LOS RIOS COMMUNITY COLLEGE DISTRICT

1919 Spanos Court, Sacramento, CA 95825
Phone (916) 568-3071 FAX (916) 568-3145
Purchasing Department

Sacramento City College American River College Cosumnes River College Folsom Lake College

ADDENDUM NO. 1

ISSUE DATE: June 14, 2018

SCC Mohr Hall Replacement

LRCCD BID NO. 18025

Issued By:

LOS RIOS COMMUNITY COLLEGE DISTRICT
1919 Spanos Court, Sacramento, CA 95825
Phone (916) 568-3071 Fax (916) 568-3145

This addendum forms a part to the Contract Documents. The addendum items supersede and supplement all portions of the bidding documents with which it conflicts. All workmanship, materials, appliances and equipment which may be included in the following addendum items shall be of the same relative quality as described for similar work set forth in the general or main specifications of which these addendum items shall be considered a part.

This Addendum has been acknowledged in the space provided on the Bid Form and is considered part of the bid documents.

This Addendum consists of 261 pages

1. REMOVE PROJECT MANUAL BID FORM PAGES “9 OF 41” THROUGH “14 OF 41” DATED “REV: MARCH 21, 2018”.
2. REPLACE PROJECT MANUAL BID FORM PAGES “9 OF 41” THROUGH “14 OF 41” DATED “REV:6/7/18”

3. Substitution Request Received.

RESPONSE: Los Rios Community College District does not pre-approve or prequalify. It is the responsibility of the contractor to make certain their product meets or exceeds all the requirements of the specifications

END OF SECTION.

BID FORM

FOR: SCC Mohr Hall Replacement Bid # 18025

SUBMIT BID TO:

If US Mail
TO: LRCCD Board of Trustees
Attn: Purchasing Dept./General Services
2100 Northrop Ave., Suite 200
Sacramento, CA 95825

If Hand-Delivered
TO: LRCCD Board of Trustees
Attn: Purchasing Dept. /General Services
2100 Northrop Ave., Suite 200
Sacramento, CA 95825

LOCATION OF BID OPENING:

Los Rios Community College District General Services
Purchasing Department/General Services
3753 Bradview Drive
Sacramento, CA 95827

PROJECT'S CONTACT: _____ _____
(Name) (Email Address)

BID FROM: _____
(Name of firm submitting Bid Proposal)

_____
(Address)

_____
(City, State, Zip Code)

_____ _____
(Telephone) (Fax)

DATE BID SUBMITTED: _____

NOTE:

1) All portions of the bid form must be completed before the bid is submitted. Failure to do so may result in the bid being rejected as non-responsive. Attached to and submitted with this bid form, bidder must provide the completed Contractor Qualifications, Non-Collusion Declaration signed by bidder, Statement of Compliance, Designation of Subcontractors-Bid Form, the appropriate bid security and any other documents required by the Contract Documents. Failure to submit all required documents may result in the bid being rejected as non-responsive.

2) The bidder agrees that each addendum received and acknowledged herein shall become a part of and included in this bid proposal. The bidder agrees the bid proposal includes the following addenda (**SEPARATELY LIST EACH ADDENDUM RECEIVED**):

Addendum No. ____ Dated _____ Addendum No.____Dated_____

Addendum No. ____ Dated _____ Addendum No.____Dated_____

Addendum No. ____ Dated _____ Addendum No.____Dated_____

The bidder agrees to perform the **Base Bid** work for the lump sum of:

_____ Dollars $_____

(Specify total dollar amount in words printed or typed) **(In figures)**

Add-Alternate #1: Site features for rock display area outside geology classroom (precast benches, decomposed granite, rock garden).

_____ **Dollars** **$**_____
(Specify total dollar amount in words printed or typed) **(In figures)**

~~**Add-Alternate #2: Landscape and irrigation around existing Lillard Hall Building.**~~

~~_____ **Dollars** **$**_____~~
~~**(Specify total dollar amount in words printed or typed)** **(In figures)**~~

~~**Add-Alternate #3: Landscape to the east of Mohr Hall Replacement Building.**~~

~~_____ **Dollars** **$**_____~~
~~**(Specify total dollar amount in words printed or typed)** **(In figures)**~~

Add-Alternate #4: Substitute poured terrazzo (epoxy) floor system for VC2 at first floor corridor and entry (Rooms M114A, M114B, M114C, S140).

_____ **Dollars** **$**_____
(Specify total dollar amount in words printed or typed) **(In figures)**

Add-Alternate #5: Add motorized roller shades at all exterior windows. Base bid includes all electrical wiring for future motorized shade locations and shades in the Lecture Room M126.

_____ **Dollars** **$**_____
(Specify total dollar amount in words printed or typed) **(In figures)**

Add-Alternate #6: Increase NRC of acoustical ceiling tiles from .75 to 1.0.

_____ **Dollars** **$**_____
(Specify total dollar amount in words printed or typed) **(In figures)**

TOTAL BID_____**Dollars $**_____
Total bid amount shall include the base bid amounts and the sum of all alternates
The lowest responsive bid shall be determined based on the sum of the base bids, all additive and all deductive alternates.

3) There is herewith enclosed cash, a bid bond for the benefit of, or a certified check or cashier's check for ten percent (10%) of the amount of the bid submitted, made payable to Los Rios Community College District in the amount of:

_____ Dollars $_____

(Specify total dollar amount in words printed or typed) **(In figures)**

4) The bidder, having the appropriate active license required by the State of California; and having carefully read and examined the plans, specifications, and all related bidding documents as prepared by the Los Rios Community College District for the project described as: SCC Mohr Hall Replacement - BID # 18025 having performed a full and complete examination of the site of the proposed work and all information available to bidder, and being familiar with all the conditions related to the proposed work, including the availability of materials, equipment, and labor, hereby offers to furnish all labor, materials, tools, transportation, services, equipment and taxes necessary to complete the work of the described project in accordance with the Contract Documents, and to complete all requirements of the Contract Documents for the sums quoted in this Bid Form. The bidder agrees that it will not withdraw its bid within ninety (90) days after the bid deadline. If the bidder is selected as the apparent lowest responsive responsible bidder, the bidder agrees, within ten (10) days after receipt of notice of selection, to sign and deliver the Contract, and to furnish the Performance Bond, the Payment Bond, Certificates of Insurance, and other required items.

5) The bidder agrees that if the bidder is selected as the apparent lowest responsive responsible bidder, and the bidder fails to sign the Contract and furnish the Performance Bond, the Payment Bond, Certificates of Insurance, or any other required items in proper form and in proper amounts within the time limit specified in the Contract Documents, the Los Rios Community College District may award the work to another bidder or call for new bids. In such event, the bidder shall be liable to the Los Rios Community College District for the difference between the amount of the disqualified bid and the larger amount for which the District procures the work plus all of the District's costs, damages, expenses and liabilities arising from bidder's failure to sign the Contract and/or furnish the required documents.

6) The bidder, if awarded the Contract, agrees to complete all work required by these Contract Documents, in strict compliance with these Contract Documents, within the prescribed calendar days from the start date specified in the Notice to Proceed.

BIDDER'S FIRM:

Bidder is a: (circle one)
Corporation Partnership Individual Joint Venture

Other: _____
(Specify)

Names and Titles of Key Members of Firm:
(Name of person signing the bid on behalf of the bidder and all general partners, if a partnership, must be included.)

_____

Name of President if a Corporation:

_____
(Print or Type Name)

Name of Secretary if a Corporation:

_____
(Print or Type Name)

Corporation is organized under the laws of the State of:

_____

DIR Number:

_____

California Contractors License(s):

_____

Name of License(s):

_____	_____	_____
Classification(s)	Number	Expiration Date

(For Joint Ventures, list Joint Venture's license or licenses for all Joint Venture partners.)

By submission of this bid, bidder certifies:

I am aware of the provisions of section 3700 of the Labor Code which requires every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the award of this Contract.

Corporate Seal:

Name of Bidder's Firm: _____

Address: _____

_____

_____

By: _____
(Signature)

_____
(Print Name)

_____
(Title)

By: _____
(Signature)

_____
(Print Name)

_____
(Title)

(If signature is by other than the sole proprietor, general partner, or corporate officers, attach an original Power of Attorney.)

The Los Rios Community College District and its Board of Trustees reserves the right to reject any or all bids received and/or waive any minor irregularity of a bid as the public good may require.

Dreyfuss+ Blackford architecture

ADDENDUM

7 June 2018

LRCCD Sacramento City College Mohr Hall Replacement Building Los Rios Community College District
LRCCD Bid No: 18025

DSA App#: 02-116163
DSA File No: 34-C3

DBA Project #B5017.00

NOTICE TO ALL BIDDERS

Addendum No: 1

The following revisions shall be incorporated into the contract documents for subject project. Any workmanship and/or materials involved shall be as set forth in the original drawings and specifications unless otherwise indicated herein. Bidder shall acknowledge receipt of this Addendum on the Bid Form.

Description of Change(s):

Drawings: 46 sheets

Specifications: 202 pages

Line item #		
1	S1.02	Dtl.17 - Raise utility enclosure pad per district request (raised 4") - no structural recalculation impacts. Remove and replace sheet
2	S7.02	dtls. 4,5,6 - add note to use 16 GA. Strapping or z clips at rated wall conditions. Remove and replace sheet
3	C3.0	removed note to demo a tree. - and see line item #4. Remove and replace sheet
4	C4.0	note added - added note: restripe parking stalls and replace asphalt after removal of mechanical pad. Remove and replace sheet
5	C5.0 and C6.0 and C9.0	See line item #1, and #4. Remove and replace sheets
7	L1.0 and L2.0	Added note: "ADD ALT 2 and 3 removed from project". Remove and replace sheets

8	L3.1	Dtl. 1 - remote control valve, ball valve revised to gate valve. Remove and replace sheet
9	GA0.00	See line item #7. Remove and replace sheet
10	A1.01	See line item #3 and #4 - note added to clarify new handrails at existing stair. Note added to clarify wheels stops are to be replaced at parking lot G. Remove and replace sheet
11	A1.10	See line item #1 - Dtls. 2,3/A1.10. Remove and replace sheet
12	A1.10	Dtl. 1 - bike rack type revised from post type to wave tube rack type. Remove and replace sheet
13	A2.00	note added at entry walk off mat to "verify depression with walk of mat product". Remove and replace sheet
14	A2.01	revised window wall location to match dtl. 14/A8.20 (window moved 2"). Remove and replace sheet
15	A2.53	clerical corrections to finish legend and finish schedule. Remove and replace sheet
16	A3.01	control joints added to exterior elevations for aesthetic reasons - elevations 2,3,4 (3). Remove and replace sheet. Remove and replace sheet
17	A3.01 and A3.02	Keynote 221-04 - overflow drain downspout nozzle - revised from lambs tongue type to perforated nozzle type. Exterior building lettering indicated on elevations, keynote added. Remove and replace sheets
18	A3.02	See line item #16 - elevations 13+14. Remove and replace sheet
19	A3.27	Roller shade location moved up apprx. 1'-6" to avoid conflict with new brace frame, detail and attachment for this remains the same. Remove and replace sheet
20	A4.01	Toilet room accessories legend - MI-1 mirror note added to see keynotes for sizes. Keynotes 102-15 and 102-16 added to interior elevations with mirror sizes indicated. Remove and replace sheet
21	A5.01	Finish note added to countertop dtl.3. Remove and replace sheet
22	A5.03	equipment tag revised to keynote for white board -dtl 4,5,10. Dtl 3- backsplash linework clarified on sink. Remove and replace sheet
23	A6.01 and 6.02	projector screen sizes clarified in all classrooms and lecture rooms - keynote revised. Remove and replace sheets
24	A6.02	See line item #19. Remove and replace sheet

25	A8.01 - A8.02	Dtl. 12 - overflow drain cover detail added for construction clarity. A8.02 Dtl. 1 - graphic correction, dtl. 8 - renamed (slate chalkboard not in project anymore). Remove and replace sheets
26	A8.20	Dtl.10 storefront head detail revised to show more information for construction clarity. Remove and replace sheet
27	A8.20	Dtl.12 storefront sill revised for construction clarity. Remove and replace sheet
28	A8.20	See line item #14 - Dtl.14/A8.20. Remove and replace sheet
29	A8.21	See line item #27 - Dtl.5/A8.21. Remove and replace sheet
30	A8.30	Roof hatch - clarified attachment note. Remove and replace sheet
31	A8.31	Dtls. 1,2,3,4,5,6,7,8,9,11 roofing details - minor note clarifications for construction. Remove and replace sheet
32	A8.32	See line item #31 - Dtl. 4/A8.32. Remove and replace sheet
33	A9.10	Dtl.3 H.M. sidelight, note revised. Remove and replace sheet
34	A9.10	Dtl.12 elevator door head, revised to show no smoke containment system (do not have this in project). Remove and replace sheet
35	A9.41	Dtl.5,9 sink and countertop casework, notes revised. Dtl. 13 - gyp. Bd added to interior wall dtl. At roller shade. Remove and replace sheet
36	A9.60	Dtl 5,9- countertop and sink casework plywood backing clarified in note (shown on drawing already). Remove and replace sheet
37	A9.80	Dtl.1,2,3,4,5,7,8 stair 1 guardrails, handrail bracket revised and steel rail framing up sized for non structural purposes. Remove and replace sheet
38	A9.81	See line item #37 - Dtls.1,2. Remove and replace sheet
39	A9.82	Dtl.1,2 stair 1, unnecessary nosing removed from steps (nosing required at top and bottom only). Remove and replace sheet
40	A9.83	Dtl.1,2 stair 1 - unnecessary, non structural steel member removed from base of stair guardrail dtl. Remove and replace sheet
42	P0.1	Add cleanout symbol to symbols list. Remove and replace sheet
43	P0.2	Plumbing fixture schedule - revised water closet type to sloan and sensor type. Remove and replace sheet
44	E0.00	Security legend - removed electric door strikes from project, changed 'power transfer hinge' to 'power transfer device'. Remove and replace sheet

45	E3.01 and E 3.02	conduit added in hallways running back to electrical room for future use. Notes 20 added indicating conduit. Notes 21 added indicating devices on countertop. Remove and replace sheets
46	E3.02	Electrical receptacle and telecom device moved from exterior wall to interior furring wall in office M222. Notes 15 added indicating conduit. Notes 16 added indicating devices on countertop. Remove and replace sheet
47	E4.01	Alarm pad locations clarified. Remove and replace sheet
49	E6.01	Data Jacks added to lighting, fire alarm panels and intrusion system cabinets in MPOE and electrical rooms. (2) 4" chases to second floor from electrical room clarified. Notes 17 and 18 clarified to use nema 4x enclosure for elevator pit light. Remove and replace sheet
50	E7.02	24 stand fiber cable added from campus MDF to south gym MC on one line diagram dtl. B. Panel type clarified on site/riser one line diagram dtl. C. Dtl. D - intrusion access one line diagram clarified to tell location of jacks on panels (see E6.01 comment) Remove and replace sheet

SPECIFICATIONS

50	Vol. 1 and Vol. 2 Table of contents	Table of contents (TOC) for vol. 1 and vol. 2 - clerical corrections, some page titles did not match TOC word for word. Elevator door smoke containment system struck from TOC - (we do not have this in project) Remove and replace sheets
50.1	01 23 00	Section 3.1, B and C - Add alternates 2 and 3 removed from project. Remove and replace entire section
51	07 32 13	Section 2.01, A - Approved clay roofing tile manufacturer revised. Remove and replace entire section
52	07 62 00	Sheet metal flashing section included in specifications. Add sheets to specifications
53	08 34 83	See line item #34 - removed section and struck out on table of contents. Remove section sheets. Remove entire section from specifications
54	08 71 00	See line item #44 - removed items from section by strikeout. Remove and replace sheets 7,8,11,12,19, and 20
55	10 28 13	Section 2.03,I and J - Sanitary napkin dispenser and vending approved manufacturer added. Remove and replace sheets 2 and 3

56	12 93 00	Section 2.01,A and Section 2.01,A - Bicycle racks and bicycle locker manufacturer revised. Remove and replace entire section
57	22 10 00	Section 2.11,C - approved manufacturer for water meter revised. Remove and replace sheets 7-13
58	22 11 13	Section 2.5 and Section 2.8 - Revised valve types and backflow preventer. Remove and replace sheets 3-7
60	22 40 00	Section 2.04,1 - See line item #43 - approved plumbing fixtures revised. Remove and replace sheets 3-7
62	23 00 50	Section 2.05, A revised. Remove and replace sheets 9-28
63	23 09 00	Section 2.14, A - flow meter type revised. Remove and replace sheets 9-23
64	23 80 00	Section 2.1 revised - change hydronic piping to aquatherm. Remove and replace sheets 19-29
68	26 43 13	spec section number did not match table of contents number - pages revised from 26 24 13 to 26 43 13 to match spec section on TOC. Remove and replace entire section
69	26 56 00	All exterior lighting in this section revised to LED. Remove and replace entire section
70	27 13 23	Section 1.5, A, 1, a - See line item #50 - note revised. Remove and replace entire section
71	27 15 00	Section 1.04, B, 1, b revised. Section 1.04, C, 2, c revised. Section 1.04, E revised. Section 1.04, F, 1, d revised. Section 2.03, A, 2 revised. Section 3.02, B, 3, c revised. Section 3.02, B, 5, e revised. Remove and replace entire section
75	27 51 26	section pages were miss numbered - revised from 26 51 26 to 27 51 26 to match table of contents. Remove and replace entire section
76	28 23 00	Section 1.04, E revised. Section 2.07 revised. Remove and replace entire section
77	28 65 16	Section 2.01 revised. Section 2.02 revised. Section 2.03, G move to section 2.01,B. Section 2.05, A, 3 transformer note removed. Section 3.06, A, 1, a revised. Remove and replace entire section

DIVISION 04 – MASONRY

DIVISION 05 – METALS

DIVISION 06 – WOOD, PLASTICS, AND COMPSITES

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

DIVISION 08 – OPENINGS

END OF TABLE OF CONTENTS

SECTION 012300 - ALTERNATES

PART 1 GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

A. This Section includes administrative and procedural requirements governing Alternates.

1.3 DEFINITIONS

A. Definition: An alternate is an amount proposed by bidders and stated on the Bid Form, for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the District decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost for each Alternate is the net change to the Contract Sum to incorporate the Alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent Work as necessary to completely and fully integrate that Work into the Project.

1. Include as part of each Alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.

B. Notification: Immediately following the award of the Contract, notify each party involved, in writing, of the status of each Alternate. Indicate whether Alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to Alternates.

C. Execute accepted Alternates under the same conditions as other Work of this Contract.

D. Schedule: A "Schedule of Alternatives" is included at the end of this Section. Specifications Sections referenced in the Schedule contain requirements for materials necessary to achieve the Work described under each Alternate.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. ADD-ALTERNATE NO. 1: Site features for rock display area outside geology classroom (precast benches, decomposed granite, rock garden).

~~B. ADD-ALTERNATE NO. 2: Landscape and irrigation around existing Lillard Hall Building.~~

~~C. ADD-ALTERNATE NO. 3: Landscape to the east of Mohr Hall Replacement Building.~~

D. ADD-ALTERNATE NO. 4: Substitute poured terrazzo (epoxy) floor system for VC2 at first floor corridor and entry (Rooms M114A, M114B, M114C, S140)

E. ADD-ALTERNATE NO. 5: Add motorized roller shades at all exterior windows. Base bid includes all electrical wiring for future motorized shade locations and shades in Lecture Room M126.

F. ADD-ALTERNATE NO. 6: Increase NRC of acoustical ceiling tiles from .75 to1.0.

END OF SECTION

SECTION 07 32 13

CLAY ROOF TILES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section describes the requirements for furnishing and installing clay roof tiles.

B. Related Sections:

1. Construction waste management is specified in Section 01 74 19.

2. Miscellaneous rough carpentry is specified in Section 06 10 53.

3. Roofing underlayment is specified in Section 07 30 63.

4. Flashing and sheet metal is specified in Section 07 62 00.

1.02 SUBMITTALS

A. General: Comply with Section 01 33 00.

B. Samples: Three full-sized roofing tiles, one for each color, for verification purposes, showing shape and range of color.

C. Product Data: Manufacturer's information on tile, tile fastening system, and installation instructions.

D. Two copies of recommended maintenance products and procedures.

E. Warranty.

1.03 QUALITY ASSURANCE

A. Installer's Qualifications: Minimum 3-years' experience installing clay roofing tile of the type specified, and a minimum of 5-installations of a magnitude similar to or larger than the work of this Section.

B. Clay roof tile system shall comply with CBC Section 1505.2 (Class A Roofing Assembly) requirements and meet MFPD Standard 2014-2.

C. Clay roof tile attachment shall comply with CBC Section 1507.3.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. General: Comply with Section 01 61 00.

B. Deliver tile on manufacturer's pallets.

C. Deliver installation materials in manufacturer's unopened containers and rolls with labels intact and legible.

D. Manufactured mortars and grouts shall contain hallmarks certifying compliance with reference standards, and shall be recommended by tile manufacturer for the application intended.

E. Store materials in accordance with manufacturer's directions and under cover to prevent damage and contamination.

F. Handle tile to avoid chipping and breakage.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Ambient Temperature: Follow requirements of setting and grouting materials manufacturers.

B. Moisture Conditions: Roof deck shall be dry when tiles are applied.

1.06 WARRANTY

A. Furnish manufacturer's standard written 50-year warranty for roofing tiles. Replace roofing tiles that crack, break, or where the finish chalks, fades, checks, crazes, peels or otherwise fails to perform. Remove and replace other work, as required, which has been connected to or superimposed on the material to be replaced.

B. Warrant completed roof to remain watertight for a minimum of 3-years from Date of Substantial Completion. Remove and replace other work, as required, which has been connected to or superimposed on the material to be replaced.

C. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

1.07 MOCK-UP

A. Mock-Up: Prior to installation of clay roofing tile, construct mock-up to demonstrate color blend and other aesthetic effects, and quality of materials and installation. Built mock-up using materials to be used in the completed work.

1. Locate mock-up on site in the location and of the size directed by the Architect.

2. Demonstrate the proposed range of aesthetic effects and workmanship. Include complete extent of installed color blend distribution expected in the completed work.

3. Obtain Architect's approval of mock-up before start of final tile installation.

4. Approved mock-up installed on the building, in an undisturbed condition at the time of Substantial Completion may become part of the completed work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Clay Roofing Tile: Gladding McBean div. of Pacific Coast Building Products Inc, Lincoln, CA. Cordova, 2 piece S-Shape tile. Color to match existing campus roofing tile. Complying with ASTM C1167.

B. Installation Materials:

1. Nailing Strips and Battens: Preservative-treated wood as indicated and specified in Section 06 10 00.

2. Nails: Hot-dip galvanized, copper or stainless steel, 11-gauge, 5/16-inch head, length sufficient to penetrate the deck a minimum of 3/4-inch or through the thickness of the deck, whichever is less: Fasteners shall comply with CBC Section 1511.1.

3. Portland Cement: ASTM C150, Type I.

4. Sand: ASTM C144.

5. Hydrated Lime: ASTM C206 or C207, Type S.

6. Water: Clear, clean, and potable.

7. Mortar: Type M, job mixed, of portland cement, sand, water, and hydrated lime or masonry cement, at Contractor's option, complying with ASTM C270.

8. Wind Locks: Provide on the first three tile courses and on all tiles at slopes over 7:12.

9. Flashings: Zinc-coated (galvanized) steel sheet complying with ASTM A653, G90 coating designation; structural quality, mill phosphatized for field painting as specified in Section 09 91 00.

10. Counter Batten System: In lieu of horizontal and vertical wood battens as indicated, Contractor shall have the option of using Monier "Counter Batten System (CBS)" or approved equal. Counter batten system shall consist of nominal 1-inch x 3-inch x 8-foot horizontal strips with 3/8-inch thick pads spaced 16-inches on center.

11. Underlayment: As specified in Section 07 30 63.

2.02 FLASHING FABRICATION

A. Form flashings to profiles indicated and to protect roof assembly and shed water.

B. Form sections square, true, and accurate to profile, in maximum possible lengths, free from distortion and other defects detrimental to appearance or performance.

C. Hem exposed edges of flashings minimum 1/2-inch on underside.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify that conditions are satisfactory for the installation of roofing tile.

B. Prior to commencing work, protect surfaces adjoining those to receive tile.

C. Grounds shall be installed prior to the installation of tile.

D. Surfaces on which tile will be installed shall be firm, dry, clean, and free of oily or waxy films and foreign matter.

3.02 INSTALLATION

A. Roof tiles and fastening system shall be installed in accordance with manufacturer's recommendations and CBC Table 1507.3.7.

B. Nailers: Install insulation stops and ridge nailers as indicated and required.

C. Underlayment: As specified in Section 07 30 63.

D. Batten System: Install nominal 1-inch x 2-inch vertical wood battens spaced 24-inches on center. Install nominal 1-inch x 4-inch horizontal wood battens over vertical wood battens spaced 13-1/2-inches on center. If optional specified elevated batten system is used in lieu of horizontal and vertical batten system, install in accordance with manufacturer's instructions.

E. Flashings:

1. Line all valleys with minimum 24-gauge galvanized steel sheet, minimum 20-inches wide for short valleys, minimum 24-inches wide for long valleys, with 1/4-inch edge turned over and fastened with cleats. Lap joints a minimum of 4-inches, but do not solder.

2. Extend flashings minimum 6-inches up vertical surfaces at sides of dormers, chimneys, and walls and counterflash. Extend flashing under tile no less than 4-inches and turn edge over 1/4-inch.

3. At lower side of dormers, chimneys, and walls, extend flashing at least 8-inches up wall, 6-inches over tile and counterflash.

4. Line wood saddles and returns with copper extending up sloping roofs a minimum of 12-inches, and up vertical walls not less than 6-inches and counterflash.

5. Secure and plug all counterflashing.

6. Extend gutter metal up the roof to a point higher than the outer edge of gutter.

7. For open valleys, the exposure of metal at the top shall be at least 6-inches and shall increase at the rate of 1-inch for every 8-feet of flow down the valley.

8. Install flat roof vents in accordance with manufacturer's instructions.

F. Coordinate with related work. Do not proceed with roofing work at areas where flashing conditions are not satisfactorily installed.

G. Wood Starter Strip Nailers: Apply wood nailers of proper height over roof underlayment to provide proper and uniform angle for first course of roofing tile.

H. Tile Installation:

1. Install in accordance with manufacturer's instructions and manufacturer's ICC Evaluation Report and CBC Table 1507.3.7.

2. Lay tiles in courses parallel to eaves. Space courses to run in straight, evenly spaced lines parallel to eaves and ridges. Neatly cut tiles to fit at walls, projections, ridges, and valleys.

3. Distribute tiles so that color variations are evenly distributed throughout the roof. Tiles that are broken, chipped, cracked, or distorted in shape or thickness will be rejected and shall be removed from the Project site.

4. Nail all roof tiles in accordance with tile manufacturer's ICC Evaluation Report for wind velocities of 80 mph and roof height under 40-feet above grade.

5. Exposure lengths of installed tile shall be as approved by the Architect.

6. Install tiles to straight lines parallel to ground level, lapped a minimum of 4-inches vertically.

7. Fasten each tile with two copper or stainless steel nails. Fasten tiles overlapping sheet metal with copper wire and plastic cement.

8. On pitches over 7:12 and where wind conditions may cause tile lifting, install wind clips at each tile.

9. Cement ridges and hip rolls in laps and where they rest on roof tiles, and fasten with #14 tex screws.

10. Where tiles join hip stringers, make watertight with plastic cement.

11. Where hip starter and closed ridge end fittings are not applied, fill the voids at ends of hips and ridges with mortar colored to match tile color.

12. Cut top end and drill short course tiles on the Project for rafters and areas that do not accommodate full courses, unless a +/- 1-inch adjustment of regular tile overhang at eave is sufficient.

13. Cut tile with a masonry saw with diamond blade.

3.03 CLEANING

A. Clean mortar from surfaces of tile after installation.

B. Replace tiles damaged prior to time of final acceptance.

3.04 CONSTRUCTION WASTE MANAGEMENT

A. General: Comply with the requirements of Section 01 74 19 Construction Waste Management for removal and disposal of construction debris and waste.

B. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section describes the requirements for furnishing and installing flashing and sheet metal.

B. Related Sections:

1. Construction waste management is specified in Section 01 74 19.

2. Formed metal fabrications are specified in Section 05 58 00.

3. Thermoplastic-polyolefin roofing is specified in Section 07 54 23.

4. Self-adhering sheet flashing is specified in Section 07 65 26.

5. Painting is specified in Section 09 91 00.

1.02 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation or other defects. Completed sheet metal flashing and trim shall not rattle, leak, or loosen and shall remain watertight.

B. Fabricate and install roof edge flashing and copings capable of resisting forces required by CBC according to recommendations in FMG Loss Prevention Data Sheet 1-49.

C. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes of 120-deg. F. ambient and 180-deg. F. material surfaces.

1.03 SUBMITTALS

A. General: Comply with Section 01 33 00.

B. Product Data: Manufacturer's product data, installation instructions and general recommendations for each specified sheet material and fabricated product. Include construction details, material descriptions, dimension of components and profiles, and finishes for each manufactured product or accessory.

C. Samples: 8-inch square samples of specified sheet materials to be exposed as finished surfaces.

D. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, and details. Distinguish between shop- and field-assembled work. Include the following:

1. Identification of material, thickness, weight, and finish for each item and location.

2. Details of forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.

3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips and other attachments. Include pattern of seams.

4. Details of termination points and assemblies, including fixed points.

5. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings, as applicable.

6. Details of special conditions.

7. Details of connections to adjoining work.

1.04 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA "Architectural Sheet Metal Manual" unless more stringent requirements are indicated or specified.

