DRIP IRRIGATION SYSTEM HAS BEEN DESIGNED TO RUN AT APPROXIMATELY 30 PSI. CONTRACTOR SHALL ENSURE THAT EACH ZONE HAS PROPER PSI AVAILABLE FOR PROPER SYSTEM OPERATION.  
 IRRIGATE WITH A LOOPED DRIFLINE DESIGN.  
 CONTRACTOR SHALL INSTALL LANDSCAPE DRIFLINE, AND ALL OTHER DRIP EQUIPMENT AS PER MANUFACTURER'S SPECIFICATIONS.

**GENERAL NOTES**  
 IRRIGATION PLAN IS SCHEMATIC. IRRIGATION CONTRACTOR SHALL EXAMINE SITE CONDITIONS UNDER WHICH WORK IS TO BE PERFORMED. IF CONDITIONS ARE UNSATISFACTORY CONTRACTOR SHALL CONTACT OWNER'S REPRESENTATIVE IN WRITING. DO NOT PROCEED UNTIL CONDITIONS ARE SATISFACTORY.  
 THE IRRIGATION CONTRACTOR SHALL COORDINATE THE WORK WITH OTHER CONTRACTORS. IRRIGATION CONTRACTOR SHALL BE FAMILIAR WITH ALL ASPECTS OF THE SITE. IRRIGATION CONTRACTOR SHALL REPAIR ANY DAMAGE, AT NO EXPENSE TO THE OWNER, AND DAMAGE CAUSED BY THE IRRIGATION CONTRACTOR.  
 DO NOT WILLFULLY INSTALL IRRIGATION SYSTEM AS SHOWN ON DRAWINGS IF IT BECOMES OBVIOUS IN THE FIELD THAT THAT CONDITIONS EXIST THAT MAY NOT HAVE BEEN CONSIDERED DURING ENGINEERING. UNKNOWN OBSTRUCTION, OR AREA DIFFERENCES SHALL BE REPORTED TO ARCHITECT. IF OBSTRUCTIONS OR DIFFERENCES ARE NOT REPORTED IMMEDIATELY, IRRIGATION CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR NECESSARY REVISIONS.  
 ALL IRRIGATION EQUIPMENT SHALL BE INSTALLED AS PER MANUFACTURERS RECOMMENDATIONS AND SPECIFICATIONS.  
 IRRIGATION MAIN LINES SHALL CONFORM TO SIZES INDICATED ON THE DRAWINGS. IRRIGATION LATERAL LINES SHALL BE SIZED AS NECESSARY.  
 THE IRRIGATION CONTRACTOR SHALL MAKE FINAL CONNECTION FROM ELECTRICAL SOURCE TO IRRIGATION CONTROLLER(S) AND MAKE ELECTRICAL CONNECTIONS FROM NEW VALVES TO THE IRRIGATION CONTROLLER(S). SEE ELECTRICAL DRAWINGS FOR POWER SUPPLY. IRRIGATION CONTRACTOR SHALL VERIFY LOCATION OF CONTROLLER WITH OWNER'S AUTHORIZED REPRESENTATIVE.  
 THE IRRIGATION CONTRACTOR SHALL PROVIDE THE OWNER OR OWNER'S AUTHORIZED REPRESENTATIVE, AT FINAL INSPECTION A COMPLETE LIST OF WRITTEN START-UP AND SHUT DOWN PROCEDURES. A COMPLETE SUPPLY LIST, AS WELL AS CONTACT INFORMATION FOR LOCAL CONTRACTORS AND DISTRIBUTORS OF MATERIALS USED SHALL ALSO BE PROVIDED.  
 IRRIGATION CONTRACTOR SHALL PAY ALL FEES AND RECEIVE APPROPRIATE INSPECTIONS ASSOCIATED WITH THE INSTALLATION OF THE IRRIGATION SYSTEM.  
 THE IRRIGATION CONTRACTOR SHALL PROVIDE OWNER WITH A ONE YEAR WARRANTY (MINIMUM) ON THE IRRIGATION SYSTEM. DURING THE ONE YEAR WARRANTY PERIOD, THE CONTRACTOR SHALL REPLACE, AT NO EXPENSE TO OWNER, ANY EQUIPMENT THAT IS IMPROPERLY CONSTRUCTED OR INSTALLED. CONTRACTOR SHALL REPLACE ANY DEFECTIVE MATERIALS.