C. Pre-installation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, installer and installer whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, skylights, and roof-mounted equipment.

2. Review methods and procedures related to sheet metal flashing and trim.

3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.

4. Review special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal flashing and trim.

5. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.05 DELIVERY, STORAGE AND HANDLING

A. General: Comply with Section 01 61 00.

B. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

C. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent required for the period of sheet metal flashing and trim installation.

PART 2 - PRODUCTS

2.01 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Sheet Metal Thickness: The following table may be used to covert specified sheet metal thickness to gauges. Not all materials will be used in the Project.

Gauge No.	Aluminum	Stainless steel	Zinc-Tin Coated Stainless Steel	Galvanized	Aluminum-Zinc Coated Steel	Zinc
12	---	---	---	---	---	.028"
13	---	---	---	---	---	.032"
14	---	---	---	---	---	.036"
15	---	---	---	---	---	.040"
16	.063"	.063"	---	.064"	.064"	.045"
18	.050"	.050"	---	.052"	.052"	.055"
20	.040"	.038"	---	.040"	.040"	.070"
22	.034"	.031"	---	.034"	.034"	.090"
23	.032"	.028"	---	.031"	.031"	.100"
24	.028"	.025"	---	.028"	.028"	.125"
25	.024"	.022"	.024"	.025"	.025"	---
26	.022"	.019"	.018"	.022"	.022"	---
28	---	.016"	.015"	.019"	.019"	---

C. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A755.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653, G90 coating designation; structural quality.

2. Surface: Smooth, flat and mill phosphatized for field painting as specified in Section 09 91 00.

D. Stainless Steel Sheet: ASTM A240 or ASTM A666, Type 304, dead soft, fully annealed, 2D finish, smooth flat surface.

E. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finished required, with temper as required to suit forming operations and performance required, 0.040-inch thick except as otherwise indicated.

1. Coil-coated Finish: Three-coat fluoropolymer containing not less than 70-percent PVDF resin by weight in color coat and clear topcoat, complying with AAMA 620. Custom colors to match color samples furnished by the Architect, including mica and metallic finishes. Concealed surfaces may be finished with manufacturer's light-colored acrylic or polyester backer finish applied to a dry film thickness of 0.5 mil.

2.02 UNDERLAYMENT MATERIALS

A. High Temperature Waterproof Sheet Flashing: As specified in Section 07 65 26.

2.03 MISCELLANEOUS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts and other suitable fasteners designed to withstand design loads and recommended by manufacturer.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.

b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.

2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A153 or ASTM F2329 or Series 300 stainless steel.

3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

4. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

C. Solder:

1. For Zinc-Coated (Galvanized) Steel: ASTM B32, Grade Sn50, 50-percent tin and 50-percent lead or Grade Sn60, 60-percent tin and 40-percent lead.

2. For Stainless Steel: ASTM B32, Grade Sn60, with an acid flux of type recommended by stainless steel sheet manufacturer.

D. Sealant Tape: Pressure-sensitive, 100-percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, non-toxic, non-staining tape 1/2-inch wide and 1/8-inch thick.

E. Elastomeric Sealant: ASTM C920, elastomeric polyurethane, polysulfide or silicone polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

H. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187.

I. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.

2.04 MANUFACTURED SHEET METAL FLASHING AND TRIM

A. Reglets: Cheney Flashing Company, Fry Reglet Corporation, Hohmann & Barnard, Inc., Keystone Flashing Company, Inc. or approved equal. Form to provide secure interlocking of separate reglet and counterflashing pieces, compatible with flashing material. Provide factory-mitered and -welded corners and junctions and interlocking counterflashing on exterior face of same metal as reglet.

1. Material: 0.022-inch galvanized steel.

2. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers and with channel for sealant at top edge.

3. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.

4. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.

5. Provide counterflashing wind-resistant clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

2.05 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness and other characteristics. Fabricate items at the shop to the greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight required to comply with performance requirements, but not less than that specified for each application and metal.

2. Obtain field measurements for accurate fit before shop fabrication.

3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels, with exposed edges folded back to form hems.

4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4-inch in 20-feet on slope and location lines and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant.

D. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with butyl sealant concealed within joints.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or form compatible, non-corrosive metal. Fabricate of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

F. Seams: Fabricate non-moving seams with flat-lock seams. Form seams and seal with elastomeric sealant. Rivet joints where required for strength.

G. Seams for Aluminum: Fabricate non-moving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where required for strength.

2.06 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Built-in Gutters: Fabricate to cross section indicated, with riveted and soldered joints, complete with end pieces, outlet tubes, and other accessories required. Fabricate in minimum 96-inch long sections. Fabricate expansion joints and accessories from same metal as gutters.

1. Fabricate gutters with built-in expansion joints and gutter-end expansion joints at walls.

2. Accessories: Provide continuous removable stainless steel leaf screen with stainless steel frame and hardware cloth screen or stainless steel wire ball downspout strainer, as indicated or as directed by the Architect.

3. Fabricate from the following material:

Material	Thickness
Galvanized Steel	0.040"

B. Downspouts: Fabricate downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors. Downspout profile and hanger style as indicated or as selected by the Architect. Fabricate from the following material:

Material	Thickness
Aluminum	0.024"

C. Splash Pans: Fabricate from the following material:

Material	Thickness
Galvanized Steel	0.022"

2.07 LOW SLOPE ROOF SHEET METAL FABRICATIONS

A. Copings: Fabricate in minimum 96-inch long, but not exceeding 10-foot long sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Miter corners, seal, and solder or weld watertight.

1. Profile: As indicated.

2. Joint Style: Butt with 12-inch wide concealed backup plate and 6-inch wide exposed cover plates.

3. Fabricate from the following material:

Material	Thickness
Aluminum	0.034"

B. Counterflashing: Fabricate from the following material:

Material	Thickness
Aluminum	0.022"

2.08 WALL SHEET METAL FABRICATIONS

A. Opening Flashings in Frame Construction: Fabricate head, sill, jamb and similar flashings to extend 4-inches beyond wall openings. Form head and sill flashing with 2-inch high end dams. Fabricate from the following material:

Material	Thickness
Galvanized Steel	0.022"

2.09 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following material:

Material	Thickness
Galvanized Steel	0.028"

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions with installer present, to verify actual locations, dimensions and other conditions affecting performance of the work.

1. Verify compliance with requirements for installation tolerances of substrates.

2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

B. For the record, prepare written report, endorsed by installer, listing conditions detrimental to performance of the work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 UNDERLAYMENT INSTALLATION

A. Self-adhering Sheet Underlayment: Install as specified in Section 07 65 26.

3.03 INSTALLATION

A. General: Anchor sheet metal flashing and trim and other components securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants and other miscellaneous items as required to complete sheet metal flashing and trim.

1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.

2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

3. Space cleats not more than 12-inches apart. Anchor each cleat with two fasteners, Bend tabs over fasteners.

4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.

5. Install sealant tape where indicated and required for a watertight installation.

6. Torch cutting of sheet metal flashing and trim is not permitted.

7. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.

1. Coat back side of uncoated aluminum and stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10-feet with no joints allowed within 24-inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with sealant concealed within joints.

D. Seal joints as required for watertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1-inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40- and 70-deg. F., set joint members for 50-percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant type joints at temperatures below 40-deg. F.

2. Prepare joints and apply sealants to comply with requirements specified in Section 07 92 00.

E. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2-inches, except reduce pre-tinning where pre-tinned surface would show in completed work.

1. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Remove flux and spatter from exposed surfaces.

3.04 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for required wind pressures.

1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate.

2. Anchor interior leg of coping with screw fasteners and washers at 24-inch centers.

C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4-inches over base flashing. Install stainless steel draw band and tighten.

D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. :Extend counterflashing 4-inches over base flashing. Lap counterflashing joints a minimum of 4-inches and bed with sealant. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and sealant.

E. Roof Penetration Flashing: Coordinate installation of roof penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric or butyl sealant and clamp flashing to pipes that penetrate roof. Coordinate with the work of Section 07 54 19.

3.05 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations. Coordinate installation of wall flashing with installation of wall opening components including windows, doors, and louvers.

3.06 MISCELLANEOUS FLASHING INSTALLATION

A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.07 INSTALLATION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4-inch in 20-feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.08 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.09 CONSTRUCTION WASTE MANAGEMENT

A. General: Comply with the requirements of Section 01 74 19 Construction Waste Management for removal and disposal of construction debris and waste.

B. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION

a. Butt hinges shall be manufactured in accordance with ANSI/BHMA A156.1.

b. Provide wide throw hinges where required:

1) Submit and provide hinge widths sufficient to clear trim projection when door swings 180 degrees (all doors shall swing 180 degrees if wall allows).

2) Utilize wide throw type hinges to clear frame or wall obstructions/cladding in order for doors to completely open (see 180 degree language above).

3) Where a door closer device is specified and will be installed on pull side/hinged side of doors (i.e. closers will hit walls or other surfaces when door is completely open), provide wide throw type hinges to give sufficient pocket depth to hide closer behind door (do not pinch or crush closer between the door and wall surface).

4) Confirm hinge sizing with frame and wall details.

c. Provide "weight/strength" as specified in hardware groups/sets in Part 3 (hinge nomenclature basis-of-design weight/strength).

d. For doors up to 36 inches wide, provide hinge height of 4-1/2 inches.

e. For doors 37 inches to 48 inches wide, provide heavy duty, four ball bearing hinges and height of 5 inches.

f. If hardware sets specify height (example: 5 inches tall at 36-inch-wide door), provide height as specified for project standards at these locations.

g. Provide two butts for doors up to 60 inches high and one additional butt for each 30 inches of height or fraction thereof.

h. Provide non-removable pins at exterior doors.

i. Provide ball-bearing hinges (non-ball-bearing hinges are not acceptable).

~~j. Electric Hinges: Provide electrified hinges with certified UL Listed, concealed wires. Provide electric hinges with standardized wire colors to accommodate up to 12 wires (4, 6, 8 or 12 as required per to provide sufficient number of concealed wires to accommodate electric function of specified hardware). If additional wires are specified (more than needed for electrified devices), provide the wires specified.~~

B. Continuous Hinges:

1. Acceptable Manufacturers:

a. Hager Manufacturing.

b. Markar Manufacturing.

c. Ives Manufacturing by Allegion.

d. Pemko Manufacturing.

e. Bommer Manufacturing.

f. Select Hinges.

g. McKinney Products Co.

h. Stanley Works.

2. Where hardware groups/sets have different information, refer to the following for clarification. Provide hardware groups/sets devices along with added devices as indicated on Drawings and detailed requirements for each type of device:

a. Provide widths sufficient to clear trim projection when door swings 180 degrees. Confirm hinge sizing with frame details. All doors shall swing 180 degrees if opening will allow. Provide wide throw hinges where required.

b. Provide continuous hinge that meet cycle testing in accordance with ANSI/BHMA Standard A156.26, Grade 1.

c. Aluminum material: Extruded tempered aluminum. Material Standard: 6063-T6 alloy. Configuration: Three interlocking extrusions in pinless assembly, installed to full height of door frame.

d. Continuous hinges shall not obscure fire rated labels of the doors or frames.

C. Gate Self-Closing Hinges:
1. Acceptable Manufacturers:
a. D&D Technologies Manufacturing - http://www.ddtechglobal.com/.

2.08 SECURING DEVICES (LATCHING SYSTEMS)

A. Provide all latching devices that are lockable including, but not limited to, door locks and panic/exit devices that comply with CBC 1010.1.9 through 1010.1.11. All new construction projects shall include locks that allow the doors to be locked from the inside. This requirement applies to classrooms and any other school room with an occupancy of five or more persons, but does not include doors that are locked from the outside at all times or student restrooms.

B. Mortise Locksets, Latchsets, and Deadbolts:

1. Acceptable Manufacturers:

a. Sargent 8200 Series.

b. Owner's standard, no substitutions permitted.

2. Levers:

a. Provide levers to return to door within 1/2 inch.

3. Where hardware groups/sets have different information, refer to the following for clarification. Provide hardware groups/sets devices along with added devices as indicated on Drawings and detailed requirements for each type of device:

a. Locksets shall meet the requirements of ANSI/BHMA A156.13-1994, Operational Grade 1.

b. Provide only thumbturn devices that meet accessibility requirements. No center pivoting thumbturns allowed.

c. If deadbolts or lockbolts are utilized on the project, devices shall be interconnected with the latching mechanism on all egress doors to provide single movement function to unlatch doors.

~~F. Electric Strikes:~~

~~1. Acceptable Manufacturer:~~

~~a. Basis-of-Design: HES Manufacturing, Inc.~~

~~b. Acceptable Manufacturers, if meeting specifications below:~~

~~1) Folger Adam Manufacturing, Inc.~~

~~2) SDC.~~

~~3) Adams Rite.~~

~~2. Specifications shall meet ANSI/BHMA 156.31, Grade 1; UL 1034, burglary-resistant listed; ANSI A250.13-2003 listed; UL 10C, 3 hour fire-rated (fail secure only); NFPA 252 fire door conformant; ASTM E152 fire door conformant. Provide dual interlocking plunger design and heavy-duty, all stainless steel construction, tested to exceed 3,000 pounds of static strength, 350 foot-pounds of dynamic strength, and factory tested to exceed 1,000,000 cycles of operation.~~

~~3. Provide electric strikes designed for use with the type locks shown at each opening where specified.~~

~~4. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.~~

~~5. For all electric strike locations, provide HES "SmartPac III" In-Line Power Control or accepted equal product to meet specified requirements: 2005 SmartPac III device is an in-line power control that is capable of receiving input voltages from 12VAC to 32VAC or DC. The built-in bridge rectifier shall provide 12VDC or 24VDC output. Under continuous duty operation, the output VDC shall be reduced by 25 percent to extend the life of the electric strike. The SmartPac III includes an in-line fuse, MOV to protect against possible inrush and reverse surges, and a 2-second to 8-second adjustable timer. Standard features include selectable 12VDC or 24VDC output options, built-in bridge rectifier, built-in surge protection / voltage regulation, activation timer keeping strike energized for set period of time, adjustable from 2 seconds to 8 seconds, continuous duty timer reducing initial voltage by 25 percent after set period of time adjustable from 2 seconds to 8 seconds, providing cooler operation of strike.~~

~~G.~~F. Flush Bolts and Dust Proof Strikes:

1. Acceptable Manufacturers:

   a. Triangle Brass Manufacturing Company, Inc. (Trimco).

   b. McKinney Products.

   c. Rockwood.

   d. Hager Manufacturing.

   e. Ives Manufacturing.

2. Where hardware groups/sets have different information, refer to the following for clarification. Provide hardware groups/sets devices along with added devices as indicated on Drawings and detailed requirements for each type of device:

a. Non-rated Openings: Where not specified in hardware sets provide supply two flush bolts for inactive leaf of pairs of locked and latched doors. Locate centerline of top bolt not more than 78 inches from finished floor. Provide dustproof strike for bottom bolts, type as required for floor condition.

b. Rated Openings: Where not specified in hardware sets provide automatic flush bolt set as applicable for inactive leaf of pairs of doors. Provide dustproof strike for bottom bolts, type as required for floor condition.

~~H.~~**G.** Coordinators:

1. Manufacturers:

a. Triangle Brass Manufacturing Company, Inc. (Trimco).

b. McKinney Products.

c. Rockwood.

d. Hager Manufacturing.

e. Ives Manufacturing.

2. Where hardware groups/sets have different information, refer to the following for clarification. Provide hardware groups/sets devices along with added devices as indicated on Drawings and detailed requirements for each type of device:

a. Provide coordinator for fire rated or smoke labeled pairs of doors equipped with automatic flush bolts and those with vertical rod/mortise lock fire exit device combinations with astragals.

b. Provide filler bars for total opening width, closer mounting brackets to allow proper installation of stop mounted hardware without damaging coordinator, carry bars, and special preparation for top latches where applicable.

2.09 KEY SYSTEMS (CYLINDERS, CORES AND KEYS.)

A. Where hardware groups/sets have different information refer to the following for clarification. Provide hardware groups/sets devices along with added devices as indicated on drawings and detailed requirements for each type of device (keying specifications below override hardware set/group nomenclature):

B. Key Systems (Cylinders, Cores and Keys):

1. For all locking or dogging devices, provide complete system set up for permanent cores provided by Client/Owner locksmith whether or not specified in Section 08 71 00, Part 3 hardware sets including lock cores, mortise cylinders, and rim cylinders Key System shall be:

a. Provide all non-cylindrical locking device locations and cylinders to be prepared for interchangeable cores (including, but not limited too final cores by Owner and construction cores in same sized final devices).

b. Provide all cylindrical locking device locations with prepared for non-interchangeable cores.

2.14 POWER SUPPLIES, ELECTRIFIED HARDWARE, AND WIRES

A. Door Position Switches

1. Acceptable Manufacturers:

a. Securitron.

b. General Electric (previously Sentrol Manufacturers).

2. Door position switch is written in hardware sets to be coordination "place-holders". Do not order final door position switches, but prepare doors and frames as follows: Door and frame supplier shall coordinate doors and frames to accept door position switch devices that are accepted during the submittals. Doors and frames shall be delivered to jobsite with DPS door position switch cuts/preparations. Final switches shall be provided and installed in pre-cut frame and door head by security vendor. Coordinate with Divisions 25-28 and applicable plans.

B. Power Supplies, Wires, and Relays:

1. Where hardware groups/sets have different information (number of hinge wires and power supply information), refer to the following specifications for clarification and submit according to complete and intended electrified system per Contract Documents. See Architectural and Security drawings and specifications.

a. Coordinate use of power supplies with door and frame locations. Provide power supplies, relay, and battery backup units as part of the overall system in accordance with the manufacturer's warranty and system requirements. UL listed for applicable use; housed in an approved enclosure; and provide both Class 1 and Class 2 outputs.

b. Output shall be filtered and regulated. Relay, timer, and logic modules shall be provided as required for interface to indicated security components, and shall be assembled, connected, and fully contained within the power supply enclosure.

c. Provide required connections to accommodate fire alarm/life safety system and/or security electronics for remote site monitoring of all electrified components and functions.

~~d. For all electric strike locations, provide HES "SmartPac III" In-Line Power Control or accepted equal product meeting specified requirements.~~

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine doors and frames and verify mounting locations as indicated on shop drawings.

B. Report unacceptable conditions to the Architect. Begin installation only when unacceptable conditions have been corrected.

3.02 INSTALLATION

A. Install in accordance with manufacturer's printed instructions and approved shop drawings.

B. Door-Floor Clearances:

1. Unless otherwise shown, provide the following door-floor clearances:

a. Labeled doors: 3/8 inch maximum over floor or threshold.

b. No threshold: 3/8 inch maximum for metal and wood doors.

c. With threshold: 1/8 inch.

d. Carpet: 1/8 inch over top of nap.

2. Undercut doors so that the sweeps still fit tight against the sill or threshold condition, but as the door opens and sweeps away from sill or threshold, the door bottoms do not rub on the floor. Metal installation parts of door bottoms are typically part of the door assembly and only the gap between the metal part and sill/threshold are seen as the undercut (means and methods: coordinate as required for door and hardware with finish floors, toppings, thresholds and performance ratings).

C. Hardware Placement:

1. Unless otherwise shown or required by CBC 2016, ADA Act - 2010 Standards for Accessible Design and/or Title 24, place hardware at the following heights:

a. Hinges: Door and frame manufacturer's standard.

b. Lever handles for latchsets, lockset and panic/exit device pull, lever trim:

1) 38 inches above finish floor/surface.

2) Verify manufacturer's template with door design.

c. Panic devices push bar:

1) Panic hardware shall be so mounted / centered between 36 inches and 44 inches above finished floor or ground.

2) Verify manufacturer's template with door design to meet CBC 2016 exterior, pull side trim.

d. Door Pulls and Push Bars (centerline): mounted / centered 42 inches above finished floor or ground.

e. Door Push Plates (centerline): mounted / centered 42 inches above finished floor or ground.

f. Where slider doors are in the fully open position, operating hardware shall be fully exposed and usable from both sides (CBC Sections 11B-404.2.7).

2. Hardware for door handles, pulls, latches, locks and other operating devices for use on means of egress doors shall comply with SFM Standard 12-10-2, Section 12-10-202 as contained in CCR Title 24, Part 12.

2.01 APPROVED MANUFACTURERS

A. Bobrick Washroom Equipment, Inc., ASI or approved equal.

2.02 MATERIALS, GENERAL

A. Stainless Steel: AISI 18-8 Type 304, with No. 4 finish.

B. Mirror Glass: Clear tempered float glass with silvering, electro-plated copper coating, and protective coating.

C. Fasteners: Concealed screws, bolts, and other devices of same material as accessory unit or of galvanized steel where concealed. Exposed face fasteners are not acceptable.

D. Keys: Unless otherwise directed by the Owner, provide universal keys for access to toilet accessory units requiring internal access for servicing. Provide a minimum of six keys.

2.03 TOILET ACCESSORY ITEMS

A. Toilet Paper Dispenser: Uline Jumbo Bath Tissue Dispenser Double Roll, Model H-1347.

B. Toilet Seat Cover Dispenser: Bobrick B-221 or approved equal.

C. Paper Towel Dispenser: San Jamar T850WS or approved equal.

D. Surface-Mounted Hand Soap Dispenser: Bobrick B-2111 or approved equal.

E. Grab Bars: Bobrick B-5806 Series or approved equal, configurations indicated.

F. Toilet Compartment Coat Hook: Bobrick B-682 or approved equal.

G. Utility Shelf with Mop Rack: Owner-furnished; Contractor-installed.

H. Semi-Recessed Waste Receptacle: Bobrick B-3644 or approved equal.

I. Sanitary Napkin Vendor: Bobrick B-2706.25 or approved equal.

J. Sanitary Napkin Disposal: Bobrick B-270 or approved equal.

K. Custom Size Glass Mirrors: As specified in Section 08 80 00.

PART 3 - EXECUTION

3.01 INSPECTION

A. Check wall openings for correct dimensions, plumbness of blocking or frames, and other preparation that would affect installation of accessories.

B. Check areas to receive surface mounted units for conditions that would affect quality and execution of work.

C. Verify spacing of plumbing fixtures and toilet partitions that affect installation of accessories.

3.02 INSTALLATION

A. Install toilet accessory units in accordance with manufacturer's instructions, using tamper-proof fasteners. Finish of exposed fasteners shall match accessory item secured. Install units plumb and level, firmly anchored in locations and at heights indicated.

B. Secure mirrors to walls in concealed, tamper-proof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square at locations indicated, in accordance with manufacturer's instructions for type of substrate involved.

C. Fit flanges of accessories snug to wall surfaces. Install sanitary sealant in gaps between 90-degree return flanges and finish wall surface after installation.

D. Finish edges of accessories with sealant to avoid water penetration.

3.03 ADJUSTING AND CLEANING

A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

B. Clean and polish exposed surfaces of accessories in accordance with manufacturer's recommendations after removing temporary labels and protective coatings.

3.04 CONSTRUCTION WASTE MANAGEMENT

A. General: Comply with the requirements of Section 01 74 19 Construction Waste Management for removal and disposal of construction debris and waste.

B. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION

SECTION 12 93 00

SITE FURNISHINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section describes the requirements for furnishing and installing the following site furnishing items:

1. Bicycle racks.

2. Waste receptacles.

3. Precast concrete benches.

4. Bike lockers.

B. Related Sections:

1. Construction waste management is specified in Section 01 74 19.

1.02 SUBMITTALS

A. General: Comply with Section 01 33 00.

B. Product Data: Manufacturer's product data and installation drawings for each site furnishing.

C. Shop Drawings: Dimensioned drawings and details showing materials, fabrication and installation. Show relationship with adjacent construction.

PART 2 - PRODUCTS

2.01 BICYCLE RACKS

A. Approved Manufacturer: Park n Pool "5 Wave Style Bike Rack" Model 10BR-025190PI or approved equal.

B. Material: 1-7/8-inch steel tubing.

C. Mounting: In ground.

D. Finish: Black powder coat.

2.02 WASTE RECEPTACLES

A. To be selected by the Architect.

2.03 PRECAST CONCRETE BENCHES

A. Approved Manufacturer: Wausau Tile Item TF5037 or approved equal.

B. Size: 96-inches x 18-inches x 16-inches.

C. Color: A26 Charcoal.

D. Finish: Acid wash.

2.08 BIKE LOCKERS

A. Approved Manufacturer: Dura Bike Locker "Vertical Bike Locker (DLPV)" or approved equal.

B. Construction:

1. Exterior Walls, Tops, Back Panels and Doors: 16-gauge galvanized steel. Doors shall havre a 16-gauge galvanized steel horizontal stiffener.

2. Frames: 14-gauge cold-rolled steel with 6 punched-in louver vents.

3. Door Hinge: 16-gauge stainless steel.

4. Fasteners: Zinc coated steel, fastened from the inside.

5. Finish: TGIC powder coat in color selected by the Architect from manufacturer's standards.

C. Locking: Stainless steel padlock handle.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install site furnishings in accordance with manufacturer's instructions. Set work plumb, level, true and in proper alignment.

B. Conceal fastenings unless otherwise indicated. Finish exposed fastenings to match item being fastened.

3.02 CONSTRUCTION WASTE MANAGEMENT

A. General: Comply with Section 01 74 19 for removal and disposal of construction debris and waste.

END OF SECTION

SPECIFICATIONS VOL. 2

Revised sheets

DIVISION 21 – FIRE PROTECTION

DIVISION 22 – PLUMBING

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING

DIVISION 25 – INTEGRATED AUTOMATION

DIVISION 26 – ELECTRICAL

END OF TABLE OF CONTENTS

D. For units installed within buildings, provide drain, connected to unit, to collect spillage from atmospheric vent. Run drain to nearest floor sink or drain.

2.10 REDUCED PRESSURE BACKFLOW PREVENTER FOR NON-POTABLE WATER SYSTEMS

A. Refer to Section 21 10 00 for backflow preventers for fire protection service.

B. Provide reduced-pressure principle backflow preventer consisting of assembly, including shutoff valves on inlet and outlet, and strainer on inlet, equal to Febco 825Y or 880, as required Wilkins, Aames, or equal. Backflow preventer shall include test cocks, and pressure differential relief valve located between two positive seating check valves. Construct in accordance with ASSE Standard 1013.

C. Provide substantial padlock and chain to lock valves in open position, and turn key over to Project Inspector.

1. Padlocks shall be as specified under Section 08 70 00.

2. Chain shall be of carbon steel, 3/8 inch wire diameter, fully welded links and weight of 140 pounds per 100 lineal feet. Chain shall be hot galvanized.

D. Provide capped connections at each test cock. Install in accordance with requirements of Authority Having Jurisdiction.

E. For units installed within buildings, provide drain, connected to unit, to collect spillage from atmospheric vent. Run drain to nearest floor sink or drain.

F. Manufacturers: Subject to compliance with requirements and local water authorities having jurisdiction, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

1. Ames

2. Febco Sales, Inc.

3. Watts Regulator Company

4. Clow

2.11 WATER METER

A. Provide and install prefabricated water meter and bypass assembly, sized as indicated on the Drawings, complete with strainer, adapter, couplings, spool piece and test nipple. The meter shall be compound type, with two measuring chambers and a single billing register. Pipe materials used in construction of the assembly shall be ductile iron, and the meter shall be bronze with stainless steel trim.

B. Install the meter and accessories in a Christy, Brooks, or equal, series "R" pit Model R37, 4 feet by 7 feet by 3 feet deep; complete with 4 piece checker plate parkway lid (screw down type), and 8 inch round meter reading lid. Install meter in accordance with the requirements of the Authority Having Jurisdiction.

C. Manufacturers: Subject to compliance with requirements and local water authorities having jurisdiction, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

1. Onicon F3500 Series

2.12 POTABLE WATER PRESSURE-REGULATING VALVE

A. Provide pressure-regulating valves, single-seated, direct-operated type, bronze body, integral strainer, complying with requirements of ASSE Standard 1003, and the lead-free requirements of California Health and Safety Code Section 11 68 75. Size for maximum flow rate and inlet and outlet pressure indicated on Drawings.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

1. Cla-Val Company

2. Watts Regulator Company

2.13 GAS PRESSURE REGULATING VALVES

A. Provide single-stage, spring-loaded, corrosion-resistant gas pressure regulators, with die-cast aluminum or cast iron body, complying with ANSI Z21.80. Unit shall be with atmospheric vent, internal relief overpressure protection, threaded ends for 2 inches and smaller, flanged ends for 2-1/2 inches and larger. For inlet and outlet gas pressures, specific gravity, and volume flow refer to Drawings schedule.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

1/2 inch: Elster (American, Singer) model 1213B.
Itron (Actaris, Slumberger, Sprague) model B42R.

3/4 thru 1-1/4inches: Elster (American, Singer) model 1813C.
Sensus (Ivensys, Equimeter, Rockwell) model 143-80-12
Itron (Actaris, Slumberger, Sprague) models B42R, B57R, B58R.

1-1/2 thru 2 inches: Elster (American, Singer) models 1813, 1813B.
Sensus (Ivensys, Equimeter, Rockwell) model 243.
Itron (Actaris, Slumberger, Sprague) models B43SR, B34R, B38R.

2.14 RELIEF VALVES

A. Provide relief valves as indicated, of size and capacity as selected by Contractor for proper relieving capacity, in accordance with ASME Boiler and Pressure Vessel Code.

B. Combined Pressure-Temperature Relief Valves: Bronze body, test lever, thermostat, complying with ANSI A21.22 listing requirements for temperature discharge capacity. Provide temperature relief at 210 degrees F, and pressure relief at 150 psi.

C. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

1. Watts Regulator Company
2. Cash (A.W.) Valve Manufacturing Corporation
3. Zurn Industries, Inc.; Wilkins-Regulator Division

2.15 TRAP PRIMER

A. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:

1. MiFab, Inc.
2. Precision Plumbing Products
3. Sioux Chief Manufacturing Company

2.16 CLEANOUTS

A. General: Install cleanouts of same diameter as pipe (4 inch maximum) in all horizontal soil and waste lines where indicated and at all points of change in direction. Cleanouts shall be located not less than 18 inches from building construction so as to provide sufficient space for rodding. No horizontal run over 50 feet inside buildings or 100 feet outside buildings shall be without cleanout, whether shown on Drawings or not. Provide two-way cleanouts where indicated on drawings, and where required for satisfactory use.

1. Provide cleanouts in waste drop from each sink and urinal.
2. Provide one wrench for each size and type of cleanout used. Turn over to Owner at completion of the project, and obtain receipt. Place receipt in Operation and Maintenance Manuals.

B. Cleanouts in floor and in concrete sidewalks: Ducco Cast Iron with nickel bronze top, clamping collar and ABS plastic plug: Zurn ZN-1400-KC, or equal, with square or round top to suit floor construction.

C. Cleanouts in composition floors: Zurn ZN-1400-X-DX, or equal (nickel bronze top).

D. Cleanouts in concealed, aboveground cast-iron soil or waste lines: Zurn Z-1440A, or equal, with ABS plastic plug.

E. Cleanouts in walls: Zurn Z-1441 or Z-1443, or equal, with stainless steel cover. Provide long sweep elbow or combination wye at connection to riser and install with surface of cleanout within 1/2 inch of front face of finished wall.

1. Where space does not permit the above installation, provide Zurn Z-1446, or equal, with stainless steel access cover, and vandal resistant screw.

2. Install face of cleanout plug within 1/2 inch of front face of finished wall.

F. Cleanouts exterior to building in landscaped areas: Zurn Z-1449-BP, or equal, cleanout ferrule with tapered bronze plug. Where located at grade, provide 18 by 18 by 6 inch concrete pad; Trowel concrete smooth and edge; set flush with finished grade.

G. Cleanouts in drive areas: Zurn -1400-HD-KC, or equal, with heavy-duty top and ABS plastic plug.

H. Cleanouts in acid waste systems: Zurn ZN-1404, or equal, cleanout access housing, with ductile cast iron body and nickel bronze top. Extend acid waste piping within the cleanout, and terminate with threaded cap. Secure acid waste pipe inside cleanout access housing with setscrews provided.

I. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

1. Zurn

2. J.R. Smith

3. Josam

2.17 FLOOR DRAINS Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:

1. Zurn

2. J.R. Smith

3. Josam

2.18 FLOOR SINKS

A. Floor Sinks: Provide anchoring flange (seepage pan) at all floor sinks, and provide flashing clamp in locations where floor membrane is used. Provide cast iron "P" trap and trap primer connection at P-Trap.

B. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:

1. Zurn

2. J.R. Smith

3. Josam

2.19 AREA DRAIN

A. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:

1. Zurn

2. J.R. Smith

3. Christy

4. Brooks

5. Santa Rosa Precast

2.20 ROOF DRAINS AND OVERFLOW DRAINS

A. See Architectural Drawings for drain style to be used.

B. Provide offset downspout boots where required for connection of exposed sheet metal downspouts to underground cast iron or PVC piping.

C. Provide rainwater leader nozzles on overflow piping. Nozzle body shall be bronze with threaded inlet and bronze wall flange with mounting holes. Size nozzle to match connected rainwater leader.

D. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:

1. J.R. Smith
2. Mifab
3. Zurn

2.21 HOPPER DRAINS

A. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:

1. Zurn
2. J.R. Smith

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine areas and conditions under which plumbing piping systems are to be installed. Do not proceed with Work until unsatisfactory conditions have been corrected in manner acceptable to Contractor.

B. Make all arrangements for the utilities required. Pay all costs involved in obtaining the services including gas service and meter, water meter, pressure reducing valve, access boxes, street work. Connect to site utilities. Verify the location of all services. No extra cost will be allowed if services are not as shown.

C. Determine sanitary sewer and storm drain location and elevation at all points of connection before installing any piping. Notify Architect immediately if indicated grades cannot be maintained.

D. At time of final connection, and prior to opening valve to allow pressurization of water and gas piping from existing systems, on site or off site, perform a pressure test to indicate static pressure of existing systems. If pressure on water piping is greater than 80 psi, or gas pressure is not as indicated on Contract Documents, inform Architect immediately. Do not allow piping systems to be pressurized without written consent of the Architect.

3.02 INSTALLATION OF WATER PIPING

A. Run all water piping generally level, free of traps or unnecessary bends, arranged to conform to the building requirements, and to suit clearance for other mechanical work such as ducts, flues, conduits, and other work. No piping shall be installed so as to cause unusual noise from the flow of water therein under normal conditions.

B. Provide manufactured water hammer arrestors, sized and installed in accordance with Plumbing and Drainage Institute Standard PDI WH201.

1. Locate water hammer arrestors at every plumbing fixture, or, where fixtures are located in groups, at every group of fixtures, and as indicated on Drawings.
2. Install water hammer arresters above accessible ceilings, or install access doors for service.

C. Install piping on room side of building insulation.

D. Check final location of rubber rings within couplings on PVC water piping with gauge or as recommended by manufacturer. Make connection to valves with cast iron adapters connected to water pipe with cast iron couplings. Furnish and install anchors or thrust blocks.

E. For all faucets, hose bibbs, or other water outlets delivering industrial hot and/or cold water, provide a sign, permanently mounted, indicating "CAUTION: NON-POTABLE WATER, DO NOT DRINK". Each sign shall be permanently engraved with black uppercase letters on a yellow background. Letters shall be minimum 1-1/4 inch high.

3.03 INSTALLATION OF SANITARY AND STORM DRAINAGE SYSTEMS

A. Make joints in PVC sewer pipe with PVC-type couplings and rubber rings.

B. Check final location of rubber rings within the couplings with gauge or as recommended by the manufacturer. Make joints between PVC pipe and cast iron pipe or fittings using cast iron adapter fittings, installed as recommended by the manufacturer.

1. Ring-Tite cast iron pipe fittings may be used in lieu of standard fittings. Make connection to valves with cast iron adapters connected to the pipe with PVC couplings.

C. Sewer Piping: Run all horizontal sanitary drain piping inside of building on a uniform grade of not less than 1/4 inch per foot unless otherwise noted or later approved. Unless otherwise noted on the plans, piping shall have invert elevations as shown and slope uniformly between given elevations.

D. Storm Drain Piping: Run all horizontal storm drain piping inside of building on a uniform grade of not less than 1/4 inch per foot. Unless otherwise noted on the plans, piping shall have invert elevations as shown and slope uniformly between given elevations.

E. Install rainwater leader nozzles at exposed bottom of leaders where they spill onto grade.

F. Run all drainage piping as straight as possible and provide easy bends with long turns; make all offsets at an angle of 45 degrees or less.

G. Grade all vent piping so as to free itself quickly of any water condensation.

H. Where possible, join groups of vent risers together with one enlarged outlet through roof. Maintain minimum of 10 foot horizontal or 3 foot vertical clearance from air intakes.

I. Hubless Cast Iron Joints: Comply with coupling manufacturer's installation instructions.

3.04 INSTALLATION OF CLEANOUTS

A. Cleanouts: Install in piping as indicated, as required by California Plumbing Code, at each change in direction of piping greater than 45 degrees. Install at maximum intervals of 50 feet for piping 4 inches and smaller and 100 feet for larger piping inside buildings, and at base of each conductor.

B. Flashing Flanges: Install flashing flange and clamping device with each cleanout passing through water resistant membrane.

3.05 INSTALLATION OF FLOOR DRAINS AND FLOOR SINKS

A. Install drains in accordance with manufacturer's written instructions and in locations indicated. Install floor drains with lip of drain slightly below finished floor to ensure drainage. Install floor sinks flush with finished floor. Coordinate with other Contractors to ensure that floor slopes to drain. Provide flashing flange and clamping device with each drain passing through water resistant membrane.

B. Install vented P-trap below each drain. Where trap primers are indicated, install trap primer connection in the P-trap.

3.06 INSTALLATION OF ROOF DRAINS AND OVERFLOW DRAINS

A. Install roof drains and overflow roof drains in accordance with manufacturer's written instructions and in locations indicated.

B. Coordinate with roofing as necessary to interface roof drains with roofing work.

3.07 INSTALLATION OF HOPPER DRAINS

A. Install hopper drain in wall, in sheet metal box, with access door.

1. Size access door and box to suit the size required for hopper drain and trap primer, and solder all seams of box. Seal all penetrations to box with non-hardening waterproof sealant. Provide locking door in occupied spaces.

B. Grind top and sides of funnel, if required, to suit wall thickness.

3.08 INSTALLATION OF NATURAL GAS PIPING

A. Install natural gas piping in accordance with Division 22 Basic Plumbing Materials and Methods sections.

B. Use sealants on metal gas piping threads that are chemically resistant to natural gas. Use sealants sparingly, and apply to only male threads of metal joints.

C. Remove cutting and threading burrs before assembling piping.

D. Do not install defective piping or fittings. Do not use pipe with threads that are chipped, stripped, or damaged.

E. Plug each gas outlet, including valves, with threaded plug or cap immediately after installation and retain until continuing piping or equipment connections are completed.

F. Ground gas piping electrically and continuously within project, and bond tightly to grounding connection.

G. Install drip-legs in gas piping where indicated and where required by code or regulation.

1. Install "Tee" fitting with bottom outlet plugged or capped at bottom of pipe risers.

H. Install piping with 1/64 inch per foot (1/8 percent) downward slope in direction of flow.

I. Install piping parallel to other piping.

J. Paint all gas piping installed in exposed exterior locations.

K. Provide shutoff valve downstream of meter.

L. Provide exterior shutoff valve at each building. Provide sign affixed to wall at valve location reading: "Gas Shut-Off." Size and location of the sign shall be as required by the Authority Having Jurisdiction. Where gas piping enters a building in more than one location, exterior shutoff valves shall have a permanently attached metal tag identifying the area served by that valve, in addition to sign on wall.

M. Provide watertight Schedule 40 PVC conduit to protect gas piping installed below covered walk, covered driveways, and where noted on Drawings. Extend sleeve at least 12 inches beyond any area where it is required to be installed, and terminate with valve box extended to grade, and marked "GAS".

3.09 GAS PRESSURE REGULATING VALVES

A. Install as indicated; comply with utility requirements. In locations where regulators are installed in confined spaces, pipe atmospheric vent to outdoors, full size of outlet. Install gas shutoff valve upstream and downstream of each pressure-regulating valve.

3.10 GAS PIPING EQUIPMENT CONNECTIONS

A. Connect gas piping to each gas-fired equipment item, with union, drip leg and shutoff gas cock full size of supply line shown. Reduce only at connection to equipment. Comply with equipment manufacturer's instructions.

1. Appliance fuel connectors, as defined in 1203 of the CPC, are not acceptable for connection of equipment, except where specifically indicated on the Contract Documents.

2. Route gas vent and gas relief to outside.

3. Gas shutoff valve shall be placed as close as possible to equipment in a location where it can be serviced. Distance from equipment to valve shall not exceed 6 feet.

3.11 INSTALLATION OF BACKFLOW PREVENTERS

A. Install backflow preventers where indicated on Drawings. Provide drain connection available from the manufacturer at drain connection, pipe drain outlet to the nearest floor drain.

B. Where drain pans are shown on the Drawings, pipe drain pan outlet to nearest floor drain.

3.12 INSTALLATION OF TRAP PRIMERS

A. Install as indicated in manufacturers printed literature, with 1/2 inch, Type L, hard copper piping to trap primer connection on floor drains and floor sinks where indicated on Drawings. At Contractor's option, Type K annealed copper tubing without joints may be used be used below slab only. See Section 22 00 50 for pipe protection requirements for below slab copper piping/tubing.

B. Install trap primer piping with 1/4 inch per foot slope, to insure that the line will drain fully to the floor drain or floor sink.

1. Provide ball valve to the inlet at each trap primer location.

C. Install trap primer and distribution unit exactly as called for in manufacturers printed installation instructions. Connect to domestic water piping from the top of the water line, in order to prevent foreign material from entering directly into primer assembly.

D. Mount trap primer in wall, in sheet metal box, with Karp or equal access door. Size access door and box to suit valve operation, and solder all seams of box. Seal all penetrations to box with non-hardening waterproof sealant. Provide locking door where installed in occupied spaces.

E. Where one trap primer will be used for more than one trap, provide a distribution unit with feeder piping for a maximum of four traps sized for equal pressure drop to each trap.

3.13 EQUIPMENT CONNECTIONS

A. Piping Runouts to Fixtures: Provide hot and cold water piping runouts to fixtures of sizes indicated.

B. Mechanical Equipment Connections: Connect hot and cold water piping system and gas piping system to mechanical equipment as indicated, and provide with shutoff valve and union for each connection.

3.14 SPARE PARTS

A. Furnish to Owner, with receipt, one valve key for each key operated hydrant, bibb, or faucet installed.

3.15 DOMESTIC WATER SYSTEM STERILIZATION

A. Clean and disinfect new or altered hot and cold water piping connected to domestic water systems using methods prescribed by the Health Authority. If the Health Authority does not prescribe methods, clean and disinfect new or altered hot and cold water piping using methods given in the California Plumbing Code.

1. A water treatment company that has a current state EPA license to apply disinfectant chlorine in potable water shall perform the procedure.

3.16 CARE AND CLEANING

A. Repair or replace broken, damaged, or otherwise defective parts, materials, and work. Leave entire work in condition satisfactory to Architect. At completion, carefully clean and adjust equipment, fixtures, and trim that are installed as part of this work. Remove labels from stainless steel sinks, except 316 stainless steel sink labels should be retained to confirm that the correct material has been provided. Leave systems and equipment in satisfactory operating condition.

3.17 OPERATION TEST

A. Test each piece of equipment to show that it will operate in accordance with indicated requirements.

3.18 TESTING AND BALANCING

A. See Section 23 05 93 of these specifications for testing and balancing requirements.

3.19 CLEANING UP

A. Upon completion of Work remove materials, equipment, apparatus, tools, and the like, and leave premises clean, neat, and orderly.

END OF SECTION

2.3 CORROSION-PROTECTION PIPING ENCASEMENT

A. Encasement for Underground Metal Piping:
   1. Standards: ASTM A 674 or AWWA C105.
   2. Form: Sheet or tube.
   3. Material: LLDPE film of 0.008-inch minimum thickness, or high-density, crosslaminated PE film of 0.004-inch minimum thickness.

2.4 PIPING SPECIALTIES

A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.5 VALVES

A. Valves: Manufacturer's name and pressure rating marked on valve body.

B. Above ground valves:
   1. Ball Valves Up To 3 Inches:
      a. Nibco. Brass or Bronze body. Working pressure shall be 200 psi.
   2. Butterfly Valves 4 inches and Over:
      a. Iron body, bronze mounted. Quarter-turn. End connections shall be flanged ends or mechanical joint as required for the type of pipe used. Working pressure shall be 200 psi.

C. Buried Valves
   1. Gate Valves Up To 3 Inches:
      a. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, compression ends, with control rod, and extension box. Working pressure shall be 200 psi.
   2. Gate Valves 4 inches and Over:
      a. AWWA C509, iron body, bronze mounted, double-disk, parallel seat gate valve. All valves shall open by turning the stem counterclockwise. Buried valves shall be non-rising type with O ring seal equipped with 2 inch square operating nut, and shall be bituminous coated. Buried valves shall have stem extensions to place operating nut within 6 inch of top of valve box. End connections shall be flanged ends or mechanical joint as required for the type of pipe used. Working pressure shall be 200 psi.

2.6 COUPLINGS AND RESTRAINED JOINTS

A. For DIP and PVC pipe:
   1. Unless otherwise noted, couplings and sleeves for DIP and PVC shall be ductile iron conforming to AWWA C153, size 3 through 24 inch and AWWA C110 greater than 24 inch, and shall be 350 psi working pressure rated. AWWA C100 fittings shall be ductile iron only. Couplings, sleeves, and accessories shall be manufactured by U.S. Pipe TrimTyte, Union Foundry, Tyler; or equal.
   2. Unless otherwise noted, flanges on all DIP spools shall conform to AWWA C115.
   3. Push-on joints shall have SBR rubber ring gaskets.

4. All fittings shall be restrained joints. Pipes shall be restrained using a wedge-action, self-actuating lug type restraint devise as manufactured by EBAA Iron Sales, StarGrip, or equal.
5. All pipe joints within the minimum distances listed below shall be restrained. Restraint shall be by use of locking gasket for ductile iron pipe. Restraint for PVC pipe shall by use of a restraint harness EBAA Series 2800, StarGrip, or equal.
   a. 8 inch pipe:
      1) Horizontal Elbows:
         a) 11.25 degree bend: 2 foot minimum restraint length.
         b) 22.5 degree bend: 4 foot minimum restraint length.
         c) 45 degree bend: 7 foot minimum restraint length.
         d) 90 degree bend: 18 foot minimum restraint length.
      2) Tees: 18 foot minimum restraint length.
      3) Reducers: 23 foot minimum restraint length.
      4) Dead Ends: 55 foot minimum restraint length.

2.7 ACCESSORIES

A. Mechanical Restraints:
   1. PVC Pipes: Certain Teed Certa Lock, Romac Grip Rings, or equal.
   2. Ductile Iron Pipes: Field Lock Gaskets, Mega Lug 1100 series, TR Flex, or equal.

B. Rods and Clamps: Socket clamps shall be stainless steel, four bolt type, equipped with stainless steel socket clamp washers and nuts Grinnell Fig. 595 and 594, Elcen Fig. 37 and 37X, or equal.
   1. Rods shall be stainless steel, 3/4 inch diameter.

C. All underground domestic water piping shall be accompanied by an HMWPE insulated (blue color) copper clad steel (CCS) tracer wire. Both ends of tracer wire shall be accessible at all utility valve boxes.

D. An insulated, lockable, UV resistant blanket type cover shall be provided for all reduced pressure principle devices and double check devices (fiberglass jacketing is not acceptable). The cover shall be a manufactured product with Velcro or equal bottom, top, and one end minimum. Brass grommets shall be required every 12 inches in the Velcro areas.

E. All devices that are ferrous metal and above grade piping shall be epoxy coated. All devices and piping shall be painted Hunter Green Semi-Gloss (ICI Devoe DC5517 or equal).

2.8 BACKFLOW PREVENTERS

1. Reduced-Pressure- Backflow Preventers:
   a. Apollo 2000R700

2.9 FIRE DEPARTMENT CONNECTIONS

1. Fire Department Connections:
   a. Description: Freestanding, with cast-bronze body, thread inlets according to NFPA 1963 and matching local fire department hose threads, and threaded bottom outlet. Include lugged caps, gaskets, and chains; lugged swivel connection and drop clapper for each hose-connection inlet; 18-inch- high brass sleeve; and round escutcheon plate.
      1) Standard: UL 405.

2) Connections: Two NPS 2-1/2 inlets and one NPS 4outlet.

PART 3 - EXECUTION

3.1 PREPARATION

A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges or unions.

3.2 EARTHWORK

A. Refer to Division 31 Section "Earthwork" for excavating, trenching, and backfilling.

3.3 INSTALLATION – PIPE

A. Have on hand all installation manuals, brochures, and procedures for the equipment and materials concerned.

B. Follow manufacturer instructions, where such are provided, in all cases that cover points not shown on the Drawings or specified herein. Manufacturer's instructions do not take precedence over the Drawings and Specifications. Where manufacturer's instructions are in conflict with the Drawings and Specification, submit the conflicting instructions to the District's Representative for clarification before performing the work.

C. Use fittings to make all changes in direction and size unless otherwise indicated on the Drawings.

D. Maintain factory plastic end covers on the pipe during storage. Caps shall be removed upon installation of pipe to insure cleanliness.

E. Lay piping on a bed of the specified sand, at least 6-inches thick, on firm undisturbed earth. Remove loose rock, clods, and debris from the trench before placing bedding sand and before laying any pipe.

F. The piping shall be made up with the pipe barrel bearing evenly along its full length on the sand bed on the bottom of the trench.

G. In the case of steel or other rigid joint piping, excavate holes under joints and connections for access for making up, welding, testing and wrapping joints.

H. Thoroughly clean out each section of pipe and fitting before lowering into the trench. Clean each pipe or fitting by swabbing-out, brushing-out, blowing-out with compressed air, washing-out with water, or by any combination of these methods necessary to remove all foreign matter.

I. If cleaned pipe sections and fittings cannot be placed in the trench without getting dirt into the open ends, tie tightly woven canvas or other type of approved cover over the ends of the pipes and fittings until they have been lowered into position in the trench. After removal of the covers in the trench, completely remove foreign matter from the pipe ends and fittings.

J. Do not lower any pipe or fitting into a trench that contains water. Pump water from wet trenches, and keep the trenches dry until the joints have been completed and the open ends of the pipes have been closed with watertight plugs or bulkheads. Do not remove the plug or bulkhead unless the trench is dry.

K. Assemble lengths of PVC that are joined by couplings, Tyton type push-on joints, Ring-Tite, Fluid-Tite, or equal, such that centerline of two pipes being joined do not form an angle exceeding 2 inches in any plane. In addition, the angle formed in the vertical plane shall not exceed 1-1/2 inch.

L. Transition plastic pipe to ductile iron when within 10 feet of a steam line. Provide 6 inches minimum powdered insulation around ductile iron sewer pipe when within 5 feet of steam line. Install insulation according to manufacturer's recommendations.

M. Install trace wire on top of pipe.

N. Install continuous line marker 18 inches above top of pipe; coordinate with Section 31 2000 Earthwork.

3.4 INSTALLATION – VALVES

A. Set valves on solid bearing.

B. Center and plumb valve box over valve. Set box cover flush with finished grade.

3.5 CONNECTIONS TO EXISTING WATER SYSTEM

A. Under no circumstances shall existing lines or utilities be interrupted without prior approval of the District. Submit a request for this approval and also state the maximum duration of shutdown.

3.6 PIPE TESTING

A. Water piping shall be hydrostatically tested at 150 psi pressure for four hours and proven watertight. Provide all instruments, facilities, and labor to conduct testing and placing in operation.

B. Piping shall be tested in sections. Testing under this Section of the work shall be done before final connections to existing utility piping is made, with the provision that subsequent leaks, if developed, at these conditions shall be corrected.

C. Any part of the system, including all accessories, that shows failure during testing shall immediately be repaired or replaced with new materials. The system shall be completely retested after repair for replacement. This procedure shall be repeated, if necessary, until all parts of the system withstand the specified tests. All retesting costs shall be part of the Contract.

D. Leakage rate shall not exceed 1.5 gallons/hour/1000 feet of pipe over a 2-hour test period.

E. Tests shall be witnessed by the District. At least 48 hours notice of tests shall be give.

3.7 IDENTIFICATION

A. Install continuous underground warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Division 31 Section "Earth Moving."

3.8 CLEANING

A. Clean and disinfect water-distribution piping as follows:
   1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
   2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
   3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
      a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
      b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
      c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
      d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

B. Prepare reports of purging and disinfecting activities.

END OF SECTION 22 11 13

C. Carriers: Provide cast iron supports for fixtures of graphitic gray iron, ductile iron, or malleable iron as indicated. Where the carrier for wall mounted water closets are installed more than 6 inches behind the finished wall, provide water closet support for wide pipe chase.

D. Fixture Bolt Caps: Provide manufacturer's standard exposed fixture bolt caps finished to match fixture finish.

E. Escutcheons: Where fixture supplies and drains penetrate walls in exposed location, provide chrome-plated cast brass escutcheons with setscrews.

F. Aerators: Provide aerators of types approved by Health Departments having jurisdiction. Delete aerators where not allowed by CPC for health care occupancies.

G. Comply with additional fixture requirements contained in Fixture Schedule shown on the drawings.

2.04 MANUFACTURERS

A. In accordance with California Plumbing Code, provide indelibly marked or embossed manufacturers name or logo, arranged so as to be visible after installation.

B. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following:

1. Vitrified China Plumbing Fixtures:
   a. Sloan Valve Co.
   b. Eljer Plumbingware Div., Wallace-Murray Corp.
   c. Kohler Co.
   d. VitrA
2. Plumbing Trim:
   a. McGuire Manufacturing Co., Inc.
   b. Delta Commercial
   c. Chicago Faucet Co.
   d. T&S Brass and Bronze Works, Inc.
3. Flush Valves:
   a. Sloan Valve Co.
   b. Zurn Industries, Hydromechanics Div.
   c. Toto USA, Inc.
4. Faucets:
   a. Chicago Faucet Co.
   b. Symmons Scott
   c. T&S Brass and Bronze Works, Inc.
   d. Delta Commercial
5. Fixture Seats:
   a. Church Seat Co.
   b. Bemis Mfg. Co.
   c. Beneke Corp.
6. Water Coolers and Drinking Fountains:
   a. Halsey Taylor Mfg. Co.
   b. Elkay Mfg. Co.

c. Acorn Aqua

7. Service Sinks:

a. American Standard

b. Kohler Co.

c. Williams Serviceptor

d. Florestone

e. Acorn

8. Stainless Steel Sinks:

a. Elkay Mfg. Co.

b. Just Mfg. Co.

c. Haws Corporation

9. Fixture Carriers:

a. Josam Mfg. Co.

b. J. R. Smith

c. Tyler Pipe; Wade Div.

d. Zurn Industries; Hydromechanics Div.

e. Mifab, Inc.

2.05 FLUSH VALVE REQUIREMENTS

A. Metering flush valves where required and specified shall be non-hold open type with exposed parts chrome plated. Conform to all codes and manufacturers' recommendations. All diaphragms are to have multiple filtered bypass and be chloramine resistant synthetic rubber with internal components suitable for l80 degree hot water to l50 pounds pressure, plastic or leather diaphragm not acceptable.

B. Electronic flush valves where required and specified shall be non-hold open type with exposed parts chrome plated. Conform to all codes and manufacturers' recommendations. All diaphragms are to have multiple filtered by pass and be chloramine and resistant synthetic rubber with rubber and internal components suitable for 180 degree hot water to 150 pounds pressure, plastic or leather diaphragm not acceptable. All flush valve solenoids and sensors shall be UL listed.

2.06 FIXTURE CONNECTIONS

A. Make connection between fixtures and flanges on soil pipe absolutely gastight and watertight with neoprene type gaskets (wall hung fixtures) or bowl wax (floor outlet fixtures). Rubber gaskets or putty will not be permitted.

B. Provide fixtures not having integral traps with P-traps of chromium-plated 17 gauge cast brass, with 17 gauge seamless brass wall return, connected to concealed waste in wall and sanitary fittings. Provide IAPMO approval for trap, and provide less trap screw cleanout.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

a. Dearborn Brass, Commercial series with brass nuts

b. Delta Commercial

c. McGuire Manufacturing Co., Inc.

C. Connections from stacks or horizontal wastes to wall or floor finish for wastes from lavatories, urinals, sinks, and drinking fountains and connection between floor drains and traps shall be IPS 85 percent red brass pipe.

D. Unions on waste pipes on fixture side of traps may be slip or flange joints with soft rubber or lead gaskets. Traps shall rough in full size to waste and vent connection, using deep escutcheon plate to cover wall penetration. Compression adaptor extensions or sweat adaptors are not acceptable.

2.07 WATER SUPPLIES AND STOPS

A. Provide 85 percent IPS threaded red brass nipple, conforming to the lead-free requirements of California Health and Safety Code Section 11 68 75, securely anchored to building construction, for each connection to stops, hose bibbs, etc. Each fixture, except hose bibbs, shall have stop valves installed on water supply lines.

B. Provide water supplies to fixtures with compression shut-off stops with IPS inlets and lock shield-loose key handles. Provide combination fixtures with compression stop and IPS inlet on each water supply fitting. Provide lock shield-loose key handle for each stop.

C. Provide 1/2 inch riser tubes with reducing coupling for fixtures, unless otherwise noted.

D. Provide cast brass escutcheon.

E. Furnish shut-off valves on hose bibbs where directly connected to mains with no intervening valves.

F. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

1. BrassCraft Manufacturing model SR37XC stop with 3-12AC riser and 647 escutcheon.
2. McGuire Manufacturing Company, Inc. model LFH2167LK.
3. Watts model LF890 203LK.

2.08 PLUMBING FIXTURE HANGERS AND SUPPORTS

A. Residential type fixture supports are not acceptable.

B. Install wall mounted water closets with combination support and waste fittings, with feet of support securely anchored to floor.

C. Install floor mounted water closets with J.R. Smith, Zurn, or equal government pattern cast iron closet flanges with brass bolts, nuts, washers, and porcelain caps secured with Spackle.

D. Install the following fixtures on concealed support with feet of support securely anchored to floor. Anchor top of support to wall construction in an approved manner.

1. Wall hung lavatories.
2. Wall mounted urinals.
3. Drinking fountains.
4. Electric water coolers.

2.09 PLUMBING FIXTURES

A. Install all plumbing fixtures at height indicated on Architectural Drawings. Where mounting height is not indicated, install at height required by Code.

B. Special Requirements For Accessible Fixtures:

1. Operating handle or valve for accessible water closets, urinals, lavatories, and sinks shall operate with less than 5 pounds force. Metering faucets shall be adjusted to operate between 10 and 15 seconds.
2. Insulate exposed waste piping and domestic water supplies below accessible fixtures with CBC access code compliant molded "closed-cell" vinyl covers. Covers shall be installed using vandal resistant fasteners and must be removable. Covers shall meet flame spread rating not to exceed 25 and smoke density not to exceed 50 when tested in accordance with ASTM E-84, and shall comply with the requirements of California Code of Regulations, Title 24. Plumberex – Handy Shield, Johns Manville – Zeston 2000, or equal.

C. Refrigerator Ice Maker:

1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:

   a. Guy Gray

   b. Water-Tite

D. Solids Interceptor:

1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:

   a. J.R. Smith Mfg. Co.