<p>COOPER ROBERTS SIMONSEN ARCHITECTURE</p> <p><b>crsa</b> 700 NORTH 200 WEST SALT LAKE CITY, UTAH 84103 (801) 355-5915 (801) 355-9885 FAX WWW.CRSARCHITECTS.COM</p>	<h2>Snow College Library</h2>	
	PROJECT NO: B07-051	
	CAD DWG FILE: GR.ROOF.IRR	DATE: 12/17/2008
	DRAWN BY: TG	CHECKED BY: CRSA
	<b>ADD-04-2</b>	



M4  
AE505

LIVE ROOF  
MODULES

CUT MODULES TO FIT  
PER MANUFACTURER'S  
INSTRUCTIONS

PLANT SCHEDULE

BOTANICAL NAME	COMMON NAME
 SEDUM SPURIUM 'RED CARPET'	RED CARPET SEDUM

1" = 20'

COOPER ROBERTS SIMONSEN ARCHITECTURE   700 NORTH 200 WEST SALT LAKE CITY, UTAH 84103 (801) 355-5915 (801) 355-9885 FAX WWW.CRSARCHITECTS.COM	<b>Snow College Library</b>	
	PROJECT NO: B07-051	DATE: 12/17/2008
CAD DWG FILE: GR.ROOF.PLA	CHECKED BY: CRSA	
DRAWN BY: TG	<div style="border: 2px solid red; padding: 5px; display: inline-block;">ADD-04-1</div>	

**ARCHITECTURAL COMPONENTS**

	Color	Manufacturer	Notes
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A1	Toilet Partitions	Linen 504	Hadrian
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Casework: Café 9rm 219) and Circulation Desk (rm 200)

A2.1	Countertop: Solid Surface	Champagne Limestone	Ceasarstone	
A2.2	Wood Boxes: painted??	Incredible White SW7028	Sherwin Williams	Epoxy semigloss
A2.3	Backpainted Glass	color to be selected by architect	Beehive Glass	
A2.4	Base	Brushed aluminum		
A2.5	Plastic Laminate - doors/doors	St 606 Suede Taupe	Pionite	On staff side

Casework: Workroom (rm 210) and Faculty Service Center (rm 207)

A3.1	Countertop	Gray Tigris 4670-60	Wilsonart	
A3.2	Vertical Surfaces:	St 606 Suede Taupe	Pionite	

Casework: Study(rm 001)

A4.1	Countertop: Solid Surface	Champagne Limestone	Ceasarstone	
A4.2	Vertical Surfaces:	St 606 Suede Taupe	Pionite	

Casework: Quiet Study (rm 207)

A5.1	Countertop: Solid Surface	Champagne Limestone	Ceasarstone	
A5.2	Glazed Wall Cabinet Doors:	Cherry veneer hardwood and clear glass		Color to match architects sample: 701 Lt Cherry, Gunlocke, keyed locks at all openings
A5.3	Vertical Surfaces:	Cherry veneer hardwood		Color to match architects sample: 701 Lt Cherry, Gunlocke, keyed locks at all openings

Elevator Finishes

A6.1	Floor	Borgogna Noce #94237, 9" x 18"	Portabella	
A6.2	Walls			Selected by architect from manufacturers standard colors/finishes
A6.3	Ceiling			Selected by architect from manufacturers standard colors/finishes

Stair A Finishes

A7.1	Stair Treads	Dolomite "polished"	Portabella	Straight edge, 28cm x 162.5 cm x 3 cm; slip resistance: (5) 5 mil cuts
A7.2	Risers	Dolomite "polished"	Portabella	6 1/4" x 4 1/16" x 3 cm. 1/16 grout joints
A7.3	Base	Brushed aluminum		
A7.4	Base Top Cap	Cherry veneer hardwood		Color to match architects sample: 701 Lt Cherry, Gunlocke, keyed locks at all openings
A7.5	Handrail/Rail Bracket	Brushed stainless	C.R. Lawrence	
A7.6	Gypsum Board	Agreeable Gray SW 7029	Sherwin Williams	Acrylic semi-gloss, coordinate with interior elevations and wall types

Stair B Finishes

A8.1	Floor	Sealed Concrete		
A8.2	Exposed Metal	Quince Tan HC-25	Benjamin Moore	Riser, stringer, pan system: acrylic semi-gloss, coordinate with interior elevations and wall types
A8.3	Exposed Metal	Agreeable Gray SW 7029	Sherwin Williams	Guardrail: acrylic semi-gloss, coordinate with interior elevations and wall types
A8.4	Handrail	Agreeable Gray SW 7029	Sherwin Williams	Acrylic Eggshell

**CEILING FINISHES**

	Color	Manufacturer	Notes
--	-------	--------------	-------

C1	Lay-in Acoustic Tile - 4' x 4' x 7/8"	Optima Vector	Armstrong	Edge: Vector 15/16", See RCP for tile size and orientation
C2	Lay-in Acoustic Tile - 2' x 2' x 3/4"	Ultima	Armstrong	Edge: Beveled Tegular 9/16", See RCP for tile size and orientation
C3	Painted Gypsum Board	Incredible White SW 7028	Sherwin Williams	Acrylic Eggshell
C4	Painted Gypsum Board	Incredible White SW 7028	Sherwin Williams	Epoxy Eggshell
C5	Open to Unpainted Structure			
C6	Wood lay-in ceiling	Woodworks Bamboo Native	Armstrong	

**General Note**

1 - Manufacturer listed is the basis of design. Alternate manufacturers (see specifications) colors and finishes must be approved prior to bid.