PART 3 - EXECUTION

3.01 PRODUCT HANDLING AND PROTECTION

A. Deliver packaged materials in their original, unopened wrapping with labels intact. Protect materials from water, the elements and other damage during delivery, storage and handling.

3.02 PREPARATORY PROVISIONS

A. The Contractor is responsible for the examination and acceptance of all conditions affecting the proper construction and/or installation of the Work of this Section. Do not proceed until all unsatisfactory conditions have been corrected. Commencing work will be construed as acceptance of all conditions by the Contractor as satisfactory for the construction and/or installation of the Work.

3.03 INSPECTION AND PREPARATION

A. Examine roughing-in work of domestic water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping, and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Install plumbing fixtures of types indicated where shown and at indicated heights; in accordance with fixture manufacturer's written instructions, roughing-in drawings. Ensure that plumbing fixtures comply with requirements and serve intended purposes. Comply with applicable requirements of the National Standard Plumbing Code pertaining to installation of plumbing fixtures.

C. Fasten plumbing fixtures securely to supports or building structure; and ensure that fixtures are level and plumb. Secure plumbing supplies to blocking behind or within wall construction so as to be rigid, and not subject to pull or push movement.

D. Install CBC accessible fixtures in accordance with Chapter 4 California Plumbing Code, and Chapters 11A and 11B California Building Code.

E. Refer to Division 26 for wiring for electronic flush valves.

3.04 INSTALLATION OF FAUCETS

A. Provide 85 percent IPS red brass pipe, conforming to lead-free requirements of California Health and Safety Code Section 11 68 75, securely anchored to building construction, for each connection to faucets, stops, hose bibbs, etc. Each fixture, except hose bibbs, shall have a stop valve installed on water supply lines to permit repairs without shutting off water mains.

B. Adjust metering faucets to run for 10 to 15 seconds.

3.05 CLEAN AND PROTECT

A. Clean plumbing fixtures of dirt and debris upon completion of installation.

B. Protect installed fixtures from damage during the remainder of the construction period.

C. Grout voids between all fixtures and adjacent surfaces with white Dow Silicone Sealant, arranged to shed water.

3.06 FIELD QUALITY CONTROL

A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

3.07 EXTRA STOCK

A. General: Furnish special wrenches and other devices necessary for servicing plumbing fixtures and trim to Owner with receipt. Furnish one device for every ten units.

END OF SECTION

a. Electronically Commutated motor (EC type): Motor shall be electronically commutated type specifically designed for applications, with heavy duty ball bearings. The motor shall be speed controllable down to 20% of full speed and 85% efficient at all speeds.

1) Exceptions:

a) Motors in fan-coils and terminal units that operate only when providing heating to the space served.

b) Motors installed in space conditioning equipment certified under 2013 California Energy Code Section 110.1 or 110.2.

4. Contractor's Option: Motors scheduled on Drawings as single-phase, and larger than 1/12 hp and smaller than 1 hp, for applications other than HVAC fans, may be EC type.

5. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

6. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

7. Motors 1/20 HP and Smaller: Shaded-pole type.

8. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

2.04 MOTOR STARTERS

A. Square D, Allen Bradley, or equal, in NEMA Type 1 enclosure, unless otherwise specified or required. Minimum starter size shall be Size 1. Provide NEMA 3R enclosure where exposed to outdoors.

B. Provide magnetic motor starters for all equipment provided under the Mechanical Work. Starters shall be non-combination type. Provide part winding or reduced voltage start motors where shown or as hereinafter specified. Minimum size starter shall be Size 1.

1. All starters shall have the following:

a. Cover mounted hand-off-automatic switch. Starters installed exposed in occupied spaces shall have key operated HOA switch.

b. Ambient compensated thermal overload.

c. Fused control transformer (for 120 or 24 volt service).

d. Pilot lights, integral with the starters. Starters located outdoors shall be in NEMA IIIR enclosures.

2. Where three phase motors are provided for two-speed operation, provide two speed motor starters.

3. Starters for single-phase motors shall have thermal overloads. NEMA I enclosure for starters located indoors, NEMA IIIR enclosure for starters located outdoors.

4. Provide OSHA label indicating the device starts automatically.

2.05 VALVES AND FITTINGS

A. Gate Valves:

1. Underground valves 2 inches thru 12 inches: 250 psi, iron body, Non-rising stem, bolted bonnet, resilient wedge valves, conforming to AWWA C509, equipped with 2" square head operating nuts, Mueller Series 2360, Nibco F-619-RW-SON, or equal.

a. Underground valves 3 inches and smaller may be furnished with operating nuts, and with Ring-Tite joint ends.

b. Furnish and deliver to Owner one wrench of each size required for operating underground valves.

B. Ball Valves:

1. 2 inches and smaller: 600 psi CWP, 150 psi SWP, cast bronze body, full port, two piece, threaded ends, and reinforced PTFE seal, conforming to MSS SP-110. Nibco T585-70, Milwaukee BA-400, Stockham T-285, or equal.

2. 2-1/2 inches: Class 150, carbon steel body, full port, two piece, stainless steel vented ball, flanged ends, and reinforced PTFE seal, conforming to MSS SP-72. Nibco F-515-CS-F-66-FS, Milwaukee F20-CS-15-F-02-GO-VB, or equal.

3. Compressed Air Services: Class 150, bronze body, full port, three piece, threaded ends, and reinforced PTFE seal, conforming to MSS SP-110. Nibco Model T-595-Y, Milwaukee BA-300, or equal.

C. Swing Check Valves: Class 125 or 150, bronze body, suitable for regrinding, threaded ends, conforming to MSS SP-80. Stockham B-321, Milwaukee 509, or equal.

D. Butterfly Valves:

1. General: Tight closing, full lug type, with resilient seat suitable for minimum working pressure of 200 psig, conforming to MSS SP-67. Bi-direction dead end service with downstream flange removed.

2. Provide valves with the following:

a. Seats: Suitable for 40 degrees F for cold water service and 250 degrees F for hot water service. Seats shall cover inside surface of body and extend over body ends.

b. Bodies: Ductile iron or cast iron.

c. Discs: Bronze or stainless steel.

d. Stems or Shafts: Stainless steel.

e. Control Handles: Suitable for locking in any position or with 10 degree or 15 degree notched throttling plates to hold valve in selected position. Provide extended necks to compensate for insulation thickness. Provide gear operator for valves 5 inches and larger.

3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

a. 2 through 12 inches: Milwaukee Valve, CL series, Nibco, Inc., model LD2000-3, or equal.

E. Silent Check Valves (for use on pump discharge):

1. General: Provide spring loaded check valves at pump discharge of all pumps.

a. 2 inches and smaller: 250 psi CWP, bronze body, Nibco Model T-480, Milwaukee 548-T, or equal.

b. 2-1/2 inches and larger: Class 250, cast iron body, wafer style, suitable for regrinding. Nibco Model F960, Milwaukee 1400, Mueller 103MAP, or equal.

F. Calibrated Balance Valves (Symbol CBV): Provide globe style valves for precision regulation and control rated 175 psi for sizes 2-1/2 inches through 12 inches and rated 240 psi for bronze sizes 2 inches and below. Each valve shall have two metering/test ports with internal check valves and protective caps. All valves must be equipped with visual position readout and concealed memory stops for repeatable regulation and control.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

a. Bell & Gossett Circuit Setter Plus

b. Armstrong CBV

c. Flow Design Inc. Accusetter

d. Tour & Andersson

e. Circuit Sensor with butterfly valve above 3 inches.

f. Illinois Series 5000 through 2 inches.

G. Air Vent Valves:

1. Provide Armstrong #1AV, Hoffman Model 78, Metraflex Model MV-15A, or equal, where automatic type air vent is shown.

2.06 JOINING MATERIALS

A. Refer to Division 22 and 23 piping sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated

a. Full-Face Type: For flat-face, Class 125, cast iron and cast bronze flanges.

b. Narrow-Face Type: For raised-face, Class 250, cast iron and steel flanges.

2. AWWA C111, rubber, flat face, 1/8-inch (3.2mm) thick, unless otherwise indicated; and full-face or ring type, unless other indicated.

3. Flange Bolts and Nuts: AWWA C111, carbon steel, unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, 100 percent lead free alloys. Include water-flushable flux according to ASTM B813.

D. Brazing Filler Metals:

1. General Duty: AWS A5.8, BCup-5 Series, copper-phosphorus unless otherwise indicated. Sil-Fos 15, or equal.

2. Refrigerant Piping:

a. Joining copper to copper: AWS A5.8, BCup-5 Series, copper-phosphorus unless otherwise indicated. Sil-Fos 15, or equal.

b. Joining copper to bronze or steel: AWS A5.8, Bag-1, silver alloy unless otherwise indicated.

E. Welding Filler Metals: Comply with ASME B31.1 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.07 STRAINERS

A. Charles M. Bailey #100A, Armstrong, Muessco, or equal, Fig. 11 "Y" pattern, 125 psi WP minimum, with monel screens with 20 square mesh for 2 inches and smaller and 3/64 inch perforations for 2-1/2 inches and larger. Install all strainers with a blow-off hose valve with hose adapter. Strainer shall have gasketed cover with straight thread.

2.08 GAUGES

A. Marsh "Series J", U.S. Gage, Danton 800, or equal, with bronze bushed movement and front recalibration. Dials shall be white with black numerals, 3-1/2 inch dial face. Normal reading shall be at mid-scale. Provide a needle valve on each gauge connection. Supply a gauge piped with branch isolation valves across the inlet and outlet of each pump and where shown on the Drawings.

B. Provide Pete's Plug II, Sisco P/T, or equal, test plug with Nordel core {and gasketed cap}, on inlet and outlet of each coil, boiler, condenser, chiller and heat exchanger and where shown on Drawings.

2.09 THERMOMETERS

A. Marsh, Taylor, Palmer, or equal, 5 inch diameter bimetal dial, adjustable from face, with adjustable positioner, located to be easily read from normal personnel approach. Normal reading shall be at mid-scale.

1. Provide extension for insulation.

2. Provide thermometers with steel bulb chambers and brass separable sockets.

3. Thermometers for air temperature shall have 8 inch minimum stem.

B. Provide Ventlock, Durodyne, or equal thermometer test holes at each air conditioning unit, furnace, and make-up air unit, in mixed air and supply air, and at all locations shown or scheduled on the Drawings. Provide two portable thermometers, with sensing connection arranged to suit test connections.

C. Provide Pete's Plug II, Sisco P/T, or equal, test plug with Nordel core, on inlet and outlet of each coil, boiler, condenser, chiller and heat exchanger and provide two digital electronic test thermometers for each range of fluid temperature and where shown on Drawings.

2.10 ACCESS DOORS

A. Where floors, walls, or ceilings must be penetrated for access to mechanical equipment, provide access doors, 14 inch by 14 inch minimum size in usable opening. Where entrance of a serviceman may be required, provide 20 inch by 30 inch minimum usable opening. Locate access doors/panels for non-obstructed and easy reach.

1. All access doors less than 7'-0" above floors and exposed to public access shall have keyed locks.

B. Access doors shall match those supplied in Division 08 in all respects, except as noted herein.

C. Provide stainless steel access doors for use in toilet rooms, shower rooms, kitchens and other damp areas. Provide steel access doors with prime coat of baked-on paint for all other areas.

D. Where panels are located on ducts or plenums, provide neoprene gaskets to prevent air leakage, and use frames to set door out to flush with insulation.

E. Provide insulated doors where located in internally insulated ducts or casings.

F. Do not locate access doors in highly visible public areas such as lobbies, waiting areas, and primary entrance areas. Coordinate with the Architect when access is required in these areas.

G. Where specific information or details relating to access panels different from the above is shown or given on the Drawings or other Divisions of work, then that information shall supersede this specification.

H. Manufacturers: Subject to compliance with requirements, available manufacturers offering products which may be incorporated into the Work include Milcor, Karp, Nystrom, or Cesco, equal to the following:

1. Milcor

a. Style K (plaster)

b. Style DW (gypsum board)

c. Style M (Masonry)

d. Style "Fire Rated" where required.

2.11 EXPANSION LOOPS

A. Manufactured assembly consisting of inlet and outlet elbow fittings, two sections of flexible metal hose and braid, and 180-degree return bend or center section of flexible hose. Flexible hose shall consist of corrugated metal inner hose and braided outer sheath.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

1. Metraflex Inc., Metraloop series.

2. Unisource Manufacturing, Inc., V serie

2.12 PIPE GUIDES

A. Where flexible connections are indicated on Drawings, provide Metraflex style IV, B-Line, or equal, pipe guides in locations recommended by manufacturer. Maximum spacing from flexible connection to first pipe guide is 4 pipe diameters, and maximum spacing from second pipe guide is 14 pipe diameters.

2.13 EQUIPMENT IDENTIFICATION

A. Identify each piece of equipment with a permanently attached engraved bakelite plate, 1/2 inch high white letters on black background.

2.14 PIPE IDENTIFICATION

A. Identify each piping system and indicate the direction of flow by means of Seton, Inc., Marking Services Inc., Reef Industries, Inc., or equal, pre-tensioned, coiled semi-rigid plastic pipe labels formed to circumference of pipe, requiring no fasteners or adhesive for attachment to pipe.

B. The legend and flow arrow shall conform to ASME A13.1.

2.15 INSULATION WORK

A. General:

1. Insulation products, including insulation, insulation facings, jackets, adhesives, sealants and coatings shall not contain polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations in amounts greater than 0.1 percent (by mass).

2. Adhesives and sealants shall comply with testing and product requirements of South Coast Air Quality Management District, Rule 1168.

3. The term "piping" used herein includes pipe, air separators, valves, strainers and fittings.

4. Apply insulating cement to fittings, valves and strainers and trowel smooth to the thickness of adjacent covering. Cover with jacket to match piping. Extend covering on valves up to the bonnet. Leave strainer cleanout plugs accessible.

5. Provide pre-formed PVC valve and fitting covers for indoor piping.

6. Provide factory-fabricated aluminum valve and fitting covers for outdoor piping.

7. Provide Calcium Silicate rigid insulation and sheet metal sleeve, 18 inch minimum length at each pipe hanger. Seal ends of insulation to make vapor tight with jacket.

8. Urethane insulation will not be allowed above ground or on hot water piping.

9. Test insulation, jackets, and lap-seal adhesives as a composite product and confirm flame spread of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with UL723, ASTM E84, or NFPA 255.

10. Clean thoroughly, test and have approved, all piping and equipment before installing insulation and/or covering.

11. Repair all damage to existing pipe and duct insulation whether or not caused during the work of this contract, to match existing adjacent insulation for thickness and finish, but conforming to flame spread and smoke ratings specified above.

B. Insulation of Piping:

1. Exposed insulated piping within the building shall have a Zeston 2000 25/50, Proto Lo-Smoke, or equal, PVC jacket and fitting cover installed over the insulation, applied per manufacturer's instructions. Verify suitability with manufacturer of insulation. Insulation with pre-applied polymer jacket may be substituted at Contractor's option.

2. Insulate refrigerant suction piping and chilled water supply and return piping, including fittings, with 3-1/2 pound per cubic foot minimum density fiberglass with factory-applied ASJ-SSL jacket Insulate valves and irregular surfaces to match adjacent insulation and cover with two layers of Glasfab saturated in Foster Sealfas 30-36, 3M, or equal, carried 3 inches over the adjoining pipe insulation. Finish with a coat of Foster Sealfas 30-36, 3M, or equal. The 3 inch wide SSL end laps furnished with the insulation shall be adhered over the end joints. Seal entire surface of insulation vapor tight, including joints and ends of PVC or aluminum fitting covers. Insulation thicknesses per application follow:

   a. Indoor refrigerant suction piping 3/4 inch diameter and smaller: 1 inch thick.

   b. Indoor refrigerant suction piping 1 inch diameter and larger: 1-1/2 inches thick.

   c. Outdoor refrigerant suction piping; all sizes: 2 inches thick.

3. In lieu of the above, refrigerant suction piping, including fittings, may be insulated with Armacell LLC; AP Armaflex, or equal. Seal all joints with Armaflex 520 BLV adhesive, or equal. Apply insulation in strict accordance with manufacturer's recommendations. Insulation thicknesses follow:

   a. Indoor refrigerant suction piping 3/4 inch diameter and smaller: 1/2 inch thick.

   b. Indoor refrigerant piping 1 inch diameter and larger: 1 inch thick.

c. Outdoor refrigerant piping; all sizes: 2 inches thick.

4. When equipment manufacturers' instructions indicate that refrigerant liquid and hot-gas gas piping be insulated, insulation thickness shall be equal to, and applied as described herein for refrigerant suction piping.

5. Where insulated piping is exposed to the weather apply aluminum jacket secured with 1/2 inch stainless-steel bands on 12 inch centers. Insulation shall be vapor tight before applying metal jacket, and aluminum fitting covers. Install jacketing with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Cover fittings with glass cloth, two coats of Foster Sealfas 30-36, and factory-fabricated aluminum fitting covers, of same material, finish, and thickness as jacket.

   a. Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.

   b. Tee covers.

   c. Flange and union covers.

   d. End caps.

   e. Beveled collars.

   f. Valve covers.

   g. Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

6. Jacket thickness:

   a. Pipes 10 inches diameter and smaller: Minimum .016 inch thick jacket with smooth finish.

   b. Pipes 12 inches diameter and larger: Minimum .020 inch thick jacket with smooth finish.

7. Insulate indoor heating hot water piping with 3-1/2# per cubic foot minimum density fiberglass with factory applied ASJ-SSL jacket, 1-1/2 inches thick for pipes 1-1/4 inches and smaller, 2 inches thick for pipes 1-1/2 inches and larger. Outdoor piping shall be insulated as described for indoor piping; 2 inches thick for all pipe sizes.

C. Duct Insulation:

1. All duct insulation shall meet minimum R-value of R-8 at 3 inch thickness 3/4 pound per cubic foot density for ductwork installed outside the building insulation envelope. For ductwork installed within the building insulation envelope, duct insulation shall have a minimum R-value of R-4.2 at 2 inch thickness, 3/4 pound per cubic foot density.

2. General: Insulation applied to the exterior surface of ducts located in buildings shall have a flame spread of not more than 25 and a smoke-developed rating of not more than 50 when tested as a composite installation including insulation, facing materials, tapes and adhesives as normally applied. Material exposed within ducts or plenum shall have a flame-spread rating of not more than 25 and a smoke-developed rating of not more than 50.

3. Wrap all unlined concealed supply and return ducts with fiberglass duct wrap, manufactured as a blanket of glass fibers factory laminated to a reinforced foil/kraft vapor retarding facing. Provide 2 inch stapling and taping flange. Wrap insulation entirely around duct and secure with outward clinching staples on 6 inch centers. Provide mechanical fasteners at maximum 18 inch centers for all bottoms of duct which are greater than 24 inches. Lap all insulation joints 3" minimum. Insulate ducts installed tight against other work before hanging in place. Seal all seams, both longitudinal and transverse, and all staple and mechanical fastener penetrations of facing with scrim backed foil tape or recommended sealant, to provide a vapor tight installation.

4. On all supply and return ductwork exposed to weather and not internally lined, field apply minimum 2" thick mineral-fiber board thermal insulation, glass fibers bonded with thermosetting resin. Comply with ASTM C612, type IB without facing and with all service jacket with factory applied FRK-25 foil reinforced kraft paper. Aluminum jacket, 0.024 inch thickness sheets manufactured from aluminum alloy complying with ASTM B209, stucco embossed finish and having an integrally bonded moisture barrier over entire surface in contract with insulation.

5. Provide internal duct lining in accordance with specification section 23 80 00.

PART 3 - EXECUTION

3.01 ELECTRICAL REQUIREMENTS

A. Provide adequate working space around electrical equipment in compliance with the California Electrical Code. Coordinate the Mechanical Work with the Electrical Work to comply.

B. Furnish necessary control diagrams and instructions for the controls. Before permitting operation of any equipment which is furnished, installed, or modified under this Section, review all associated electrical work, including overload protection devices, and assume complete responsibility for the correctness of the electrical connections and protective devices. Motors and control equipment shall conform to the Standards of the National Electrical Manufacturers' Association. All equipment and connections exposed to the weather shall be NEMA IIIR with factory-wired strip heaters in each starter enclosure and temperature control panel where required to inhibit condensation.

C. All line voltage and low voltage wiring and conduit associated with the Temperature Control System are included in this Section. Wiring and conduit shall comply with Division 26.

3.02 PIPING SYSTEM REQUIREMENTS

A. Drawing plans, schematic and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

3.03 PRIMING AND PAINTING

A. Perform all priming and painting on the equipment and materials as specified herein.

B. Priming:

1. Exposed ferrous metals, including piping, which are not galvanized or factory-finished shall be primed. Black steel pipe exposed to the weather shall be painted one coat of Rust-Oleum #1069 primer for black steel piping or Rust-Oleum #5260, Kelly Moore, or equal, primer for galvanized piping.

2. Metal surfaces of items to be jacketed or insulated except ductwork and piping shall be given two coats of primer unless furnished with equivalent factory finish. Items to be primed shall be properly cleaned by effective means free of rust, dirt, scale, grease and other deleterious matter and then primed with the best available grade of zinc rich primer. After erection or installation, all primed surfaces shall be properly cleaned of any foreign or deleterious matter that might impair proper bonding of subsequent paint coatings. Any abrasion or other damage to the shop or field prime coat shall be properly repaired and touched up with the same material used for the original priming.

3. Where equipment is provided with nameplate data, the nameplate should be masked off prior to painting. When painting is completed, remove masking material.

C. See Painting Section for detailed requirements.

3.04 INSTALLATION OF VALVES

A. General:

1. Valves shall be full line size unless indicated otherwise on Drawings.

2. Install horizontal valves with valve stem above horizontal, except butterfly valves.

3. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

4. Locate valves for easy access and provide separate support where necessary.

5. Install valves in position to allow full stem movement.

6. Install exposed polished or enameled connections with special care showing no tool marks or exposed threads.

7. Butterfly valves conforming to the paragraph "Butterfly Valves" may be used in lieu of gate or globe valves for locations above grade.

8. Ball valves conforming to the paragraph "Ball Valves" may be used in lieu of gate valves for locations above grade for services 2-1/2 inches and smaller.

9. Valves 2-1/2 inches and smaller (except ball valves) in nonferrous water piping systems may be solder joint type with bronze body and trim.

10. Provide gate or globe valves on inlet and outlet of each pump.

B. Gate Valves:

1. Furnish valves in copper lines with adapters to suit valve / line requirements.

2. Underground gate valves:

a. Underground valves 3 inches and smaller may be furnished with operating nuts or hand-wheels, and with Ring-Tite joint ends.

b. Furnish and deliver to Owner one wrench of each size required for operating underground valves.

C. Swing Check Valves: Install in horizontal position with hinge pin level.

D. Butterfly Valves: Install with stems horizontal.

E. Silent Check Valves: Install in horizontal or vertical position between flanges.

F. Calibrated Balancing Valves: Install calibrated balancing valves per manufacturers' recommendations, including requirements for straight pipe lengths at valve inlet and outlet.

G. Air Vent Valves:

1. Install with shutoff valves or cocks and drain to floor sink or drain.

2. At each high point of piping provide manual air vent connection at top of pipe. Provide ball valve within 18 inches of ceiling in accessible location, and extend drain line to allow convenient access.

H. Valve Adjustment: Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.05 INSTALLATION OF PIPING AND DUCT SYSTEMS

A. General:

1. All piping shall be concealed unless shown or otherwise directed. Allow sufficient space for ceiling panel removal.

2. Installation of piping shall be made with appropriate fittings. Bending of piping will not be accepted.

3. Install piping to permit application of insulation and to allow valve servicing.

4. Where piping, conduit, or ductwork is left exposed within a room, the same shall be run true to plumb, horizontal, or intended planes. Where possible, uniform margins are to be maintained between parallel lines and/or adjacent wall, floor, or ceiling surfaces.

5. Horizontal runs of pipes, conduits, or ductwork suspended from ceilings shall provide for a maximum headroom clearance. The clearance shall not be less than 6'-6" without written approval from the Architect.

6. Close ends of pipe immediately after installation. Leave closure in place until removal is necessary for completion of installation.

7. At the time of rough installation, or during storage on the construction site and until final startup of the heating and cooling equipment, all duct and other related air distribution component opening shall be covered with tape, plastic, sheet metal, or other methods acceptable to the enforcing agency.

8. Each piping system shall be thoroughly flushed and proved clean before connection to equipment.

9. Pipe the discharge of each relief valve, air vent, backflow preventer, and similar device to floor sink or drain.

10. Install exposed polished or enameled connections with special care showing no tool marks or threads at fittings.

11. Install horizontal valves with valve stem above horizontal.

12. Use reducing fittings; bushings shall not be allowed. Use eccentric reducing fittings wherever necessary to provide free drainage of lines and passage of air.

13. Verify final equipment locations for roughing-in.

14. Where piping is installed in walls within one inch of the face of stud, provide a 16 gauge sheet metal shield plate on the face of the stud. The shield plate shall extend a minimum of 1-1/2 inches beyond the outside diameter of the pipe.

B. Expansion Loops:

1. Install expansion loops where piping crosses building expansion or seismic joints, between buildings, between buildings and canopies, and as indicated on Drawings.

2. Install expansion loops of sizes matching sizes of connected piping.

3. Install grooved-joint expansion joints to grooved-end steel piping.

4. Materials of construction and end fitting type shall be consistent with pipe material and type of gas or liquid conveyed by the piping system in which expansion loop is installed.

C. Sleeves:

1. Install Adjus-to-Crete, Pipeline Seal and Insulator, or equal, pipe sleeves of sufficient size to allow for free motion of pipe, 24 gauge galvanized steel. The space between pipe and sleeves through floor slabs on ground, through outside walls above or below grade, through roof, and other locations as directed shall be caulked with oakum and mastic and made watertight. The space between pipe and sleeve and between sleeve and slab or wall shall be sealed watertight.

2. At Contractor's option, Link-Seal, Metraflex Metraseal, or equal, casing seals may be used in lieu of caulking. Wrap pipes through slabs on grade with 1 inch thick fiberglass insulation to completely isolate the pipe from the concrete.

D. Floor, Wall, and Ceiling Plates:

1. Fit all pipes with or without insulation passing through walls, floors, or ceilings, and all hanger rods penetrating finished ceilings with chrome-plated or stainless escutcheon plates.

E. Firestopping:

1. Pack the annular space between the pipe sleeves and the pipe and between duct openings and ducts through all floors and walls with UL listed fire stop, and sealed at the ends. All pipe penetrations shall be UL listed, Hilti, 3M Pro-Set, or equal.

   a. Install fire caulking behind mechanical services installed within fire rated walls, to maintain continuous rating of wall construction.

2. Provide SpecSeal Systems UL fire rated sleeve/coupling penetrators for each pipe penetration or fixture opening passing through floors, walls, partitions or floor/ceiling assemblies. All Penetrators shall comply with UL Fire Resistance Directory (Latest Edition), and in accordance with CBC requirements.

3. Sleeve penetrators shall have a built in anchor ring for waterproofing and anchoring into concrete pours or use the special fit cored hole penetrator for cored holes.

4. Copper and steel piping shall have SpecSeal plugs on both sides of the penetrator to reduce noise and to provide waterproofing.

5. All above Firestopping systems to be installed in strict accordance with manufacturer's instructions.

6. Alternate firestopping systems are acceptable if approved equal. However, any deviation from the above specification requires the Contractor to be responsible for determining the suitability of the proposed products and their intended use, and the Contractor shall assume all risks and liabilities whatsoever in connection therewith.

F. Flashing:

1. Flashing for penetrations of metal or membrane roof for mechanical items such as flues, ducts, and pipes shall be coordinated with the roofing manufacturer and roofing installer for the specific roofing type. The work of this section shall include furnishing, layout, sizing, and coordination of penetrations required for the mechanical work.

   a. Furnish and install flashing and counterflashing in strict conformance with the requirements of the roofing manufacturer. Submit shop drawing details for review prior to installation.

   b. Furnish and install counterflashing above each flashing required. Provide Stoneman, or equal, vandalproof top and flashing combination. Elmdor/Stoneman Model 1540.

   c. Flues and ducts shall have 24 gauge galvanized sheet metal storm collar securely clamped to the flue above the flashing.

2. For all other types of roofing system, furnish and install around each pipe, where it passes through roof, a flashing and counterflashing. All flashing shall be made of four pound seamless sheet lead with 6 inch minimum skirt and steel reinforced boot. Counterflashing shall be cast iron. For vents, provide vandalproof top and flashing combination. Elmdor/Stoneman Model 1100-4.

G. Hangers and Supports:

1. General: Support all ductwork, equipment and piping so that it is firmly held in place by approved iron hangers and supports, and special hangers as required. All components shall support weight of ductwork, equipment and pipe, fluid, and pipe insulation based on spacing between supports with minimum factor of safety of five based on ultimate strength of material used. Do not exceed manufacturer's load rating. Pipe attachments or hangers, of same size as pipe or tubing on which used, or nearest available. Rigidly fasten hose faucets, fixture stops, compressed air outlets, and similar items to the building construction. The Architect shall approve all hanger material before installation. Do not support piping or ductwork with plumbers' tape, wire rope, wood, or other makeshift devices. Where building structural members do not match piping and ductwork support spacing, provide all "bridging" support members as required firmly attached to building structural members in a fashion approved by the Structural Engineer.

   a. Materials, design, and type numbers for support of piping per Manufacturers' Standardization Society (MSS), Standard Practice (SP)-58.

   b. Materials and design for ductwork support shall be per SMACNA "HVAC Duct Construction Standards, Metal and Flexible."

2. All hanger components shall be provided by one manufacturer: B-Line, Grinnell, Uni-Strut, Badger, or equal. All hangers and clamps shall incorporate minimum ¼" thick sticky-back felt or ribbed neoprene between the hanger or clamp and the pipe.

3. Pipe Hanger and Support Spacing:

   a. Vertical piping support spacing: B-line #B3373 clamps attached to the pipe above each floor to rest on the floor. Provide with lead or Teflon liners on copper tubing. Provide additional support at base of cast iron risers and support at unsupported riser joints and horizontal offsets per 2007 Mason Industries Seismic Restraint Guidelines. Provide intermediate support for vertical piping, spaced at or within the following maximum limits.

Pipe Diameter	Steel Fluid	Steel Vapor	Copper Fluid	Copper Vapor	CPVC & PVC (Note 2)
1/2 - 1"	12	6	10	6	Base and Each Floor (Note 1)
1-1/4 - 2"	12	Each Floor	10	6	Base and Each Floor (Note 1)

2-1/2 - 3"	12	Each Floor	10	10	Base and Each Floor (Note 1)
Over 4"	12	Each Floor	10	10	Base and Each Floor (Note 1)

Note 1: Provide mid-story guides.
Note 2: For PVC piping, provide for expansion every 30 feet per IAPMO installation standard.

b. Vertical cast iron piping support spacing: Base and each floor not to exceed 15 feet.

c. Horizontal piping, hanger and support spacing: Locate hangers and supports at each change of direction, within one foot of elbow, and spaced at or within following maximum limits.

Pipe Diameter	Steel Fluid	Steel Vapor	Copper Fluid	Copper Vapor	CPVC & PVC
1/2 - 1"	6	6	5	6	3
1-1/4 - 2"	7	10	6	6	4
2-1/2 - 3"	10	10	10	10	4
Over 4"	10	10	10	10	4

d. Horizontal cast iron piping support spacing:

1) Support piping at every other joint for piping length of less than 4 feet.

2) For piping longer than 4 feet, provide support on each side of the coupling, within 18 inches of each joint.

3) Hanger shall not be installed on the coupling.

4) Provide support at each horizontal branch connection.

5) Provide sway brace at 40 foot maximum spacing for all suspended pipe with no-hub joints, except where a lesser spacing is indicated in the 2007 Mason Industries Seismic Restraint Guidelines. Provide a brace on each side of a change in direction of 90 degrees or more. Brace riser joints at each floor and at 15 foot maximum intervals.

4. Suspended Piping:

a. Individually suspended piping: B-Line B3690 J-Hanger or B3100 Clevis, complete with threaded rod, or equal. All hangers on supply and return piping handling heating hot water or steam shall have a swing connector at point of support.

Pipe Size	Rod Size
2" and Smaller	3/8"
2-1/2" to 3-1/2"	1/2"
4" to 5"	5/8"
6"	3/4"

b. Trapeze Suspension: B-Line 1-5/8 inch width channel in accordance with manufacturers' published load ratings. No deflection to exceed 1/180 of a span.

c. Trapeze Supporting Rods: Shall have a safety factor of five; securely anchor to building structure.

d. Pipe Clamps and Straps: B-Line B2000, B2400; isolate copper pipe with two thicknesses of 2 inches wide 10-mil polyvinyl tape. Where used for seismic support systems, provide B-Line B2400 series pipe straps.

e. Concrete Inserts: B-line B22-I continuous insert or B2500 spot insert. Do not use actuated fasteners for support of overhead piping unless approved by Architect.

f. Above Roof: H frame made from Uni-Strut hot-dipped galvanized 1-5/8 inch single or double channel with P-2072A or P-2073A foot secured to roof and surrounded with waterproof roofed-in sleeper. Secure to sleeper with lag screws, and secure sleeper to blocking under roof.

g. Steel Connectors: Beam clamps with retainers.

5. Duct Hanger and Support Spacing: Conform to Requirements of CMC and SMACNA "HVAC Duct Construction Standards, Metal and Flexible."

6. Support to Structure:

   a. Steel Structure: Provide and install additional steel bracing as required to suit structure. Provide through bolts with length to suit requirements of the structural components. Burning or welding on any structural member may only be done if approved by the Architect.

7. Rubber Neoprene Pipe Isolators:

   a. Pipe isolators shall comprise an internal rubber or neoprene material that isolates pipe from hanger and structure. Install at all piping located in acoustical walls. Refer to Architectural Drawings for location of acoustical walls.

   b. Isolation material shall be either a rubber or neoprene material that prevents contact between the pipe and the structure. The rubber shall have between a 45 to 55 durometer rating and a minimum thickness of 1/2 inch.

   c. Acceptable Suppliers:

      1) Vertical runs: Acousto-Plumb, Hubbard Holdrite Silencer, or equal.

      2) Horizontal runs: B-Line, Vibraclamp, Acousto-Plumb, Hubbard Holdrite Silencer, or equal.

8. Provide support for piping through roof, arranged to anchor piping solidly in place at the roof penetration.

9. Provide rigid insulation and a 12 inch long, 18 gauge galvanized sheet iron shield between the covering and the hanger whenever hangers are installed on the outside of the pipe covering.

10. Insulate copper tubing from ferrous materials and hangers with two thicknesses of 3 inch wide, 10 mil polyvinyl tape wrapped around pipe.

11. Provide a support or hanger close to each change of direction of pipe either horizontal or vertical and as near as possible to concentrated loads.

12. Suspend rods from concrete inserts with removable nuts where suspended from concrete decks. Power actuated inserts will not be allowed.

13. On chilled or combination hot and chilled water or refrigerant pipes, install the hangers on the outside of the pipe covering and not in contact with the pipe. Provide rigid insulation and a 12 inch long, 18 gauge galvanized sheet iron shield between the covering and the hanger whenever hangers are installed on the outside of the pipe covering.

H. Vibration Isolation Requirements:

1. All piping including heating hot water supply and return, chilled water supply and return, refrigerant piping, and drain piping shall be vibration isolated from the structure, other piping, mechanical equipment, ducts, gypsum board, etc. This includes pipe penetrations through framing, pipes running along framing members, and hangers. This requirement applies to all pipes attached to a partition adjacent to occupied spaces and also to pipes suspended from structure that supports the floor of occupied spaces.

2. In double-stud assemblies, piping shall not be attached to both stud bays. A length of piping shall only be attached to one stud bay. Piping shall be attached only to the stud bay on the side of the wall of the room it serves.

3. Submit proposed piping isolation devices for approval. Acceptable manufacturers include Acousto-Plumb, Hubbard Holdrite Silencer, or approved equal.

4. All hangers and clamps shall incorporate minimum ¼" thick sticky-back felt or ribbed neoprene between the hanger or clamp and the pipe. Felt or neoprene shall wrap completely around the pipe and shall extend out a minimum of ¼" past the hanger edges.

5. At trapeze and unistrut pipe installations, an "acoustically resilient" material shall be installed between the pipe and the clamp. Acceptable products include Hydro-Strut by Hydro-Craft, Hubbard Holdrite Silencer 257-P and 287-P, or approved equal.

6. ¾" neoprene waffle pads shall be used between pipe riser clamps and the structure. Acceptable products include Mason Super W, Hubbard Holdrite Silencer 275-T, or approved equal.

7. At gypsum board walls install piping with a minimum of 1" clearance between the pipe and gypsum board.

8. Where pipes 3" diameter and larger penetrate sound-rated constructions, the pipe opening shall be oversized by one inch and sealed airtight with safing and acoustically rated caulking. See Architectural plans for locations of sound-rated constructions.

9. Where pipes smaller than 3" diameter penetrate sound-rated constructions, the pipe opening shall be oversized by 1/4 inch and sealed airtight with safing and acoustically rated caulking. See Architectural plans for locations of sound-rated constructions.

10. See Section 23 05 48 for additional requirements.

3.06 PIPE JOINTS AND CONNECTIONS

A. General:

1. Cutting: Cut pipe and tubing square, remove rough edges or burrs. Bevel plain ends of steel pipe.

2. Remove scale, slag, dirt and debris from inside and outside of pipe before assembly.

3. Boss or saddle type fittings or mechanically extracted tube joints will not be allowed.

B. Threaded Pipe: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply thread compound to external pipe threads: Rectorseal No. 5, Permatex No. 1, or equal.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

C. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for type of water conveyed by pipe. Join flanges with gasket and bolts according to ASME B31.9.

D. Copper Pipe and Tubing: All joints shall be brazed according to ASME Section IX, Welding and Brazing Qualifications, except pneumatic control piping, and hydronic piping having grooved-end fittings and couplings.

E. Welded Pipe:

1. Make up with oxyacetylene or electric arc process.

2. All welding shall conform to the American Standard Code for Power Piping ASME B-31.1. When requested by the Architect, furnish certification from an approved testing agency or National Certified Pipe Welding Bureau that the welders performing the work are qualified.

3. All line welds shall be of the single "V" butt type. Welds for flanges shall be of the fillet type.

4. Where the branch is two pipe sizes smaller than the main or smaller, Bonney Weldolets, Threadolets, Nibco, or equal, may be used in lieu of welding tees.

F. Flexible Connections:

1. Furnish and install Thermo Tech., Inc. F/J/R, Metraflex, or equal, flexible couplings with limiter bolts on piping connections to all equipment mounted on anti-vibration bases, except fan coil units under 2000 cfm, on each connection to each base mounted pump and where shown. Couplings shall be suitable for pressure and type of service.

2. Flexible connections in refrigerant lines; Flexonic, Anaconda or equal, metal hose, full size.

3. Anchor piping securely on the system side of each flexible connection.

G. Grooved-End Fittings and Couplings: Assemble joints with coupling and gasket, lubricant, and bolts. Cut or roll grooves in ends of pipe based on pipe and coupling manufacturer's written instructions for pipe wall thickness. Use grooved-end fittings and rigid, grooved-end couplings.

3.07 UNIONS AND FLANGES

A. Install Epco, Nibco, or equal, dielectric unions or flanges at points of connection between copper or brass piping or material and steel or cast iron pipe or material except in drain piping. Bushings or couplings shall not be used.

B. Install unions in piping NPS 2" and smaller 3 or flanges in piping NPS 2-1/2" and larger whether shown or not at each connection to all equipment and tanks, and at all connections to all automatic valves, such as temperature control valves.

C. Locate the unions for easy removal of the equipment, tank, or valve.

D. Do not install unions or flanges in refrigerant piping systems.

3.08 ACCESS DOOR

A. Furnish and install access doors wherever required whether shown or not for easy maintenance of mechanical systems; for example, at concealed valves, strainers, traps, cleanouts, dampers, motors, controls, operating equipment, etc. Access doors shall provide for complete removal and replacement of equipment.

3.09 CONCRETE WORK

A. Concrete work required for work of this Section shall be included under another section of the Specification, unless otherwise noted, including poured-in-place concrete work for installing precast manholes, catch basins, etc., and shall include reinforced concrete bases for pumps, tanks, compressors, fan units, boilers, unless the work is specifically indicated on the Drawings to be furnished under this Section.

B. Underground anchors, and pads for valve access boxes are included under this Section of the Specification. Concrete shall be 3000 psi test minimum. Refer to Division 03 for concrete types.

3.10 PIPE PROTECTION

A. Wrap bare galvanized and black steel pipe buried in the ground and to 6" above grade, including piping in conduit, with one of the following, or equal:

1. Polyethylene Coating: Pressure sensitive polyethylene coating, "X-Tru-Coat" as manufactured by Pipe Line Service Corporation or "Green Line" wrap as manufactured by Roystron Products, or equal.

   a. Field Joints and Fittings: Protecto Wrap #1170 tape as manufactured by Pipe Line Service Corporation, or Primer #200 tape by Roystron Products, or equal. Installation shall be as per manufacturer's recommendation and instructions.

2. Tape Wrap: Pressure-sensitive polyvinyl chloride tape, "Transtex #V-l0 or V-20", "Scotchwrap 50", Slipknot l00, Pabco, or equal, with continuous identification. Tape shall be a minimum of 20 mils thick for fittings and irregular surfaces, two wraps, 50 percent overlap, 40 mils total thickness. Tape shall be laminated with a suitable adhesive; widths as recommended by the manufacturer for the pipe size. Wrap straight lengths of piping with an approved wrapping machine.

B. Field Joints: Valves and Fittings: double wrap polyvinyl chloride tape as above. Provide at least two thicknesses of tape over the joint and extend a minimum of 4 inches over adjacent pipe covering. Build up with primer to match adjacent covering thickness. Width of tape of fittings shall not exceed 3 inches. Tape shall adhere tightly to all surfaces of the fittings without air pockets.

C. Testing: Test completed wrap of piping, including all epoxy painted piping with Tinker and Rasor Co. holiday detector, or equal.

D. Cleaning: Clean all piping thoroughly before wrapping.

1. Inspection: Damaged or defective wraps shall be repaired as directed. No wrapped pipe shall be covered until approved by Architect.

E. Covering: No rocks or sharp edges shall be backfilled against the wrap. When backfilling with other than sand, protect wrap with an outer wrapping of Kraft paper; leave in place during backfill.

3.11 PIPE IDENTIFICATION

A. Provide temporary identification of each pipe installed, at the time of installation. Temporary identification shall be removed and replaced with permanent identification as part of the work.

B. Apply the legend and flow arrow at all valve locations; at all points where the piping enters or leaves a wall, partition, cluster of piping or similar obstruction, at each change of direction, and at approximately 20'-0" intervals on pipe runs. Variations or changes in locations and spacing may be made with the approval of the Architect. There shall be at least one marking in each room. Markings shall be located for maximum visibility from expected personnel approach.

1. Apply legend and flow arrow at approximately 10'-0" intervals in science classrooms and science prep rooms.

C. Wherever two or more pipes run parallel, the markings shall be supplied in the same relative location on each.

D. Each valve on non-potable water piping shall be labeled with a metal tag stamped "DANGER -- NON-POTABLE WATER" in 1/4 inch high letters.

E. Apply the markings after painting and cleaning of piping and insulation is completed.

3.12 EXPANSION ANCHORS IN HARDENED CONCRETE

A. Refer to Structural Drawings.

B. Qualification Tests: The specific anchor shall have a current ICC-ES report and evaluated in cracked concrete in accordance with Acceptance Criteria AC193. If the specific anchor satisfies cyclic testing requirements per Acceptance Criteria AC01, Section 5.6, the full allowable shear and tension loads listed in the current ICC-ES report and manufacturer's recommendations for the specific anchor may be used. Otherwise, the design shear and tension loads shall not be more than 80% of the listed allowable shear and tension loads for the specific anchor.

C. Installation: The anchors must be installed in accordance with the requirements given in ICC Research Committee Recommendations for the specific anchor.

D. Testing: Fifty percent of the anchors shall be load-tested on each job to twice the allowable capacity in tension, except that if the design load is less than 75 pounds; only one anchor in ten need be tested. If any anchor fails, all anchors must be tested. The load test shall be performed in the presence of a special inspector.

E. The load may be applied by any method that will effectively measure the tension in the anchor, such as direct pull with a hydraulic jack, a torque wrench calibrated using the specific anchor or calibrated spring-loading devices. Anchors in which the torque is used to expand the anchor without applying tension to the bolt may not be verified with a torque wrench.

3.13 TESTS AND ADJUSTMENTS

A. Test the installations in accordance with the following requirements and all applicable codes:

1. Notify the Architect at least seven days in advance of any test.

2. Inspector of Record should witness all tests of piping systems.

3. All piping shall be tested at completion of roughing-in, or at other times as directed by the Architect.

4. Furnish all necessary materials, test pumps, gases, instruments and labor required for testing.

5. Isolate from the system all equipment that may be damaged by test pressure.

6. Make connections to existing systems with flanged connection. During testing of the new work, provide a slip-in plate to restrict test pressure to new systems only. Remove plate and complete connection to existing system at completion of testing.

a. Inspector of record shall witness final connection to system.

B. Test Schedule: No loss in pressure or visible leaks shall show after four hours at the pressures indicated.

System Tested	Test Pressure PSI	Test With
Compressed Air, Acetylene and Oxygen	200 lb.	Air & Non-corrosive Leak Test Fluid

Gases and Vacuum	100	Air & Non-corrosive Leak Test Fluid
Heating Hot Water, Chilled Water, Condenser Water	125	Water

1. Non-corrosive leak test fluid shall be suitable for use with the piping material specified, and with the type of gas conveyed by the piping system.

C. Perform operational tests under simulated or actual service conditions, including one test of complete plumbing installation with all fixtures and other appliances connected, and one test of complete installation of 48 hours each for heating and cooling with all equipment connected and operating.

D. Should any material or work fail in any of these tests, it shall be immediately removed and replaced for new material, and portion of the work replaced shall again be tested by Contractor at his own expense.

E. Lubricate each item of equipment, including motors, before operation.

F. Testing, Evacuating, Charging and Lubrication of Refrigeration Systems:

1. Pressurize with dry nitrogen and/or refrigerant to 300 psig and test all joints with an electronic detector or halide torch. Release the pressure and attach a high vacuum pump. Evacuate to 4 mm (4000 microns) and hold for 30 minutes. Break to 5 psig with dry nitrogen and allow to remain in the system for ten minutes. Evacuate to 2 mm (2000 microns) and hold for 30 minutes. Use a mercury manometer or electronic vacuum gauge. Do not start timing until recommended vacuum range is reached.

2. At the end of the evacuation, if the system has been proved leak-free, charge with refrigerant and fill the crankcase to the oil level specified by the manufacturer. All refrigerant oil shall be delivered to the location in sealed containers.

3. Replenish for a period of one year without cost to the Owner all refrigerant and oil required to maintain the proper levels.

3.14 OPERATION OF SYSTEMS

A. Do not operate any mechanical equipment for any purpose, temporary or permanent, until all of the following has been completed:

1. Complete all requirements listed under "Check, Test and Start Requirements."

2. Ductwork and piping has been properly cleaned. Piping systems shall be flushed and treated prior to operation.

3. Filters, strainers etc. are in place.

4. Bearings have been lubricated, and alignment of rotating equipment has been checked.

5. Equipment has been run under observation, and is operating in a satisfactory manner.

B. Provide test and balance agency with one set of Contract Drawings, Specifications, Addenda, Change orders issued, applicable shop drawings and submittals and temperature control drawings.

C. Operate every fire damper, smoke damper, combination smoke and fire damper under normal operating conditions. Activate smoke detectors as required to operate the damper, stage fan, etc. Provide written confirmation that all systems operate in a satisfactory manner.

3.15 TEMPORARY HEAT

A. The General Contractor will provide for all temporary heat at such times as may be required or directed by the Architect and pay all fuel and energy costs incurred.

B. Temporary heating facilities proposed for use by the Contractor will be subject to review of the Architect. Prior to use of any equipment for temporary heat, install temporary filters on all return air inlets, to preclude dust and

construction debris from entering the duct system. In addition, install filters in air handling units, and replace at the completion of temporary operation.

C. Filters used for temporary operation of systems shall be as specified for permanent filters specified herein.

D. Comply with Check, Test and Start Requirements for start-up of equipment prior to operation for temporary heat.

E. Contractor shall complete the permanent heating system as soon as possible, thereby making it available for temporary heat. When available, the system may be used as required at the direction of the Architect after systems are properly prepared for use as specified elsewhere. Contractor shall then be responsible for operating the system during periods required and the General Contractor shall pay the fuel and energy costs incurred. Operation of the heating system prior to the filing of "notice of completion" shall not change the Guarantee provisions in any way.

3.16 CHECK, TEST AND START REQUIREMENTS

A. An authorized representative of the equipment manufacturer shall perform check, test and start of each piece of mechanical equipment. The representative may be an employee of the equipment manufacturer, or a manufacturer-certified contractor. Submit written certification from the manufacturer stating that the representative is qualified to perform the check test and start of the equipment.

1. As part of the submittal process, provide a copy of each manufacturer's printed startup form to be used.

2. Some items of specified equipment may require that check, test and start of equipment must be performed by the manufacturer, using manufacturer's employees. See specific equipment Articles in these Specifications for this requirement.

3. Provide all personnel, test instruments, and equipment to properly perform the check, test and start work.

4. When work has been completed, provide copies of reports for review, prior to final observation of work.

B. Provide copies of the completed check, test and start report of each item of equipment, bound with the Operation and Maintenance Manual.

C. Upon completion of the work, provide a schedule of planned maintenance for each piece of equipment. Indicate frequency of service, recommended spare parts (including filters and lubricants), and methods for adjustment and alignment of all equipment components. Provide a copy of the schedule with each Operation and Maintenance Manual. Provide a copy of certification from the Owner's representative indicating that they have been properly instructed in maintenance requirements for the equipment installed.

3.17 PRELIMINARY OPERATIONAL REQUIREMENTS AND TESTS

A. Prior to observation to determine final acceptance, put HVAC, plumbing, and fire protection systems into service and check that work required for that purpose has been done, including but not limited to the following condensed check list. Provide indexed report to tabulating the results of all work.

1. All equipment has been started, checked, lubricated and adjusted in accordance with the manufacturer's recommendations, including modulating power exhausts if present.

2. Correct rotation of motors and ratings of overload heaters are verified.

3. Specified filters are installed and spare filters have been turned over to Owner.

4. All manufacturers' certificates of start-up specified have been delivered to the Owner.

5. All equipment has been cleaned, and damaged painted finishes touched up.

6. Damaged fins on heat exchangers have been combed out.

7. Missing or damaged parts have been replaced.

8. Flushing and chemical treatment of piping systems has been completed and water treatment equipment, where specified, is in operation.

9. Equipment labels, pipe marker labels, ceiling markers and valve tags are installed.

10. Valve tag schedules, corrected control diagrams, sequence of operation lists and start-stop instructions have been posted.

11. Preliminary test and balance work is complete, and reports have been forwarded for review.

12. Automatic control set points are as designated and performance of controls checks out to agree with the sequence of operation.

13. Operation and Maintenance Manuals have been delivered and instructions to the operating personnel have been made.

B. Prior to the observation to determine final acceptance, operate all mechanical systems as required to demonstrate that the installation and performance of these systems conform to the requirements of these specifications.

1. Operate and test all mechanical equipment and systems for a period of at least five consecutive 8 hour days to demonstrate the satisfactory overall operation of the project as a complete unit.

2. Include operation of heating and air conditioning equipment and systems for a period of not less than two 8 hour days at not less than 90 percent of full specified heating and cooling capacities in tests.

3. Commence tests after preliminary balancing and adjustments to equipment have been checked. Immediately before starting tests, install air filters and lubricate all running equipment. Notify the Architect at least seven calendar days in advance of starting the above tests.

4. During the test period, make final adjustments and balancing of equipment, systems controls, and circuits so that all are placed in first class operating condition.

5. Where Utility District rebates are applicable, demonstrate that the systems meet the rebate program requirements.

C. Before handing over the system to Owner replace all filters with complete new set of filters.

D. Review of Contractor's Tests:

1. All tests made by the Contractor or manufacturers' representatives are subject to observation and review by the Owner. Provide timely notice prior to start of each test, in order to allow for observation of testing. Upon the completion of all tests, provide a letter to confirm that all testing has been successful.

E. Test Logs:

1. Maintain test logs listing the tests on all mechanical systems showing dates, items tested, inspectors' names, remarks on success or failure of the tests.

F. Preliminary Operation:

1. The Owner reserves the right to operate portions of the mechanical system on a preliminary basis without voiding the guarantee.

G. Operational Tests:

1. Before operational tests are performed, demonstrate that all systems and components are complete and fully charged with operating fluid and lubricants.

2. Systems shall be operable and capable of maintaining continuous uninterrupted operation during the operating and demonstration period. After all systems have been completely installed, connections made, and tests completed, operate the systems continuously for a period of five working days during the hours of a normal working day.

3. This period of continuous systems operation may be coordinated with the removal of Volatile Organic Compounds (VOCs) from the building prior to occupancy should the Owner decide to implement such a program.

4. Control systems shall be completely operable with settings properly calibrated and adjusted.

5. Rotating equipment shall be in dynamic balance and alignment.

6. If the system fails to operate continuously during the test period, the deficiencies shall be corrected and the entire test repeated.

3.18 CALIFORNIA ENERGY CODE COMMISSIONING

A. New systems classified as "complex" as defined in California Energy Code (CEC), Title 24, Part 6, Subchapter 1, All Occupancies – General Provisions, Section 100.1, Definitions and Rules of Construction, shall be commissioned as described in Subchapter 3, Nonresidential, High-Rise Residential Hotel/Motel Occupancies, and Covered Processes – Mandatory Requirements, Section 120.8, Building Commissioning. The following CEC requirements shall be completed by Contractor:

1. 120.8 (g) Functional performance testing.
2. 120.8 (h) Documentation and training.
   a. 120.8 (h) 1 Systems manual.
   b. 120.8 (h) 2 Systems operations training.
3. 120.8 (i) Commissioning report.

3.19 ACCEPTANCE REQUIREMENTS

A. The contractor shall complete the Acceptance Requirements of the California Building Energy Efficiency Standards, including but not limited to Air Distribution Systems, Outside Air systems, Packaged HVAC Systems, VFD Systems, Hydronic System Controls, Space Conditioning Controls, Demand Control Ventilation and Air Economizers. Contractor shall perform required acceptance tests and shall complete the appropriate "Certificates of Acceptance" and submit such certificates to the authorities having jurisdiction for approval and issuance of final occupancy permit.

3.20 DEMONSTRATION AND TRAINING

A. An authorized representative of the equipment manufacturer shall train Owner-designated personnel in maintenance and adjustment of equipment. The representative may be an employee of the equipment manufacturer, or a manufacturer-certified contractor. Submit written certification from the manufacturer stating that the representative is qualified to perform the Owner training for the equipment installed.

1. As part of the submittal process, provide a training agenda outlining major topics and time allowed for each topic.
2. Some items of specified equipment require that training must be performed by the manufacturer, using manufacturer's employees. See specific equipment Articles in these Specifications for this requirement.
3. Contractor shall provide three copies of certification by Contractor that training has been completed, signed by Owner's representative, for inclusion in Operation and Maintenance Manual. Certificates shall include:
   a. Listing of Owner-designated personnel completing training, by name and title.
   b. Name and title of training instructor.
   c. Date(s) of training.
   d. List of topics covered in training sessions.
4. Refer to specific equipment Articles for minimum training period duration for each piece of equipment.

3.21 EXECUTION OF LEED IEQc3.1 AND IEQc3.2 CONSTRUCTION INDOOR AIR QUALITY (IAQ) MANAGEMENT PLAN

A. Construction Ventilation, Filtration, Building Flush-out, Cleaning:

1. Contractor shall execute the Architect and University Project Manager approved Construction IAQ Management Plan.
2. Temporary Construction Ventilation: The Contractor shall execute the Construction IAQ Management plan and Comply with recommended control measures of the Sheet Metal and Air

Conditioning Contractors National Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 0008-2008, Chapter 3.

3. Minimum MERV 8 filters shall be utilized during the construction phase. If continuous ventilation is not possible via building's HVAC system(s), ventilation shall be supplied via open windows and temporary fans, sufficient to provide no less than three air changes per hour.

4. The contractor shall protect stored on-site and installed absorptive materials from moisture damage.

5. Building Flush-out:

   a. The contractor shall calculate the flushout out time as required per the LEED IEQc3.2 Construction Indoor Air Quality Management Plan, Before Occupancy.

   b. The contractor shall execute the building flush out per the LEED IEQc3.2 Construction Indoor Air Quality Management Plan, and for a duration sufficient to meet the LEED IEQc3.2 requirements.

   c. The contractor shall provide any temporary services required to meet the indoor conditions (temperature and humidity) required to comply with the LEED IEQc3.2 Construction Indoor Air Quality Management Plan, Before Occupancy.

6. Cleaning:

   a. Clean interior and exterior surfaces exposed to view; remove temporary labels, stains, and foreign substances; polish transparent and glossy surfaces.

   b. Clean equipment and fixtures to sanitary condition.

   c. Oil film on sheet metal shall be removed before shipment to site. Ducts shall be inspected to confirm that no oil film is present. Remove oil if present.

   d. Replace air filters (i.e., pre and final filters) at the time of Substantial Completion.

END OF SECTION

2.11 TRANSDUCERS

A. Current Switches: Clamp-On Design Current Operated Switch for Motor Status Indication; Range- 1.5 to 150 amps.; Trip Point- Adjustable; Switch: Solid state, normally open, 1 to 135 VAC or VDC, 0.3 Amps. Zero off state leakage; Lower Frequency Limit- 6 Hz.; Trip Indication- LED; Approvals- UL, CSA; Max. Cable Size- 350 MCM; Manufacturer- Veris Industries, Inc., RE Technologies SCS1150A-LED or approved equal.

B. Wire Through Current Switch (CS/CR) shall consist of 0 to 200 A continuous amperage rating, adjustable trip set-point to ± 1 % of range, 8 A @ 240 VAC resistive, 4 A @ 120 VAC tungsten, 2A @ 240 VAC inductive (1/2 hp). Load control contact power shall be induced from monitored conductor (minimum conductor current required to energize relay 5 A, max. rating of 135A). Where used for single-phase devices, provide the CS/CR in a self-contained unit with override switch in housing similar to Kele RIBX or approved equal. Veris Industries, Inc., Model # 715; RE Technologies RCS 1150 or approved equal.

C. CURRENT TRANSFORMERS (CT) Clamp-On Design Current Transformer for Motor Current Sensing Range: 1-10 A minimum, 20-200 A maximum. Trip Point: Adjustable. Output: 0-5 VDC. Accuracy: ±0.2% from 20 to 100 Hz. For variable frequency drive pump and fan applications, CT should have Volt-amp (VA) memory to distinguish at no load, full motor speed. Manufacturer: KELE SA100 or approved equal.

2.12 CONTINUOUS LEVEL TRANSMITTERS

A. Capacitance Type. Provide a loop powered, continuous capacitance type level transmitter with adjustable span and zero. Output: 4-20 mA. Probe: Fluoropolymer coated stainless steel rod or cable. Provide cable probe with end attachment hardware or weight. Electrical Enclosure: NEMA 3R, 7. Approvals: UL or CSA. Accuracy: ± 1% of calibrated span. Process Connection: MPT or ANSI Flange as required. Manufacturer: Drexelbrook, Endress & Hauser, or approved equal.

2.13 HYDROSTATIC PRESSURE

A. Two wire smart d/p cell type transmitter. 4-20 mA or 1 to 5 V user selectable linear or square root output. Adjustable span and zero. Stainless steel wetted parts. Environmental limits: –40 to 250°F (-40 to 121°C), 0 to 100% rH. Accuracy: Less than 0.1% of span. Output Damping: Time constant user selectable from 0 to 36 seconds. Vibration Effect: Less than ± 0.1% of upper range limit from 15 to 2000 Hz in any axis relative to pipe mounted process conditions. Electrical Enclosure: NEMA 3R, 4X, 7, 9. Approvals: FM, CSA. Manufacturer: Rosemount Inc. 3051 Series, Foxboro, Johnson-Yokagawa, or approved equal.

2.14 FLOW METERS (FMS)

A. Insertion electromagnetic type for water service: Materials of construction for wetted metal components shall be 316 SS. For installations in non-metallic pipe, install grounding rings or probes. The flow meter shall average velocity readings from two sets of diametrically opposed electrodes. Each flow meter shall be individually wet-calibrated against a primary volumetric standard that is accurate to within 0.1% and traceable to U.S. National Institute of Standards and Technology (or equivalent ISO standard). Accuracy shall be within ± 1% of rate from 2-20 ft/s. Overall turndown shall exceed 100:1. Output signals shall be completely isolated and shall consist of the following: (1) high resolution frequency output for use with peripheral devices such as an ONICON display module or Btu meter, (1) analog output; 4-20mA, 0-10V, or 0-5V jumper selectable and (1) scalable dry contact output for totalization. Acceptable manufacturers subject to compliance with requirements: Onicon F3500, or approved equal.

B. Vortex shedding flow meter for liquid and gas service: Output: 4-20 mA. Maximum Fluid Temperature: 800°F (427°C).Wetted Parts: Stainless Steel. Housing: NEMA 3R. Turndown: 10:1 minimum. Accuracy: 0.5% of calibrated span for liquids, 1% of calibrated span for steam and gases. Body: Wafer style or ANSI flanged to match piping specification. Manufacturer: Foxboro 83 series, Johnson, Yokagawa, Rosemount, or approved equal.

2.15 ELECTRIC CONTROL COMPONENTS

A. Limit Switches (LS): Limit switches shall be UL listed, with adjustable trim arm. Limit switches shall be as manufactured by Square "D," Allen Bradley, or approved equal; SPDT or DPDT type.

B. Low Temperature Detector (Freezestat) (FZ): Low temperature detector shall consist of a "cold spot" element which responds only to the lowest temperature along any one foot of entire element, minimum bulb size of 1/8" x 20' (3.2mm x 6.1m), junction box for wiring connections and gasket to prevent air leakage or vibration noise,

DPST (4 wire, 2 circuit) with manual reset. Temperature range 15 to 55 *F (-9.4 to 12.8 *C), factory set at 38 °F.

C. Control Relays: All control relays shall be UL listed, with contacts rated for the application, and mounted in minimum NEMA 1 enclosure for indoor locations, NEMA 3R for outdoor locations.

1. Control relays for use on electrical systems of 120 volts or less shall have, as a minimum, the following:

a. AC coil pull-in voltage range of + 10%, - 15% or nominal voltage. Coil sealed volt amperes (VA) not greater than four (4) VA. Silver cadmium Form C (SPDT) contacts in a dust proof enclosure, with 8 or 11 pin type plug. Pilot light indication of power-to-coil, and coil retainer clips. Coil rated for 50 and 60 Hz service. Relays shall be IDEC or approved equal.

2. Relays used for across-the-line control (start/stop) of 120V motors, 1/4 HP, and 1/3 HP, shall be rated to break minimum 10 Amps inductive load. Relays shall be Veris, or approved equal.

3. Relays used for stop/start control shall have low voltage coils (30 VAC or less).

D. General Purpose Power Contactors: NEMA ICS 2, AC general-purpose magnetic contactor. ANSI/NEMA ICS 6, NEMA Type 1 enclosure. Manufacturer shall be Honeywell or approved equal.

E. Control Transformers: Furnish and install control transformers as required. Control transformers shall be machine tool type, and shall be US and CSA listed. Primary and secondary sides shall be fused in accordance with the NEC. Transformer shall be proper size for application, and mounted in minimum NEMA 1 enclosure. Transformers shall be manufactured by Westinghouse, Square "D," Jefferson, Functional Devices, Honeywell or approved equal.

F. Time Delay Relays (TDRs): TDRs shall be capable of on or off delayed functions, with adjustable timing periods and cycle timing light. Contacts shall be rated for the application with a minimum of two (2) sets of Form C contacts, enclosed in a dust proof enclosure.

1. TDRs shall have silver cadmium contacts with a minimum life span rating of one million operations. TDRs shall have solid state, plug-in type coils with transient suppression devices.

2. TDRs shall be UL and CSA listed, Crouzet type, or approved equal.

G. Electric Push Button Switch: Switch shall be momentary contact, oil tight, push button, with number of N.O. and/or N.C. contacts as required. Contacts shall be snap-action type, and rated for minimum 120 VAC operation. Switch shall be 800T type, as manufactured by Allen Bradley, or approved equal.

H. Pilot Light: Panel-mounted pilot light shall be NEMA ICS 2 oil-tight, transformer type, with screw terminals, push-to-test unit, LED type, rated for 120 VAC. Unit shall be 800T type, as manufactured by Allen Bradley, or approved equal.

I. Alarm Horn: Panel-mounted audible alarm horn shall be continuous tone, 120 VAC Sonalert solid state electronic signal, as manufactured by Mallory, or approved equal.

J. Electric Selector Switch (SS): Switch shall be maintained contact, NEMA ICS 2, oil-tight selector switch with contact arrangement, as required. Contacts shall be rated for minimum 120 VAC operation. Switch shall be 800T type, as manufactured by Allen Bradley, or approved equal.

2.16 EQUIPMENT LABELS

A. Provide labels for all equipment, components, and field devices furnished. Labels shall be white with black lettering. They shall be a minimum of ½ inch high with ¼ inch block lettering.

2.17 NETWORK CONTROLLERS (NC)

A. The Network Controller (NC) shall be a Native BACnet® controller based on 32 bit technology to provide the interface between the LAN or WAN and the field control devices, and provide global supervisory control functions over the control devices connected to the NC. The NC shall conform to BACnet® Building Controller (B-BC) profile and be provided with appropriate PIC statement defining BACnet® services and objects supported. BACnet® Data Sharing BIBBs supported shall include at a minimum: RP, RPM, WP, WPM, COV. Alarm and Event, Trending, and scheduling including SCHED-A BIBBs support shall also be supported in BACnet® native communications. The NC shall support Master Communication control on the BACnet communication bus. The NC shall physically connect to the LAN without the need for additional Router

hardware. The NC shall support transmitting and receiving segmented messages as well as BACnet® Broadcast Messages over IP. It should be possible to define any NC in an IP subnet as a BBMD device. The NC shall also support both Secure (https://) and non-secure (http://) remote web server access using commonly used web browsers. . It shall be capable of executing application control programs to provide:

1. Calendar functions
2. Scheduling
3. Trending and Trending Backfill
4. Alarm monitoring and routing
5. Time synchronization
6. Integration of BACnet® devices and BACnet® controller data
7. Integration of MODBUS devices and serial MODBUS RTU controller data

B. The Network Controller must provide the following hardware features as a minimum:

1. One Ethernet Port -10 / 100 Mbps RJ45
2. One RS-232 port
3. One RS 485 port
4. Three independent BACnet® MS/TP Channel capable of supporting up to 90 total Unitary controllers
5. A minimum of 24 On-board I/O, expandable up to 128 hardware points; external expansion I/O on dedicated controller I/O bus is also accepted for up to 256 (alternate maximum of 128 physical points for UUKL applications) physical I/O points where on-board I/O is not supported
6. Battery Backup using Gold Capacitor to avoid low battery alarms and subsequent replacement during service life of the controller.
7. Flash memory for long term data backup (If battery backup or flash memory is not supplied, the controller must contain a hard disk with at least 1 gigabyte storage capacity)
8. A Reset Button
9. The NC must be capable of operation over a temperature range of 0 to 50°C
10. The NC must be capable of withstanding storage temperatures of between 5 and 70°C
11. The NC must be capable of operation over a humidity range of 5 to 93% RH, non-condensing
12. Shall include expansion for Input/Output that require Hand-Off-Auto (HOA) switches
13. Field Bus for remote I/O
14. Controller shall operate with a fixed cycle time. Controllers with non-deterministic operating system shall not be acceptable

C. Integration

1. Any or all the 3 independent MS/TP channels may be used to integrate MODBUS devices like Energy Meters etc. or BACnet® devices and BACnet® controller data. The BMS contractor shall include if any, license required for this interface within their scope..

D. Event Alarm Notification and actions

1. The NC shall provide alarm recognition, storage routing, management, and analysis to supplement distributed capabilities of equipment or application specific controllers.
2. Alarm generation shall be selectable for annunciation type and acknowledgement requirements including but limited to:
   a. To alarm
   b. Return to normal

c. To fault

3. Provide for the creation of an unlimited number of alarm classes for the purpose of routing types and or classes of alarms based on priority.

4. Provide timed (schedule) routing of alarms by class, object, group, or priority.

5. Provide alarm generation from binary object "runtime" and /or event counts for equipment maintenance. The user shall be able to reset runtime or event count values with appropriate password control.

E. Control equipment and network failures shall be treated as alarms and be annunciated.

F. A log of alarms shall be maintained by the NC.

G. Provide a "query" feature to allow review of specific alarms by user defined parameters

H. A separate log for system alerts (controller failures, network failures, etc.) shall be provided and available for review by the user.

I. An Error Log to record invalid property changes or commands shall be provided and available for review by the user.

2.18 ADVANCED APPLICATION SPECIFIC CONTROLLERS (B-AAC)

A. Controller shall be 32 bit microprocessor based BACnet® Advanced Application Controller in accordance with the ANSI/ASHRAE Standard 135-2004. Advanced Application Controllers shall be provided for Air Handling Units, Variable Air Volume (VAV) Terminals and other applications as shown on the drawings. The application control program shall be resident within the same enclosure as the input/output circuitry, which translates the sensor signals. The system supplier must provide a PICS document showing the installed systems compliance level to the ANSI/ASHRAE Standard 135-2004.Communication: The unitary controller shall communicate with other devices on the internetwork using EIA standard 709.1, the LonTalk™ protocol, as the common communication protocol with a minimum transmission speed of 78Kbaud. Network media shall be Level IV, 22AWG, twisted-pair wire, and shall conform to UL Category 4 for high-speed networks. Repeater bus topologies shall include bus segments of 60 nodes unless routers are utilized. Systems communicating at slower speeds shall not exceed 30 nodes per segment to ensure adequate global data and alarm response times.

B. All Advanced Application Controller shall be fully programmable with the help of Windows based software programming tool and shall at all times maintain their BACnet® compliance. Controllers offering application selection only (non-programmable) require a 15% spare point capacity to be provided for all applications. All control sequences within or programmed into the B-AAC shall be stored in non-volatile memory, which is not dependent upon the presence of a battery, to be retained.

C. Stand-alone, Native BACnet®, UL Listed Application Controllers shall be used to provide direct digital control of HVAC equipment. In addition to their standalone capabilities, they shall also provide the ability networked in a peer-to-peer, BACnet® MS/TP field network to other MS/TP controllers, and VAV/SPC zone controllers on the single MS/TP channel. These controllers may be used to optimize the energy consumption by implementing various control strategies such as temperature setup/setback etc.

D. Standard features for all Advanced Application Controllers shall include:

1. 32 bit microprocessor based controllers

2. Stand-alone or networked peer-to-peer capabilities on single MS/TP channel, Masters to slave devices are not acceptable

3. Should have on-board Real Time Clock

4. Should support BACnet® intrinsic alarm reporting

5. Should support calendar objects for scheduling

6. Should comply to BACnet® B-AAC device profile

7. Flexibility to be used and connected to Network Controller to expand the I/O capacity of network controller

8. BACnet® MS/TP LAN with configurable baud rate from 9600 to 76.8k baud

9. All Inputs to be Universal Inputs with 12 bit resolution- software selectable as analog or digital with standard and custom ranges.

10. Pulse counting shall be available for any one of binary inputs up to 15Hz frequency

11. Standard P, PI, or PID BACnet® Loop Objects

12. Minimum of one Loop Object for each output

13. In the particular case of Programmable VAV Controllers (VAV), the following shall apply in addition to the standard features listed above:

    a. Standard VAV control sequences are incorporated to provide pressure independent control of a single duct VAV unit

    b. Each VAV Controller shall be without actuator to provide flexibility to choose suitable modulating or floating actuator based on the application. For example VAV box controller used in the laboratory should use the modulating actuator and the VAV box controller used in office area should use the floating actuator.

    c. Each controller shall have an onboard flow-thru sensor for use with a single or multi-point differential pressure measuring station or pitot tube. Programmable controller to allow customizing of the standard sequences for temperature setback, overrides, proportional wet reheat and other user defined sequences to adapt to changing building conditions. The ability to only change operating parameters or substitute between configurable applications shall not be considered acceptable.

    d. Should be easily programmable using Microsoft Windows based programming utility.

    e. The VAV controller shall communicate with the main network controller at a baud rate of not less than 38.4K baud. The VAV controller shall provide LED indication of communication and controller performance to the technician, without cover removal.

14. In the particular case of Programmable Small Point Control (SPC) Application Controllers, the following shall apply in addition to the standard features listed above:

    a. Programmable control basic to allow customizing of the standard sequences for temperature setback, overrides, proportional wet reheat and other user defined sequences to adapt to changing building conditions. The ability to only change operating parameters or substitute between configurable applications shall not be considered acceptable

    b. Should be easily programmable using Microsoft Windows based programming utility.

    c. The SPC shall communicate with the main network controller at a baud rate of not less than 38.4K baud. The SPC shall provide LED indication of communication and controller performance to the technician, without cover removal.

2.19 APPLICATION SPECIFIC CONTROLLER (B-ASC)

A. Controller shall be 32 bit microprocessor based BACnet® Application Specific Controller in accordance with the ANSI/ASHRAE Standard 135-2004. Application Specific Controller shall be provided for Fan Coil unit (FCU) and other unitary applications as shown on the drawings. The application control program shall be resident within the same enclosure as the input/output circuitry, which translates the sensor signals. The BMS Contractor must provide a PICS document showing the installed systems compliance level to the ANSI/ASHRAE Standard 135-2004.

B. All Application Specific Controller shall be fully programmable as per application with the help of Windows based software programming tool. Controllers offering application selection only (non-programmable), require a 15% spare point capacity to be provided for all applications. All control sequences within or programmed into the B-ASC shall be stored in non-volatile memory, which is not dependent upon the presence of a battery, to be retained.

C. Stand-alone, Native BACnet®, UL Listed Application Controllers shall be used to provide direct digital control of HVAC equipment. In addition to their standalone capabilities, they shall also provide the ability networked in a peer-to-peer, BACnet® MS/TP field network to other controllers, or as part of a complete facilities

management system which integrates multiple field networks. These controllers may be used to optimize the energy consumption by implementing various control strategies such as temperature setup/setback etc.

D. Standard features for all Application Specific Controllers shall include:

1. 32 bit microprocessor based controllers
2. Stand-alone or networked peer-to-peer capabilities as MS/TP, Masters to slave devices are not acceptable
3. Should have on-board Real Time Clock
4. Should support BACnet® intrinsic alarm reporting
5. Should support BACnet® B-ASC profile and BTL
6. BACnet® MS/TP LAN with configurable baud rate from 9600 to 76.8k baud
7. All Inputs to be Universal Inputs with 12 bit resolution- software selectable as analog or digital with standard and custom ranges.
8. Pulse counting shall be available for any one of binary inputs up to 15Hz frequency
9. All Outputs to be Universal Outputs with 8 bit resolution - software selectable for analog or digital with standard and custom ranges
10. Maximum 90 objects
11. Standard P, PI, or PID BACnet® Loop Objects.
12. Minimum of 1 Loop Object for each output.
13. In the particular case of Programmable Unitary Applications, the following shall apply in addition to the standard features listed above:
    a. Standard FCU control sequences are incorporated to provide control of Fan Coil Unit
    b. Programmable control basic to allow customizing of the standard sequences for temperature setback, overrides, proportional wet reheat and other user defined sequences to adapt to changing building conditions. The ability to only change operating parameters or substitute between configurable applications shall not be considered acceptable
    c. Should be easily programmable using Microsoft Windows based programming utility.

PART 3 - EXECUTION

3.01 SECTION INCLUDES

A. Examination
B. Protection
C. Coordination
D. Submittals
E. Test and Balance
F. Life Safety
G. General Workmanship
H. Field Quality Control
I. Existing Equipment
J. Wiring
K. Communication Wiring
L. Installation of Sensors
M. Flow Switch Installation

N. Actuators

O. Identification of Hardware and Wiring

P. Operator Interface

Q. ATC/BMCS System Checkout and Testing

R. ATC/BMCS Demonstration

S. ATC/BMCS Acceptance Period

T. Trend Logs and Trend Graphs

U. Software Optimization

V. Cleaning and Training

W. Sequences of Operation

3.02 EXAMINATION

A. The project plans shall be thoroughly examined for control device and equipment locations. Any discrepancies, conflicts, or omissions shall be reported to the Architect and Engineer for resolution before rough-in work is started.

B. The Contractor shall examine the drawings and specifications for other parts of the work. If head room or space conditions appear inadequate—or if any discrepancies occur between the plans and the Contractor's work, and the plans and the work of others—the Contractor shall report these discrepancies to the Engineer and shall obtain written instructions for any changes necessary to accommodate the Contractor's work with the work of others.

3.03 PROTECTION

A. The Contractor shall protect all work and material from damage from its work or employees, and shall be liable for all damages thus caused.

B. The Contractor shall be responsible for its work and equipment until finally inspected, tested, and accepted. The Contractor shall protect any material that is not immediately installed. The Contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

3.04 COORDINATION

A. Where the work of this section will be installed in close proximity to, or will interfere with, the work of other trades, the Contractor shall assist in working out space conditions to make a satisfactory adjustment. If the Contractor installs its work before coordinating with other trades, so as to cause any interference with the work of other trades, the Contractor shall make the necessary changes in its work to correct the condition without extra charge.

B. Coordinate and schedule work with all other work in the same area, or with work that is dependent upon other work, to facilitate mutual progress.

C. Coordination with controls specified in other sections or divisions: Other sections and divisions of this Specification may include controls and control devices that are to be part of or interfaced to the control system specified in this section. These controls shall be integrated into the system and coordinated by the Contractor as follows:

1. Each supplier of a control product is responsible for the configuration, programming, startup, and testing of that product to meet the sequences of operation described in this section.

2. Each supplier of a control product is responsible for providing, installing and configuring any necessary communications interfaces or gateways required for compatibility with the controls installed under this section. Each supplier is responsible for supply to this contractor any necessary data files (XIF files) required for communications interfaces.

3.05 SUBMITTALS:

A. Refer to "Submittals" Article in Part 1 of this Specification for requirements.

3.06 TEST AND BALANCE:

A. The Controls Contractor shall furnish the software necessary to interface to the control system for test and balance purposes. The TAB contractor shall be responsible for providing the necessary computer hardware to operate the software.

B. The Controls Contractor shall provide training in the use of this software. This training will be planned for a period of two hours.

3.07 LIFE SAFETY:

A. Duct smoke detectors required for air handler shutdown are supplied under Division 16. The Contractor shall interlock smoke detectors to air handlers for shutdown as described in Part 3: "Sequences of Operation."

3.08 GENERAL WORKMANSHIP

A. Install equipment, piping, and wiring raceway parallel to the building lines (i.e., horizontal, vertical, and parallel to walls) wherever possible.

B. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.

C. Install all equipment in readily accessible locations as defined by Chapter 1, Article 100, Part A of the National Electric Code (NEC).

D. Verify integrity of all wiring to ensure continuity and freedom from shorts and grounds.

E. All equipment, installation, and wiring shall comply with acceptable industry specifications and standards for performance, reliability, and compatibility, and be executed in strict adherence to local codes and standard practices.

3.09 FIELD QUALITY CONTROL

A. All work, materials, and equipment shall comply with the rules and regulations of applicable local, state, and federal codes and ordinances as identified in Part 1 of this Specification.

B. Contractor shall continually monitor the field installation for code compliance and quality workmanship.

C. Contractor shall have work inspected by local or state authorities having jurisdiction over the work.

3.10 WIRING

A. All control and interlock wiring shall comply with national and local electrical codes and Division 16 of this specification.

B. Raceways:

1. All NEC Class 1 (line voltage) wiring shall be UL Listed in approved raceway per NEC and Division 16 requirements.

2. All wiring (Class 1 and Class 2) in mechanical, electrical, or service rooms—or where subject to mechanical damage—shall be installed in raceway at levels below 10 ft.

3. Size of raceway and size and type of wire shall be the responsibility of the Contractor, in keeping with the manufacturer's recommendation and NEC requirements, except as noted elsewhere.

4. Include one pull string in each raceway 1 inch or larger.

5. Conceal all raceways, except within mechanical, electrical, or service rooms. Install raceway to maintain a minimum clearance of 6 inches from high-temperature equipment (e.g., steam pipes or flues).

6. Secure raceways with raceway clamps fastened to the structure and spaced according to code requirements. Raceways and pull boxes may not be hung on flexible duct strap or tie rods. Raceways may not be run on or attached to ductwork.

7. Adhere to Division 16 requirements where raceway crosses building expansion joints.

8. Install insulated bushings on all raceway ends and openings to enclosures. Seal top end of all vertical raceways.

9. Flexible metal raceways and liquid-tight, flexible metal raceways shall not exceed 1m [3 ft] in length and shall be supported at each end. Flexible metal raceway less than 1/2 in. electrical trade size shall not be used. In areas exposed to moisture—including chiller and boiler rooms—liquid-tight, flexible metal raceways shall be used.

10. Raceway shall be rigidly installed, adequately supported, properly reamed at both ends and left clean and free of obstructions. Raceway sections shall be joined with couplings (per code). Terminations shall be made with fittings at boxes, and ends not terminating in boxes shall have bushings installed.

11. Do not install wiring in raceway containing tubing.

C. All low-voltage wiring shall meet NEC Class 2 requirements. (Low-voltage power circuits shall be sub-fused when required to meet the Class 2 current limit.)

1. Where NEC Class 2 (current limited) wires are in concealed and accessible locations, including ceiling return air plenums, approved cables not in the raceway may be used, provided that the cables are UL Listed for the intended application. For example, plenums shall be UL Listed specifically for that purpose.

2. Do not install Class 2 wiring in raceway containing Class 1 wiring. Boxes and panels containing high-voltage wiring and equipment may not be used for low-voltage wiring except for the purpose of interfacing the two (e.g., relays and transformers).

3. Where Class 2 wiring is run exposed, wiring is to be run parallel along a surface or perpendicular to it, and neatly tied at 3m [10 ft] intervals.

4. Where plenum cables are used without raceway, they shall be supported from or anchored to structural members. Cables shall not be supported by or anchored to ductwork, electrical raceways, piping, or ceiling suspension systems.

5. Install plenum wiring in sleeves where it passes through walls and floors. Maintain fire rating at all penetrations.

D. All wire-to-device connections shall be made at a terminal block or terminal strip. All wire-to-wire connections shall be made at a terminal block or wire nut at junction box.

1. All wiring within enclosures shall be neatly bundled and anchored to permit access and prevent restriction to devices and terminals.

2. All wiring shall be installed as continuous lengths, with no splices permitted between termination points.

E. Maximum allowable voltage for control wiring shall be 120v. If only higher voltages are available, the contractor shall provide step-down transformers.

F. Control and status relays are to be located in designated enclosures only. These enclosures include packaged equipment control panel enclosures, unless they also contain Class 1 starters.

G. The contractor shall terminate all control and interlock wiring, and shall maintain updated wiring diagrams with terminations identified at the job site.

3.11 COMMUNICATION WIRING

A. Do not install communication wiring in raceway and enclosures containing Class 1 wiring.

B. Maximum pulling, tension, and bend radius for cable installation, as specified by the cable manufacturer, shall not be exceeded during the installation.

C. Contractor shall verify the integrity of the entire network following the cable installation. Use appropriate test measures for each particular cable.

D. When a cable enters or exits a building, a lightning arrestor shall be installed between the lines and ground. The lightning arrestor shall be installed according to the manufacturer's instructions.

E. All runs of communication wiring shall be unspliced lengths when that length is commercially available.

F. All communication wiring shall be labeled to indicate origination and destination data.

3.12 INSTALLATION OF SENSORS

A. Install sensors in accordance with the manufacturer's recommendations.

B. Mount sensors rigidly and adequately for the environment within which the sensor operates.

C. Temperature Sensors

1. Room temperature sensors shall be installed on concealed junction boxes properly supported. Additionally, the wiring to the sensor shall not be required to be polarity sensitive. The design of the sensor shall be modular, which allows for the rough-in of all wiring without the presence of the electronics or esthetic covering.

2. All wires attached to sensors shall be air sealed in their raceways or in the wall to stop air transmitted from other areas affecting sensor readings.

3. Sensors used in mixing plenums and in hot and cold decks shall be of the averaging type. Averaging sensors shall be installed in a serpentine manner vertically across the duct. Each bend shall be supported with a capillary clip.

4. Low-limit sensors used in mixing plenums shall be installed in a serpentine manner horizontally across duct. Each bend shall be supported with a capillary clip. Provide adequate sensor length and installation to cover the entire coil such that it extends within 4" of the perimeter with a maximum of 18" between each pass. Sensor to be routed in a horizontal serpentine fashion from top to bottom.

5. All pipe-mounted temperature sensors shall be installed in wells. Install all liquid temperature sensors with heat-conducting fluid in thermal wells.

6. Install outdoor air temperature sensors on the north wall, complete with sun shield at designated location.

D. Differential air static pressure:

1. Supply duct static pressure: Pipe the high pressure tap to the duct using a pitot tube. Pipe the low pressure port to a tee in the high pressure tap tubing of the corresponding building static pressure sensor (if applicable) or to the location of the duct high pressure tap and leave open to the plenum.

2. Return duct static pressure: Pipe the high pressure tap to the duct using a pitot tube. Pipe the low pressure port to a tee in the low pressure tap tubing of the corresponding building static pressure sensor.

3. Building static pressure: Pipe the low pressure port of the pressure sensor to the static pressure port located on the outside of the building through a high volume accumulator. Pipe the high pressure port to a location behind a thermostat cover.

4. The piping to pressure ports on all pressure transducers shall contain a capped test port located adjacent to the transducer.

5. All pressure transducers other than those controlling VAV boxes shall be located in field device panels, not on the equipment monitored or on ductwork. Mount transducers in a location accessible for service without the use of ladders or special equipment.

6. All air and water differential pressure sensors shall have gauge tees mounted adjacent to all taps. Water gauges shall also have shutoff valves installed before the tee.

3.13 ACTUATORS

A. Electric and electronic actuators:

1. Dampers: Actuators shall be direct-mounted on damper shaft or jackshaft unless shown as a linkage installation. Actuators shall be mounted following manufacturer's recommendations.

2. Valves: Actuators shall be connected to valves with adapters approved by the actuator manufacturer. Actuators and adapters shall be mounted following the actuator manufacturer's recommendations.

3. Use line shafting or shaft couplings (jackshafting) in lieu of blade-to-blade linkages or shaft coupling when driving axially aligned damper sections.

3.14 IDENTIFICATION OF HARDWARE

A. Identify control panels with minimum ½ inch letters on laminated plastic nameplates.

B. Manufacturers' name plates and UL or CSA labels are to be visible and legible after equipment is installed.

C. Identifiers shall match record documents.

3.15 PROGRAMMING

A. Provide programming for the system and adhere to the sequences of operation provided. Imbed into the control program sufficient comment statements to clearly describe each section of the program.

B. Load, test, troubleshoot and verify the correct operation of all software.

3.16 OPERATOR INTERFACE:

A. Standard graphics: See graphic standards at end of this section. Provide graphics for all mechanical systems and floor plans of the building. This includes each chilled water system, hot water system, chiller, boiler, air handler, and all terminal equipment. The contractor shall be provided AutoCAD drawings of the floor plans by the Architect for use in preparation of floor plan graphics. Point information on the graphic displays shall dynamically update. Show on each graphic all input and output points for the system. Also show relevant calculated points such as set points.

B. Show terminal equipment information on a "graphic" summary table. Provide dynamic information for each point shown.

C. Operator Interface software is existing Honeywell. The contractor shall provide all the labor necessary to add equipment database and graphics to the existing software.

D. Expand existing Honeywell server license as necessary to accommodate all new points associated with this project and any new workstations provided.

3.17 ATC/BMCS SYSTEM CHECKOUT AND TESTING BY CONTROLS CONTRACTOR

A. Completely install and thoroughly inspect startup, test, adjust, and document all systems and equipment.

1. All testing listed in this Article shall be performed by the Controls Contractor and shall make up part of the necessary verification of an operating control system. This testing shall be completed before the Owner's representative is notified of the system demonstration. All testing shall be documented in the ATC/BMCS start-up report.

2. The Controls Contractor shall furnish all labor and test apparatus required to calibrate and prepare for service all instruments, controls, and accessory equipment furnished under this section of the specification.

a. Instrumentation required to verify readings and test system and equipment performance shall be provided by Controls Contractor. Generally, no testing equipment will be required beyond that required to perform Controls Contractors work under these Contract Documents. All equipment used for testing and calibration shall be NIST/NBS traceable and calibrated within the preceding 6-month period. Certificates of calibration shall be submitted.

b. Contractor shall provide the TAB contractor with software which shall run on the TAB contractor's portable computer. This software shall support all functions and allow querying and editing of all parameters required for proper calibration and start up.

3. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify proper electrical voltages and amperages. Verify that terminations are tight.

4. Coordinate with TAB subcontractor to obtain control settings that are determined from balancing procedures. Record the following control settings as obtained from TAB contractor, and note any TAB deficiencies in the ATC/BMCS Start-Up Report:

a. Optimum duct static pressure set points for VAV air handling units

b. Minimum outside air damper settings for air handling units

c. Optimum differential pressure set points for variable speed pumping systems

d. Calibration parameters for flow control devices such as VAV boxes and flow measuring stations.

5. Enable the control systems and verify calibration of all input devices individually. Perform calibration procedures per manufacturers' recommendations.

6. Verify that all digital output devices (relays, solenoid valves, two-position actuators and control valves, and magnetic starters) operate properly and that the normal positions are correct.

7. Verify that all analog output devices (I/Ps, actuators) are functional, that start and span are correct, and that direction and normal positions are correct. The Contractor shall check all control valves and automatic dampers to ensure proper action and closure. The Contractor shall make any necessary adjustments to valve stem and damper blade travel.

8. Verify that the system operation adheres to the Sequences of Operation. Simulate and observe all modes of operation by overriding and varying inputs and schedules.

9. Tune all control loops to obtain the fastest stable response without hunting, offset or overshoot. Record tuning parameters and response test results for each control loop in the ATC/BMCS Start Up Report. Except from a startup, maximum allowable variance from set point for controlled variables under normal load fluctuations shall be as follows. Within 3 minutes of any upset (for which the system has the capability to respond) in the control loop, tolerances shall be maintained (exceptions noted):

   a. Duct air temperature: ± 1°F.

   b. Space Temperature: ± 2°F.

   c. Chilled Water: ± 1°F.

   d. Hot water temperature: ± 3°F.

   e. Duct pressure: ± 0.25" w.g.

   f. Water pressure: ± 1 psid.

   g. Duct or space Humidity: ± 5%.

   h. Air flow control: ± 5% of setpoint velocity. For min OA flow loops being reset from CO2, response to upset max time is one hour.

10. Alarms and interlocks:

    a. Check each alarm separately by including an appropriate signal at a value that will trip the alarm.

    b. Interlocks shall be tripped using field contacts to check the logic, as well as to ensure that the fail-safe condition for all actuators is in the proper direction.

    c. Interlock actions shall be tested by simulating alarm conditions to check the initiating value of the variable and interlock action.

11. Coil Valve Leak Check

    a. Verify proper close off of the valves. Ensure the valve seats properly by simulating the maximum anticipated pressure difference across the circuit. Calibrate air temperature sensors on each side of coil to be within 0.5°F of each other. Command the valve to close. Energize fans. After 5 minutes, observe air temperature difference across coil. If a temperature difference is indicated leakage is probably occurring. If necessary close the isolation valves to the coil to ensure the conditions change. If necessary remedy the condition by adjusting the stroke and range, increasing the actuator size/torque, replacing the seat, or replacing the valve as applicable.

12. Operator Interfaces:

    a. Verify that all elements on the graphics are functional and are properly bound to physical devices and/or virtual points, and that hot links or page jumps are functional and logical.

    b. Output all specified BMCS reports for review and approval.

c. Verify that the alarm printing and logging is functional and per requirements.

d. Verify that trend archiving to disk and provide a sample to the CA for review.

e. Verify the functionality of remote OIs and that a robust connection can be established consistently.

f. Verify that required third party software applications required with the bid are installed and are functional.

3.18 ATC/BMCS DEMONSTRATION

A. Assist Commissioning Authority in verification and performance testing. Assistance will generally include the following:

1. Attend Commissioning (Cx) progress and coordination meetings.

2. Prepare and submit required draft forms and systems information.

3. Establish trend logs of system operation.

4. Demonstrate system operation.

5. Manipulate systems and equipment to facilitate testing.

6. Provide instrumentation necessary for verification and performance testing.

7. Provide a Control technician to work at the direction of Commissioning Authority for software optimization assistance for a maximum of 8 hours.

B. Demonstrate the operation of the ATC/BMCS hardware, software, and all related components and systems to the satisfaction of the Commissioning Authority and Owner. Schedule the demonstration with the Owner's representative 1 week in advance.

C. The Contractor shall supply all personnel and equipment for the demonstration. The Contractor shall allow a maximum of 40 hours for system demonstration. Contractor supplied personnel must be competent with and knowledgeable of all project-specific hardware, software, and the HVAC systems. All training documentation and submittals shall be at the job site.

D. Demonstration shall involve a representative sample of systems/equipment randomly selected by the Owner and the CA. Two weeks prior to the system demonstration the CA shall provide copies of all commissioning documents and forms to be used for the system demonstration the commissioning forms and documents to be used

E. The system shall be demonstrated following the same procedures used in the Start Up Test by using the approved Commissioning Checklists. Demonstration shall include the following:

1. Demonstrate that required software is installed on BMCS workstations. Demonstrate that graphic screens, alarms, trends, and reports are installed as submitted and approved.

2. Demonstrate that points specified and shown can be interrogated and/or commanded (as applicable) from all workstations, as specified.

3. Demonstrate correct calibration of input/output devices. A maximum of 10 percent of I/O points shall be selected at random by Commissioning Authority and/or Owner for demonstration. Upon failure of any device to meet the specified end-to-end accuracy, an additional 10 percent of I/O points shall be selected at random by Commissioning Authority for demonstration. This process may be repeated until 100 percent of randomly selected I/O points have been demonstrated to meet specified end-to-end accuracy if devices fail in the previous sample.

4. Demonstrate that all DDC and other software programs exist at respective field panels. The Direct Digital Control (DDC) programming and point database shall be as submitted and approved.

5. Demonstrate that all DDC programs accomplish the specified sequences of operation. Where there are multiple applications of the same program (e.g. typical AHU, Fan Coil Unit) then the CA shall select one typical application of each type for testing.

6. Demonstrate that the panels automatically recover from power failures, as specified.

7. Demonstrate that the stand-alone operation of panels meets the requirements of these Specifications. Demonstrate that the panels' response to LAN communication failures meets the requirements of these Specifications.

8. Identify access to equipment selected by Commissioning Authority. Demonstrate that access is sufficient to perform required maintenance.

9. Demonstrate that required trend graphs and trend logs are set up per the requirements. Provide a sample of the data archive. Indicate the file names and locations.

10. ATC/BMCS Demonstration shall be completed and approved prior to Substantial Completion.

11. Any tests successfully completed during the demonstration will be recorded as passed for the functional performance testing and will not have to be re-accomplished.

3.19 ATC/BMCS ACCEPTANCE PERIOD

A. After approval of the ATC/BMCS Demonstration and prior to Contract Close-Out the two week Acceptance Period shall begin. The Acceptance Period shall not be scheduled until all HVAC systems are in operation, all required cleaning and lubrication is complete and TAB Report has been submitted and approved.

B. Operational Test: The system shall operate properly for two weeks without malfunction, without alarm caused by control action or device failure, and with smooth and stable control of systems and equipment in conformance with these specifications. At the end of the two weeks, contractor shall forward the trend logs specified below to the CA for review. CA shall determine if the system is performing correctly and document any problems requiring contractor attention.

C. During the Acceptance Period, the contractor shall maintain a hard copy log of all alarms generated by the BMCS. For each alarm received, contractor shall diagnose the cause of the alarm, and shall list on the log for each alarm, the diagnosed cause of the alarm, and the corrective action taken. If in the contractor's opinion, the cause of the alarm is not the responsibility of the contractor, contractor shall immediately notify the Owner's representative.

D. Contractor shall correct any problems and provide notification to the Owner's representative that all problems have been corrected. The Acceptance Period shall be restarted at a mutually scheduled time for an additional one-week period. This process shall be repeated until Commissioning Authority issues notice that the BMCS is ready for functional performance testing.

3.20 TREND LOGS

A. Trend logs are databases representing a historical record of the systems operation. Contractor shall establish and store these trend logs.

B. CA will analyze trend logs of the system operating parameters to evaluate normal system functionality. Contractor shall establish trends, ensure that they are being stored properly, and forward the data in electronic format to the CA.

1. Data shall include a single row of field headings and the data thereafter shall be contiguous. Each record shall include a date and time field. Recorded parameters for a given piece of equipment or component shall be trended at the same intervals and be presented in a maximum of two separate two dimensional formats with time being the vertical axis and field name being the horizontal axis. Data shall be forwarded in one of the following formats.

a. Microsoft ACCESS Database (*.mdb)

b. Microsoft EXCEL Spreadsheet (*.xls)

c. Comma Separated Value (*.csv or *.txt), preferably with quotes delimiting text fields and # delimiting date/time fields

C. Sample times indicated as COV (±) or change of value mean that the changed parameter only needs to be recorded after the value changes by the amount listed. When output to the trending file, the latest recorded value shall be listed with any given time increment record. If the BMCS does not have the capability to record based on COV, the parameter shall be recorded based on the interval common to the unit.

3.21 TREND GRAPHS

A. Trend graphs shall generally be used during the Acceptance Period to facilitate and document testing. Prepare controller and workstation software to display graphical format trends during the Acceptance Period. Trend graphs shall demonstrate compliance with contract documents.

3.22 WARRANTY PHASE ATC/BMCS TRENDING

A. Throughout the Warranty Phase, trend logs shall be maintained as required for the Acceptance Period. Contractor shall forward archive trend logs to the CA for review upon CA's request. CA will review these and notify contractor of any warranty work required.

3.23 OPPOSITE SEASON TESTING

A. Within 6 months of completion of the Acceptance Period, CA shall schedule and conduct Opposite Season functional performance testing. Contractor shall participate in this testing and remedy any deficiencies identified. Testing shall consist of:

1. Demonstrate that DDC programs accomplish the specified sequences of operation. Where there are multiple applications of the same program (e.g. typical AHU, Fan Coil Unit) then the CA shall select one typical application of each type for testing.

3.24 SOFTWARE OPTIMIZATION ASSISTANCE

A. The contractor shall provide the services of a controls technician for a maximum of 16 hours at the project site to work with the CA to make changes to control unit software and/or workstation graphics software that have been identified by the CA during the construction and commissioning of the project.

B. The Owner's representative shall notify contractor 2 days in advance of each day of requested assistance.

C. The controls technician provided shall be thoroughly trained in the programming and operation of the controller and workstation software.

3.25 CLEANING

A. The Contractor shall clean up all debris resulting from its activities daily. The Contractor shall remove all cartons, containers, and crates under its control as soon as their contents have been removed. Waste shall be collected and placed in a designated location.

B. At the completion of work in any area, the Contractor shall clean all of its work and equipment, keeping it free from dust, dirt, and debris.

C. At the completion of work, all equipment furnished under this Section shall be checked for paint damage, and any factory-finished paint that has been damaged shall be repaired to match the adjacent areas. Any cabinet or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas.

3.26 TRAINING

A. Provide 4 hours of training specific to this project.

B. Train the designated staff of Owner's representative and Owner to enable them to:

1. Understand control system architecture and configuration

2. Understand DDC system components

3. Understand system operation, including DDC system control and optimizing routines (algorithms)

END OF SECTION

4. Flexible ducts shall be selected for minimum of 6 inch positive static pressure and minimum of 1 inch negative static pressure.

5. Duct Access Panels:

a. Provide duct access panel assembly of the same material and gauge used for the duct. Duct access panels shall conform to the following:

1) Fasteners: Black steel or stainless steel to match material used for the duct. Panel fasteners shall not penetrate duct wall.

2) Gasket: Comply with NFPA 96, grease-tight, high temperature ceramic fiber, rated for minimum 1500 °F.

O. Provide Ventlon, or equal, flexible connections on inlet and outlet of AC Unit, air handler and exhaust fans. Provide galvanized weather hood over flexible connections exposed to the weather.

2.14 HYDRONIC PIPING

A. Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Provide materials and products complying with California Mechanical Code. Where more than one type of material or product is indicated, selection from materials or products specified is Contractor's option and shall be coordinated with LRCCD representative.

B. Heating Hot Water Piping, Chilled Water Piping, Condenser Water Piping:

1. Polypropylene Pipe and Fittings Aboveground:

a. Pipe shall be manufactured from a PP-R resin meeting the short-term properties and long-term strength requirements of ASTM F 2389 or CSA B137.11. The pipe shall contain no rework or recycled materials except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All pipe shall be made in an extrusion process. Hydronic hot water and heating piping shall contain a fiber layer (faser) to restrict thermal expansion. All pipe shall comply with the rated pressure requirements of ASTM F 2389 or CSA B137.11. All pipe shall be certified by NSF International as complying with NSF 14, and ASTM F 2389 or CSA B137.11.

b. Fittings shall be manufactured from a PP-R resin meeting the short-term properties and long-term strength requirements of ASTM F 2389. The fittings shall contain no rework or recycled materials except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All fittings shall be certified by NSF International as complying with NSF 14, and ASTM F 2389 or CSA B137.11.

c. Pipe and fittings shall be Aquatherm® Blue Pipe® MF®, available from Aquatherm, NA.

2. Copper Tube and Fittings Aboveground:

a. Copper Tube and Fittings Aboveground: ASTM B88, Type L, drawn-temper, 150 psig minimum working pressure at 200 deg. F. Provide wrought-copper fittings and unions, ASTM B16.22, with full solder cup. Capped outlets shall be Schedule 40 screwed brass. Contractor's option: For piping 2-1/2 inches and larger, grooved-end copper fittings, ASTM B 75 or ASTM B 584, and grooved-end tube couplings, rigid pattern, with steel bolts and nuts and pre-lubricated EPDM gasket rated for minimum 230 deg. F. Fittings and coupling shall be rated minimum 200 psig working pressure at 250 deg. F.

3. Steel Pipe and Fittings Aboveground:

a. 2 inches and smaller: ASTM A 53/A 53M, Schedule 40 black steel with plain ends, 150 psig minimum working pressure at 200 deg. F. Provide malleable-iron threaded fittings, ASTM B16.3, Class 150, and unions, ASTM B16.39, Class 150, and cast-iron flanges and flange fittings, and threaded joints.

b. 2-1/2 inches and larger: ASTM A 53/A 53M, Schedule 40 black steel with plain ends, 150 psig minimum working pressure at 200 deg. F. Provide wrought-steel fittings, ASTM A 234/A 234M, and wrought-cast or forged-steel flanges and flange fittings, ASME B16.5, material group 1.1, with butt welding end connections and raised face.

1) Contractors option: Grooved-end system as follows:

2) Joint Fittings: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47/A 47M, Grade 32510 malleable iron; ASTM A 53/A 53M, Type F, E, or S, Grade B fabricated steel; or ASTM A 106, Grade B steel fittings with grooves or shoulders constructed to accept grooved-end couplings; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.

3) Couplings: Ductile- or malleable-iron housing and synthetic rubber gasket of central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.

4) Refer to Grooved-End Fittings and Couplings Schedule in PART 3 of this Section for application of grooved-end fittings and couplings.

C. Pre-Insulated Underground Heating Hot Water Piping and Chilled Water Piping: Refer to Section 23 91 00.

2.15 HYDRONIC PUMPS

A. Close-Coupled, End Suction Centrifugal Pumps

1. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, close-coupled, cast iron, bronze-fitted, end-suction pump as defined in HI 1.1-1.2 and HI 1.3; designed for installation with pump and motor shafts mounted horizontally.

2. Pump Construction:

a. Casing: Radially split, cast iron, drain plug at bottom and air vent at top of volute, threaded gage tappings at inlet and outlet, and flanged connections.

b. Impeller: ASTM B 584, cast bronze or cast brass; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. For constant-speed pumps, trim impeller to match specified performance.

c. Pump Shaft: Steel, with copper-alloy shaft sleeve.

d. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N bellows and gasket. Include water slinger on shaft between motor and seal.

e. Pump Bearings: Permanently lubricated or grease lubricated ball bearings as normally furnished for pump size scheduled on Drawings.

3. Motor: Single speed and rigidly mounted to pump casing with integral pump support.

a. 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.

1) Enclosure: open, drip proof totally enclosed, fan cooled explosion proof.

2) Enclosure Materials: Rolled steel.

3) Motor Bearings: Permanently lubricated or grease-lubricated ball bearings as normally furnished for pump size scheduled on Drawings.

4) Efficiency: Premium efficient.

4. 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. ITT Corporation; Bell & Gossett.

b. Armstrong Pumps Inc.

c. PACO Pumps.

d. TACO Incorporated.

B. Separately Coupled, Base-Mounted, End-Suction Centrifugal Pumps

1. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, separately coupled, cast iron, bronze-fitted, end-suction pump as defined in HI 1.1-1.2 and HI 1.3; designed for base mounting, with pump and motor shafts horizontal.

2. Pump Construction:

   a. Casing: Radially split, cast iron, drain plug at bottom and air vent at top of volute, threaded gage tappings at inlet and outlet, and flanged connections.

   b. Impeller: ASTM B 584, cast bronze or cast brass; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. For constant-speed pumps, trim impeller to match specified performance.

   c. Pump Shaft: Steel, with copper-alloy shaft sleeve.

   d. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N bellows and gasket. Include water slinger on shaft between motor and seal.

   e. Pump Bearings: Permanently lubricated or grease lubricated ball bearings as normally furnished for pump size scheduled on Drawings.

3. Shaft Coupling: Replaceable molded-rubber insert and interlocking spider capable of absorbing vibration. Provide EPDM coupling sleeve for variable-speed applications.

4. Coupling Guard: Dual rated; ANSI B15.1, Section 8; OSHA 1910.219 approved; steel; removable; attached to mounting frame.

5. Mounting Frame: Welded-steel frame and cross members, factory fabricated from ASTM A 36/A 36M channels and angles. Fabricate to mount pump casing, coupling guard, and motor.

6. Motor: Single speed and secured to mounting frame, with adjustable alignment.

   a. 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.

      1) Enclosure: Open, drip proof totally enclosed, fan cooled explosion proof.

      2) Enclosure Materials: Rolled steel.

      3) Motor Bearings: Permanently lubricated or grease-lubricated ball bearings as normally furnished for pump size scheduled on Drawings.

      4) Efficiency: Premium efficient.

7. 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:

8. ITT Corporation; Bell & Gossett.

9. Armstrong Pumps Inc.

10. PACO Pumps.

11. TACO Incorporated.

2.16 TEMPERATURE CONTROL SYSTEM

A. Refer to Section 23 09 00, Automatic Temperature Controls, Building Management Control Systems.

2.17 COOLING TOWER

A. General: Furnish and install factory-assembled, induced draft, crossflow cooling tower with vertical air discharge, conforming in all aspects to the specifications, schedules and as shown on the plans. Overall dimensions shall not exceed approximately 12 ft long x 22 ft wide x 17 ft high. The total connected fan horsepower shall not exceed 20 HP. Basis of Design cooling tower for this project is Baltimore Aircoil Company Model XESE-1222-10M ENDURA. Provide Basis of Design cooling tower or approved equal meeting all requirements of this specification.

B. Thermal Capacity: The cooling tower(s) shall be warranted by the manufacturer to cool 1,800 GPM of water from 95°F to 85°F at 75°F entering wet bulb temperature. Additionally, the thermal performance shall be certified by the Cooling Technology Institute in accordance with CTI Certification Standard STD-201. Lacking such certification, a field acceptance test shall be conducted within the warranty period in accordance with CTI Acceptance Test Code ATC-105, by the Cooling Technology Institute or other qualified independent third party testing agency. Manufacturers' performance guarantees or performance bonds without CTI Certification or independent field thermal performance test shall not be accepted. The cooling tower(s) shall comply with the energy efficiency requirements of ASHRAE Standard 90.1.

C. Corrosion Resistant Construction: Unless otherwise noted in this specification, all steel basin panels and structural members shall be constructed of heavy-gauge G-235 (Z700 metric) hot-dip galvanized steel with all edges given a protective coating of zinc-rich compound.

D. Quality Assurance: The cooling tower manufacturer shall have a Management System certified by an accredited registrar as complying with the requirements of ISO9001:2008 to ensure consistent quality of products and services. Manufacturers that are not ISO9001 Certified shall not be acceptable.

E. Wind and Seismic Forces: The structure shall be designed, tested and certified in accordance with IBC 2009 regulations to meet a minimum unrestricted seismic design SDS = 2.64 g with an Importance Factor of 1.0 and wind load of 60 psf. The unit shall be certified by the manufacturer for operation after an event, up to SDS and the wind load ratings listed above, and verify that such rating is based on actual shake-table testing. Experience or calculation data is not acceptable to verify operation. Units not provided with a certificate of IBC 2009 compliance shall not be an acceptable alternative.

F. Construction Details

1. Structure: The cooling tower shall be constructed with a sturdy structural frame designed to transmit all wind, seismic and mechanical loads to the equipment anchorage. The frame shall be constructed of heavy-gauge steel angles and channels.

2. Casing Panels: Casing panels shall be constructed of corrosion and UV-resistant fiberglass reinforced polyester (FRP) to minimize maintenance requirements and prolong equipment life. Casing panels shall not provide structural support, since the sturdy, structural frame of the tower transfers all loads to the equipment anchorage.

3. Cold Water Basin: The cold-water basin shall be constructed of 304 stainless steel panels and structural members. Basin shall include a depressed center section with drain/clean-out connection. The basin area under the fill shall be sloped toward the depressed center section to facilitate cleaning. Standard basin accessories shall include a corrosion resistant make-up valve with large diameter plastic float for easy adjustment of the operating water level, removable anti-vortexing device to prevent air entrainment, and large area lift out strainers with perforated openings sized smaller than the water distribution system nozzles.

4. Water Outlet: The water outlet connection shall be beveled for welding and grooved for mechanical coupling or bolt hole circle designed to accept an ASME Class 150 flat face flange. The outlet shall be provided with large-area lift out strainers with perforated openings sized smaller than the water distribution nozzles and an anti-vortexing device to prevent air entrainment. The strainer and vortex device shall be constructed of the same materials as the cold-water basin to prevent dissimilar metal corrosion.

5. Water Distribution System: The hot water distribution basins shall be the open and gravity fed for easy cleaning, and constructed of 304 stainless steel. The basins must be accessible from outside the unit and serviceable during tower operation. Basin weirs and plastic metering orifices shall be provided to assure even distribution of the water over the fill. Weir dams shall accommodate a flow range of 50% to 100% of the design flow rate. Lift-off distribution covers shall be constructed of heavy-gauge G-235 (Z700) hot-dip galvanized steel and designed to withstand a 50 psf (244 kg/m2) live load or 200 pound (90.7 kg) concentrated load. Gravity flow nozzles shall be snap-in type for easy removal. Should pressurized nozzles be used, they shall utilize grommets, which ensure easy removal.

G. Mechanical Equipment

1. Fan(s): Fan(s) shall be heavy-duty, axial flow with aluminum alloy blades selected to provide optimum cooling tower thermal performance with minimal sound levels. Air shall discharge through a fan cylinder designed for streamlined air entry and minimum tip clearance for maximum fan efficiency. The top of the fan cylinder shall be equipped with a conical, non-sagging removable fan guard.

2. Bearings: N/A

3. Fan Drive: The fan(s) shall be driven be direct drive and connected to VFD provided by BAC. VFD startup is to be included and be coordinated with equipment commissioning. VFD shall be shipped loose for field installation.

4. Fan Motor: Fan motor(s) shall be totally enclosed air over (TEAO), reversible, squirrel cage, ball bearing type designed specifically for cooling tower service. The motor shall be furnished with special moisture protection on windings, shafts and bearings. Fan motors shall be premium efficient/inverter duty type designed per NEMA Standard MG1, Section IV Part 31. Space heater shall be provided in fan motor(s) and wired according to the motor nameplate.

5. Variable frequency drive(s) shall be provided by the manufacturer and designed specifically for the cooling tower motor(s); refer to VFD specification Section 239500 for requirements. The drive enclosure(s) shall be provided in NEMA 3R outdoor-rated enclosure(s).

6. Mechanical Equipment Warranty: The fan(s), fan shaft(s), sheaves, bearings, and mechanical equipment support and fan motor shall be warranted against defects in materials and workmanship for a period of five (5) years from date of shipment. An additional two years of warranty, for a total of seven (7) years, shall be provided for fan motor(s) when space heaters are field-wired at time of initial installation.

H. Fill and Drift Eliminators

1. Fill and Drift Eliminators: The fill and integral drift eliminators shall be formed from self-extinguishing (per ASTM-568) polyvinyl chloride (PVC) having a flame spread rating of 5 per ASTM E84 and shall be impervious to rot, decay, fungus and biological attack. The fill shall be suitable for entering water temperatures up to and including 130°F (54.4°C). The fill shall be manufactured, tested and rated by the cooling tower manufacturer and shall be elevated above the cold-water floor to facilitate cleaning.

I. Air Inlet Louvers

1. Air Inlet Louvers: Air Inlet louvers shall be separate from the fill and removable to provide easy access for inspection of the air/water interface at the louver face. Louvers shall prevent water splash out during fan cycling and be constructed of maintenance free, corrosion and UV resistant, fiberglass reinforced polyester (FRP).

J. Access

1. Plenum Access: Two hinged access doors shall be provided for access into the plenum section.

K. Sound

1. Sound Level: To maintain the quality of the local environment, the maximum sound pressure levels (dB) measured 50 ft (15240 mm) from the cooling tower operating at full fan speed shall not exceed the sound levels detailed below. If the tower exceeds these conditions the tower must be either oversized and reduced in horsepower, provided with a low sound fan, or provided with sound attenuation.

Sound Power (dB)							
63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8k Hz
103	101	101	96	91	84	80	77

L. Accessories

1. Balancing Valves: Heavy-duty butterfly valves shall be provided at the hot water inlet connections. These valves shall include cast iron bodies, elastomer seat and steel operating stems. There shall be a locking handle to maintain the valve setting in any position. Wafer type field supplied spool piece is required between the inlet connection and the valve.

2. Basin Heater(s): The cooling tower cold water basin shall be provided with electric heater(s) to prevent freezing in low ambient conditions. The heater(s) shall be selected to maintain 40°F basin water temperatures at 0°F ambient. The heater(s) shall be 460 V /3 phase/ 60Hz electric and shall be provided with low water cutout and thermostat.

3. Basin Water Level Control: A make-up valve with unsinkable polystyrene filled plastic float arranged for easy adjustment. The corrosion resistant makeup valve is suitable for water supply pressures between 15 psig (103 kPa) and 50 psig (345 kPa).

4. Vibration Cutout Switch: Provide an electronic remote reset vibration switch with contact for BAS monitoring. Wiring shall be by the installing contractor. The electronic vibration cutout switch shall be set to trip at a point so as not to cause damage to the cooling tower. To ensure this, the trip point will be set in a frequency range of 2 to 1000 Hertz and a trip point of 0.45 in/sec (0.0114 m/sec).

5. Basin Sweeper Piping: The cold-water basin of the cooling tower shall be equipped with PVC sump sweeper piping with plastic eductor nozzles.

6. Access Door Platform: A galvanized steel platform and aluminum ladder to grade shall be provided at all access doors to access the plenum section of the cooling tower. All working surfaces shall be able to withstand 50 psf (244 kg/m2) live load or 200 pound (90.72 kg) concentrated load.

7. Internal Walkway: An internal walkway shall be provided in the plenum section to provide for inspection and maintenance. All working surfaces shall be able to withstand 50 psf (244 kg/m2) live load or 200 pound (90.7 kg) concentrated load. Other components of the cooling tower, i.e., basin and fill/drift eliminators, shall not be considered an internal working surface. Cooling tower manufacturers that promote these surfaces to be used as a working platform shall provide a two-year extended warranty to the Owner to repair any damage to these surfaces caused during routine maintenance.

8. Externally Mounted Pre-wired Terminal Box: The cooling tower shall ship from the factory with the fan motor(s) (and vibration cutout switch) wired to terminal blocks encased in a Type 304 stainless steel NEMA 3R enclosure, mounted on the outside of the tower. No casing penetrations shall be permitted in the field.

PART 3 - EXECUTION

3.01 ROOF MOUNTED EQUIPMENT

A. Mount and anchor equipment in strict compliance with drawings details. Alternate anchorage methods will not be considered for roof mounted equipment.

B. Examine rough-in for roof mounted equipment to verify actual locations of piping and duct connections prior to final equipment installation.

C. Verify that piping to be installed adjacent to roof mounted equipment allows service and maintenance.

D. Verify that gas piping will be installed with sufficient clearance for burner removal and service.

E. Install ducts to termination at top of roof curb and install heavy duty rubber gaskets on supply and return openings and on full perimeter of curb, or as required for an airtight installation, prior to setting unit on curb.

F. Cover roof inside each roof mounted air conditioning unit, heat pump unit, and heating and ventilating unit roof curb with 2 inch thick, 3 pound density fiberglass insulation board.

G. Connect supply and return air ducts to horizontal discharge roof mounted equipment with flexible duct connectors specified elsewhere in these Specifications.

H. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.

3.02 INSTALLATION OF SPLIT SYSTEM AC AND SPLIT SYSTEM HEAT PUMP SYSTEMS

A. General:

1. Install units level and plumb.

2. Install evaporator-fan components as detailed on Drawings.

3. Install ground or roof- mounted condensing units as detailed on Drawings.

4. Install seismic restraints as required by applicable codes. Refer to Article, Submittals, in Section 23 00 50, Basic HVAC Materials and Methods, for delegated design requirements for seismic restraints.

5. Install and connect refrigerant piping as detailed in unit manufacturers' literature. Install piping to allow access to unit.

6. Install cooling coil condensate primary drain pan piping, and overflow, if provided, and run to nearest code-compliant receptacle, or as indicated on Drawings. Install secondary drain pan for units installed over permanent and suspended-tile ceilings. Install secondary drain pan piping and terminate 1/2 inch below ceiling, with escutcheon, in a readily visible location or as shown on Drawings.

7. Install air filters at each indoor unit. Install washable, permanent filters at indoor units designed to accept washable, permanent filters. Refer to Drawings schedule, and Article, Air Filters, in this Section, for filter requirements for ducted, above-ceiling units incorporating mixing boxes.

8. Duct Connections: Duct installation requirements are specified in Article, Ductwork, in this Section. Drawings indicate the general arrangement of ducts. Connect supply and return ducts to split-system air-conditioning units with flexible duct connectors. Flexible duct connectors are specified in Article, Ductwork, in this Section.

3.03 REFRIGERANT PIPING INSTALLATION

A. General:

1. Install refrigerant piping according to ASHRAE 15. Install and connect refrigerant piping as detailed in unit manufacturers' literature. Install piping to allow access to unit.

2. Install piping straight and free of kinks, restrictions or traps.

3. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

4. Slope horizontal suction piping 1 inch/10 feet towards compressor.

5. Install fittings for changes in direction and branch connections.

6. Piping under raised floors shall be kept 6 inches minimum above ground; excavate as necessary.

7. Install locking caps on refrigerant access valves located outside building, including valves located on roofs.

8. Insulate refrigerant piping, including liquid and hot gas pipes when required by system manufacturer, and including headers, branches, and other components as detailed in unit manufacturers' literature. Refer to Article, Insulation Work, in Section 23 00 50, Basic HVAC Materials and Methods.

B. Factory Pre-charged and sealed line set piping:

1. Keep the entire system clean and dry during installation.

2. All tubing shall be evacuated and sealed at the factory. The seal must not be broken until ready for assembly.

3. If there is any evidence of dust, moisture, or corrosion, the tubing must be cleaned out by drawing a swab soaked with methyl alcohol through the tubing as many times as necessary to thoroughly clean the tubing.

4. Where line set piping is used, enclose in iron or steel piping and fittings or in EMT conduit.

C. Field Assembled Refrigerant Piping:

1. Select system components with pressure rating equal to or greater than system operating pressure.

2. Where subject to mechanical injury, enclose refrigerant piping in EMT conduit.

3. When brazing, remove solenoid valve coils and sight glasses, also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

3.04 INSTALLATION OF FANS

A. Provide access doors for fans or motors mounted in ductwork.

B. Mount all fans as detailed on Drawings and in compliance with CBC standards.

C. Fan motors mounted in air-stream to be totally enclosed.

D. Completely line supply, return or exhaust fan cabinets with 1 inch thick, 3/4 pound density acoustic insulation securely cemented in place.

E. Roof fans shall be mounted level.

F. Provide heavy-duty rubber gasket between exhaust fan mounting flange and roof curb, or as required for an airtight installation.

G. Label fume hood fans with sign "CAUTION - HAZARDOUS EXHAUST."

3.05 AIR INLETS AND OUTLETS

A. Provide all air inlets and outlets with gaskets and install so that there will be no streaking of the walls or ceilings due to leakage. Duct connection to outlet on exposed duct shall be full size of outer perimeter of outlet flange.

B. Unless otherwise indicated on Drawings, provide rectangular plenum on top of each diffuser and ceiling return for connection to ductwork. Line plenum with internal insulation as indicated for lined ductwork. Size plenum to allow full opening into air terminal.

C. Ceiling-mounted air terminals or services installed in T-Bar type ceiling systems shall be positively attached to the ceiling suspension main runners or to cross runners with the same carrying capacity as the main runners.

1. Terminals or services weighing not more than 56 pounds shall have two No. 12 gauge hangers connected from the terminal or service to the structure above. These wires may be slack.

2. Support terminals or services weighing more than 56 pounds directly from the structure above by approved hangers. Provide 4 taut 12 gauge wires each, attached to the fixture and to the structure above. The 4 taut 12 gauge wires, including their attachment to the structure above must be capable of supporting 4 times the weight of the unit.

3. Secure air inlets and outlets to main runners of ceiling suspension system with two #8 sheet metal screws at opposing corners.

D. Furnish all air inlets and outlets with a baked prime coat unless otherwise noted. Provide off-white baked enamel finish on ceiling-mounted air inlets and outlets. Paint exposed mounting screws to match the material being secured.

E. Air inlets and outlets shall match all qualities of these specified including appearance, throw, noise level, adjustability, etc.

3.06 AIR TERMINAL UNIT INSTALLATION

A. Install air terminal units according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."

B. Install air terminal units level and plumb. Maintain sufficient clearance for normal service and maintenance.

C. Where installing piping adjacent to air terminal unit, allow space for service and maintenance.

D. Connect heating coils to supply with shutoff valve, strainer, control valve, and union or flange; and to return with balancing valve and union or flange, or as detailed on Drawings.

3.07 FILTERS

A. Mount filters in airtight frames furnished by the filter manufacturer, and install in accordance with manufacturer's recommendations.

B. Air filters shall be accessible for cleaning or replacement.

C. Identify each filter access door with 1/2 inch high minimum stenciled letters.

D. Provide temporary filters for all fans that are operated during construction; after all construction dirt has been removed from the building install new filters at no additional cost to the Owner. In addition to temporary filters at filter location, provide temporary filters on all duct openings which will operate under a negative pressure.

1. Filters used for temporary operation shall be the same as permanent filters for the application. Filters used for duct openings may be 1 inch thick pleated media disposable type.

3.08 DAMPERS

A. All dampers automatically controlled by damper motors are specified under "Temperature Control System" except those specified with items of equipment.

B. Provide opposed blade manual air dampers at each branch duct connection and at locations indicated on the drawings and where necessary to control air flow for balancing system. Provide an opposed blade balancing damper in each zone supply duct. Provide an access panel or Ventlok flush type damper regulator on ceiling or wall for each concealed damper.

C. Install fusible link fire dampers full size of duct at points where shown or required.

D. Provide 18 inch x 12 inch minimum hinged access doors in ductwork and furring for easy access to each fire damper; insulated access doors in insulated ducts. Label access doors with 1/2 inch high red letters.

1. Provide Ventlok Series 100, Durodyne, or equal access doors with hardware for convenient access to all automatic dampers and other components of the system, insulated type in insulated ducts. Provide Ventlok #202 for light duty up to 2 inch thick doors, #260 heavy-duty up to 2 inch thick doors and #310 heavy-duty for greater than 2 inch thick doors. Provide #260 hinges on all hinged and personnel access doors; include gasketing.

3.09 INSTALLATION OF DUCTWORK

A. Assemble and install ductwork in accordance with recognized industry practices which will achieve air tight and noiseless (no objectionable noise) systems capable of performing each indicated service. Install each run with minimum of joints. Align ductwork accurately at connections within 1/8 inch misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers, and anchors of type which will hold ducts true to shape and to prevent buckling. Where possible, install ductwork to clear construction by 1/4 inch minimum, except at air inlets and outlets. Where ductwork will not clear construction, secure duct firmly to eliminate noise in the system.

B. Duct Joints: Install duct sealers, pop rivets or sheet metal screws at each fitting and joint. Duct sealer shall be fire retardant. Sheet metal screw for joints shall be minimum #10 size galvanized.

C. Applicable Leakage Classes:

Pressure Class	Leakage Class	
	Round Duct	Rectangular Duct
2"W.G. or less	12	12
4"W.G. or greater	3	6

D. Upper connection of support to wood structure shall be with wood screws or lag screws in shear fastened in the upper one half of the wood structural member. Fasteners shall conform to the following schedule:

For ducts with P/2=30"	#10 x 1-1/2" wood screw
For ducts with P/2=72"	1/4"x 1-1/2" lag screw
For ducts with P/2 over 73"	3/8"x 1-1/2" lag screw

E. Upper connection in tension to wood shall not be used unless absolutely necessary. Where deemed necessary the contractor shall submit calculations to show the size fastener and penetration required to support loads in tension from wood in accordance with the following schedule:

For ducts with P/2=30"	260 pounds per hanger
For ducts with P/2=72"	320 pounds per hanger
For ducts with P/2=96"	460 pounds per hanger
For duct with P/2 larger than 120"	NOT ALLOWED

F. Install concrete inserts for support of ductwork in coordination with formwork as required to avoid delays in work.

G. Where ducts pass through interior partitions and exterior walls, conceal space between construction opening and duct or duct plus insulation with sheet metal flanges of same gauge as duct. Overlap opening on four sides by at least 1-1/2 inches.

H. Support ductwork in manner complying with SMACNA "HVAC Duct Construction Standards," hangers and supports sections. Where special hanging of ductwork is detailed or shown on Drawings, Drawings shall be followed. Angles shall be attached to overhead construction in a manner so as to allow a minimum of 2 inches of movement in all directions with no bending or sagging of the angle.

1. Except where modified in individual paragraphs of this Section, provide hanger support with minimum 18 gauge straps, 1 inch wide. Fold duct strap over at bottom of duct.

2. Install duct supports to rectangular ducts with sheet metal screws. Provide one screw at top of duct and one screw into strap at bottom of duct.

I. Installation of Flexible Ductwork:

1. Provide flexible ducts with supports at 30 inch centers with 2 inch wide, 26 gauge steel hanger collar attached to the structure with an approved duct hanger. Installation shall minimize sharp radius turns or offsets.

a. Supports shall be in accordance with SMACNA HVAC Duct Construction Standards (Metal and Flexible).

b. Make bends to maintain R/W-1.5.

2. Make connections to rigid duct and units with Panduit style draw band at inner liner material, and a second draw band over the outer vapor barrier material.

3. Make connection to duct with spin-in fittings, with air scoop and balance damper.

J. Installation of Shower Exhaust Ducts:

1. Slope duct a minimum of 1 percent to drain back to the exhaust grille.

K. Paint inside of ducts, visible through grille, dull black.

L. Where ductwork is installed in finished areas of buildings that do not have ceilings, paint ductwork, support hangers, and air inlets and outlets to match adjacent architectural surfaces, or as directed by Architect.

3.10 INSTALLATION OF PUMPS

A. Install pumps as shown on Drawings.

B. Install pumps to provide access for periodic maintenance including removing motors, impellers, couplings, and accessories. Manufacturer recommended clearances shall be maintained.

C. Independently support pumps and piping so that weight of piping is not supported by pumps and weight of pumps is not supported by piping.

3.11 DUCTWORK SEALING AND LEAK TESTING

A. New Construction: All duct systems (supply, return, outside air intake, and exhaust), except those exposed in the conditioned space, shall be sealed and leak tested to a leakage rate not to exceed 6 % of the fan flow of the system. The leakage rate shall be confirmed through field verification and diagnostic testing in accordance with the procedures set forth in the 2013 California Building Energy Efficiency Standards Reference

Appendices. Contractor shall also complete the Acceptance Requirements in the standards for duct sealing/leak testing. Refer to Section 23 00 50 for additional information on Acceptance Requirements.

3.12 EQUIPMENT START-UP

A. Initial start-up of the systems and pumps shall be under the direct supervision of the Contractor.

B. Equipment start-up shall not be performed until the piping systems have been flushed and treated and the initial water flow balance has been completed.

C. It shall be the responsibility of the Contractor to assemble and supervise a start-up team consisting of controls contractor, start-up technician, and test and balance contractor; all to work in concert to assure that the systems are started, balanced, and operate in accordance with the design.

D. After start-up is complete, instruct the Owner's personnel in the operation and maintenance of the systems. Obtain from the Owner's representative a signed memo certifying that instruction has been received.

3.13 TESTING AND BALANCING

A. For testing and balancing requirements, refer to Section 23 05 93, Testing and Balancing for HVAC.

3.14 CLEANING AND PROTECTION

A. As each duct section is installed, clean interior of ductwork of dust and debris. Clean external surfaces of foreign substances that might cause corrosive deterioration of metal or where ductwork is to be painted.

B. Strip protective paper from stainless steel ductwork surfaces, and repair finish wherever it has been damaged.

C. Temporary Closure: At ends of ducts that are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering that will prevent entrance of dust and debris until connections are to be completed.

D. As each internally lined duct section is installed, check internal lining for small cuts, tears, or abrasions. Repair all damage with fire retardant adhesive.

3.15 ACCEPTANCE REQUIREMENTS

A. In addition to the testing and balancing requirements specified in Section 23 05 93, the Contractor shall also be responsible to complete the Acceptance Requirements of the 2013 California Building Energy Efficiency Standards. Refer to Section 23 00 50 for additional information on Acceptance Requirements.

3.16 EQUIPMENT MOUNTING

A. Mount and anchor equipment in strict compliance with Drawings details. Alternate anchorage methods will not be considered for roof mounted equipment.

3.17 GROOVED-END FITTINGS AND COUPLINGS SCHEDULE

A. Optional grooved-end fittings and couplings may be utilized only as follows:

1. Heating Hot Water Piping:
    a. In Mechanical Rooms only, where accessible for service or replacement.
2. Chilled Water Piping and Condenser Water Piping:
    a. In Mechanical Rooms, where accessible for service or replacement.
    b. Above lay-in type suspended ceilings, where accessible by ladder.
    c. Outside building above grade.
3. Grooved-end fittings and couplings shall not be installed in vertical building shafts.

END OF SECTION

SECTION 26 43 13

SURGE PROTECTIVE DEVICES (SPD)

PART 1 - GENERAL

1.01 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Surge protective devices (SPD).

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1.02 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified.

1. American National Standards Institute, Inc. (ANSI)/Institute of Electrical and Electronics Engineers (IEEE):

ANSI/IEEE C62.1;	Standard for Surge Arresters for Alternating Current Power Circuits.
ANSI/IEEE C62.11;	Standard for Metal-Oxide Surge Arrestors for AC Power Circuits.
ANSI/IEEE C62.41.1;	Guide on the Surges Environment in Low-Voltage (1000V and Less) AC Power Circuits.
ANSI/IEEE C62.41.2;	Recommended Practices on Characterization of Surges in Low-Voltage (1000V and Less) AC Power Circuits.
ANSI/IEEE C62.45;	Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000V and Less) AC Power Circuits.

2. Underwriters Laboratory, Inc. (UL):

UL 50;	Cabinets and Boxes.
UL 1283	Electromagnetic Interference Filters.
UL 1449;	Surge Protective Devices, 3rd Edition.

3. National Electrical Manufacturers Association (NEMA):

NEMA LS1;	Low Voltage Surge Protective Devices.
NEMA PB1.1;	Instructions for Safety Instruction Operation and Maintenance of Panelboards Rated 600 Volts or less.

1.03 SYSTEM DESCRIPTION

A. Provide surge protective device (SPD) equipment having the electrical characteristics, ratings, and modifications as specified herein and as shown on the drawings. To maximize performance and reliability and to obtain the lowest possible let-through voltages, the ac surge protection shall be integrated into electrical distribution equipment such as switchboards and panelboards.

B. SPD units and all components shall be designed, manufactured, and tested in accordance with the latest applicable UL standard (ANSI/UL 1449 3rd Edition).

C. SPD units shall be furnished in two Types. Type 1 and Type 2 as outlined below:

1. Type 1: Permanently connected SPDs installed on the line or load side of main disconnect device(s), at main switchboard. This type closely relates to the devices previously referred to as secondary surge arrestors. These Type 1 SPDs should be specially suited to conduct the high energy impulses from lightning strikes.

2. Type 2: Permanently connected SPD installed on the load side of the service panel main disconnect device(s). This type most closely relates to devices that were previously classified as Transient Voltage Surge Suppression (TVSS). These Type 2 SPDs are specially suited for distribution boards and panelboard applications.

1.04 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
2. Describe system operation, equipment and dimensions and indicate features of each component.
3. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
4. Shop Drawings: Include elevations, cabinet dimensions, complete component listing and layout within cabinet, amperage ratings and capacities, system characteristics and wiring diagrams.
5. Submit Manufacturer's installation instructions.
6. Complete bill of material listing all components.
7. Warranty.

1.05 OPERATION AND MAINTENANCE MANUAL

A. Supply operation and maintenance manuals in accordance with the requirements of Section 260010: Basic Electrical Requirements, to include the following.

1. A detailed explanation of the operation of the system.
2. Instruments for routine maintenance.
3. Pictorial parts list and parts number.
4. Telephone numbers for authorized parts and service distributors.

1.06 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: SPD components shall not be delivered to the Project site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Equipment damaged during shipment shall be replaced and returned to Manufacturer at no cost to Owner.

B. Storage: Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris and traffic. Provide heat where required to prevent condensation.

C. Handling: Handle in accordance with the Manufacturer's written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to Manufacturer.

1.08 WARRANTY

A. Units and components offered under this Section shall be covered by a 5 year parts and labor warranty for malfunctions resulting from defects in materials and workmanship. Warranty shall begin upon acceptance by the Owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Current Technology.
2. Square D Surgelogic/EFI.
3. Clipper Power System (Cutler-Hammer).
4. Liebert.
5. General Electric.

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.02 GENERAL

A. All Specification noted herein apply to the switchboard and panelboard units, unless otherwise noted.

B. The SPD system utilizes diversion modules to suppress and divert transient voltage and surge currents. The system is designed to provide protection for sensitive electronic devices against the effects of surges, transients and electrical line noise.

C. Environmental requirements:

1. Operating temperature: -40c to 60c.
2. Relative humidity: 0 - 95%.
3. Operating altitude: 0 - 12,000 feet.
4. Audible noise: Less than 35 dB.

D. Electrical requirements:

1. Unit operating voltage: The SPD system voltage shall be as indicated on the Drawings.
2. Maximum continuous operating voltage (MCOV): The MVOC shall not be less than 125% of the nominal system operating voltage.
3. The suppression system shall incorporate thermally protected metal-oxide varistors (MOVs) as the core surge suppression component for the service entrance and all other distribution levels. The system shall not utilize silicon avalanche diodes, selenium cells, air gaps, or other components that may crowbar the system voltage leading to system upset or create any environmental hazards.
4. Protection modes: The SPD must protect all modes of the electrical system being utilized. The required protection modes are indicated by bullets in the following table:

PROTECTION MODES TABLE				
Configuration	L-N	L-G	L-L	N-G
WYE	•	•	•	•
Delta	N/A	•	•	N/A
Single Split Phase	•	•	•	•
High Leg Delta	•	•	•	•

5. Nominal discharge current (I_n): All SPDs applied to the distribution system shall have a 20kA I_n rating regardless of their SPD Type (includes Types 1 and 2) or operating voltage. SPDs having an I_n less than 20kA shall be rejected.
6. Voltage protection rating (VPR): The maximum ANSI/UL 1449 3rd Edition VPR for the device shall not exceed the following:

VOLTAGE PROTECTION RATING TABLE				
System Voltage	L-N	L-G	L-L	N-G
120/208	700V	700V	1200V	700V

VOLTAGE PROTECTION RATING TABLE				
System Voltage	L-N	L-G	L-L	N-G
277/480	1200V	1200V	2000V	1200V
346/600	1500V	1500V	3000V	1500V

E. SPD design:

1. The SPD shall be maintenance free and shall not require any user intervention throughout its life. SPDs containing items such as replaceable modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.
2. The surge current shall be equally distributed to all MOV components to ensure equal stressing and maximum performance. The surge suppression platform must provide equal impedance paths to each matched MOV.
3. Each unit shall include a high-performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be up to 50dB from 10kHz to 100MHz using the MIL-STD-220A insertion loss test method.
4. No plug-in component modules or printed circuit boards shall be used as surge current conductors. All internal components shall be soldered, hardwired with connections utilizing low impedance conductors.
5. SPD shall provide the following integral monitoring options:
   a. Each unit shall have a green/red solid-state indicator light that reports the status of the protection on each phase:
      1) For WYE configured units, the indicator lights must report the status of all protection elements and circuitry in the L-N and L-G modes. WYE configured units shall also contain an additional green/red solid-state indicator light that reports the status of the protection elements and circuitry in the N-G mode.
      2) For delta configured units, the indicator lights must report the status of all protection elements and circuitry in the L-G and L-L modes.
      3) The absence of a green light and the presence of a red light shall indicate that damage has occurred on the respective phase or mode. All protection status indicators shall indicate the actual status of the protection on each phase or mode. If power is removed from any one phase, the indicator lights shall continue to indicate the status of the protection on all other phases and protection modes.
   b. The SPD must include Form C dry contacts (one NO and one NC) for remote annunciation of its status. Both the NO and NC contacts shall change state under any fault condition.
   c. The SPD shall contain an audible alarm that will be activated under any fault condition. There shall also be an audible alarm silence button used to silence the audible alarm after it has been activated.
   d. Surge counter:
      1) The SPD shall be equipped with an LCD display that indicates to the user how many surges have occurred at the location.
      2) The surge counter shall trigger each time a surge event with a peak current magnitude of a minimum of 50 ± 20A occurs.
      3) A reset pushbutton shall also be standard, allowing the surge counter to be zeroed. The reset button shall contain a mechanism to prevent accidental resetting of the counter via a single, short-duration button press. In order to prevent accidental resetting, the surge counter reset button shall be depressed for a minimum of 2 seconds in order to clear the surge count total.
      4) The ongoing surge count shall be stored in non-volatile memory. If power to the SPD is completely interrupted, the ongoing count indicated on the surge counter's display prior to the interruption shall

be stored in non-volatile memory and displayed after power is restored. The surge counter's memory shall not require a backup battery in order to achieve this functionality.

6. The unit shall contain thermally protected MOVs. These thermally protected MOVs shall have a thermal protection element packaged together with the MOV in order to achieve overcurrent protection of the MOV. The thermal protection element shall disconnect the MOV(s) from the system in a fail-safe manner should a condition occur that would cause them to enter a thermal runaway condition.

7. All of the SPD's components and diagnostics shall be contained within one discrete assembly. SPDs or individual SPD modules that must be ganged together in order to achieve higher surge current ratings or other functionality shall not be accepted.

8. Safety requirements:

   a. The SPD shall minimize potential arc flash hazards by containing no user serviceable or replaceable parts and shall be maintenance free. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.

   b. SPDs designed to interface with the electrical assembly via conductors shall require no user contact with the inside of the unit. Such units shall have any required conductors be factory installed.

2.03 SYSTEM APPLICATION

A. The SPD applications covered under this section include switchboards panelboard assemblies. All SPDs shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category C, B, and A environments.

B. The minimum surge current capacity the device is capable of withstanding shall be as shown in the following table:

MINIMUM SURGE CURRENT CAPACITY TABLE			
Category	Application	Per Phase	Per Mode
C	Service Entrance Locations (Switchboards)	250kA	125kA
B	High Exposure Roof Top Locations (Switchboards and Panelboards)	160kA	80kA
A	Branch Locations (Panelboards)	120kA	60kA

C. All SPDs installed on the line side of the service entrance disconnect shall be Type 1 SPDs. All SPDs installed on the load side of the service entrance disconnect shall be Type 1 or Type 2 SPDs.

2.04 PANELBOARDS

A. The SPD application covered under this section includes lighting and outlet panelboards. The SPD units shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category A or B environments.

B. The SPD shall not limit the use of through-feed lugs, sub-feed lugs, and sub-feed breaker options.

C. SPDs shall be installed immediately following the load side of the main breaker. SPDs installed in main lug only panelboards shall be installed immediately following the incoming main lugs.

D. The panelboard shall be capable of re-energizing upon removal of the SPD.

E. The SPD shall be interfaced to the panelboard via a direct bus bar connection. Alternately, an SPD connected to a 30A circuit breaker for disconnecting purposes may be installed using short lengths of conductors as long as the conductors originate integrally to the SPD. The SPD shall be located directly adjacent to the 30A circuit breaker.

F. The SPD shall be included and mounted within the panelboard by the manufacturer of the panelboard.

G. The SPD shall be of the same manufacturer as the panelboard.

H. The complete panelboard including the SPD shall be UL67 listed.

2.05 SWITCHBOARDS

A. The SPD application covered under this section is for switchboard locations. Service entrance located SPDs shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category C environments.

B. The SPD shall be of the same manufacturer as the switchboard.

C. The SPD shall be factory installed inside the switchboard at the assembly point by the original equipment manufacturer.

D. Locate the SPD on the load side of the main disconnect device, as close as possible to the phase conductors and the ground/neutral bar.

E. The SPD shall be connected through a disconnect (30A circuit breaker). The disconnect shall be located in immediate proximity to the SPD. Connection shall be made via bus, conductors, or other connections originating in the SPD and shall be kept as short as possible.

F. The SPD shall be integral to switchboard as a factory standardized design.

G. All monitoring and diagnostic features shall be visible from the front of the equipment.

2.06 ENCLOSURES

A. All enclosed equipment shall have NEMA 1 general purpose enclosures, unless otherwise noted. Provide enclosures suitable for locations as indicated on the drawings and as described below:

1. NEMA 1: Constructed of a polymer (units integrated within electrical assemblies), intended for indoor use to provide a degree of protection to personal access to hazardous parts and provide a degree of protection against the ingress of solid foreign objects (falling dirt).

2. NEMA 4: Constructed of steel, intended for either indoor or outdoor use, to provide a degree of protection from the following:

a. Against access to hazardous parts.

b. Of equipment inside the enclosure against ingress of solid foreign objects (dirt and windblown dust).

c. With respect to the harmful effects on the equipment due to the ingress of water (rain, sleet, snow, splashing water, and hose directed water).

2.07 SOURCE QUALITY CONTROL

A. Standard factory tests shall be performed on the equipment under this section. All tests shall be in accordance with the latest version of NEMA and UL standards.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of SPD installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.02 INSTALLATION

A. Install SPD in accordance with Manufacturer's written instructions, as indicated on the Drawings and as specified herein.

B. Set cabinets plumb and symmetrical with building lines in conformance with PB1.2. Furnish and install all construction channel bolts, angles, etc., required to mount the equipment furnished under this Section.

C. Unless otherwise indicated on the Power Single Line Diagram, provide SPDs on all service entrance switchboards, 120/208 volt distribution switchboards and 120/208 volt panelboards.

D. Conductors from the power source to the SPD shall be minimum #4 AWG copper in switchboards and #8 AWG copper in panelboards (when not direct bus connected). Conductors shall be routed without sharp bends and straight and short as possible. The absolute maximum of 7'-0" long for units in switchboards and 1'-0" long for units in panelboards.

E. Conductors originating from direct bus bar connections shall be individually wrapped with electric tape in half-lapped increments for added protection of the un-protected conductors. Tie-wrap the conductors away from the bus bars without any sharp bends. All holes that the conductors pass through shall be grommets.

F. Cabinets shall be anchored and braced to withstand seismic forces as calculated per Section 260010: Basic Electrical Requirements.

3.03 FIELD QUALITY CONTROL

A. Prefunctional testing:

1. Visual and mechanical inspection:

a. Inspect for physical damage, defects, alignment and fit.

b. Compare nameplate information and connections to Contract Documents.

c. Check tightness of all control and power connections.

END OF SECTION

SECTION 26 56 00

EXTERIOR LIGHTING

PART 1 - GENERAL

1.01 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Site lighting fixtures.
2. Lamps and diodes.
3. Ballasts and LED drivers.
4. Pole standards.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1. Division 03: Cast-in-place concrete. Light pole foundations and backboxes.
2. Division 05: Miscellaneous. Fittings, brackets, backing supports, rods, etc. as required for support and bracing of lighting fixtures.

1.02 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:

1. Underwriters Laboratories, Inc. (UL):

UL 66;	Fixture Wire.
UL 844;	Electric Lighting Fixtures for Use in Hazardous Locations.
UL 924;	Emergency Lighting and Power Equipment.
UL 1598;	Luminaires.
UL 2108;	Low Voltage Lighting Systems.

2. Illumination Engineering Society of North America (IESNA):

IESNA LM-79-2008;	Approved Method for Electrical and Photometric Measurements of Solid-State Lighting Products.
IESNA LM-80-2008;	Approved Method for Measuring Lumen Maintenance of LED Light Sources.

3. Restriction of Hazardous Substances in LED (RoHS):

EU RoHS;	Directive 2002/95/EC Restriction of Hazardous Materials.

1.03 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
3. Independent Testing Laboratories, Inc. or equal, photometric test report for each luminaire type and lamp combination listed on the fixture schedule. Test reports shall be based on Illuminating Engineering Society published test procedures and shall contain candlepower distribution curves in five lateral planes for fixtures with asymmetric distributions and fixture luminance data for vertical angles above 45 degrees from nadir.
4. Shop Drawings:

a. Where noted in the Fixture Schedule, submit Shop Drawings of special mounting details, including fixture support, attachment methods, etc. Shop Drawings shall include plan and section views indicating all structural members being used for support.

b. Where noted in the Fixture Schedule, submit Shop Drawings from Manufacturer detailing custom lighting fixtures indicating dimensions, weights, methods of field assembly, components, features, accessories, methods of support, etc.

5. Samples of fixture finish where "FINISH AS SELECTED BY THE ARCHITECT" is indicated on the Fixture Schedule. The Engineer or Architect must approve samples in writing prior to ordering. With each submitted sample provide the paint formula used to achieve the color finish.

6. Submit Manufacturer's installation instructions.

7. Complete bill of material listing all lighting fixtures and components.

8. Warranty.

1.04 OPERATION AND MAINTENANCE MANUAL

A. Supply operation and maintenance manuals in accordance with the requirements of Section 260010: Basic Electrical Requirements, to include the following:

1. A detailed explanation of the operation of the system.

2. Instructions for routine maintenance.

3. Pictorial parts list and part numbers.

4. Telephone numbers for the authorized parts and service distributors.

1.05 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: Lighting fixtures shall not be delivered to the Project site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Equipment damaged during shipment shall be replaced and returned to Manufacturer at no cost to Owner.

B. Storage: Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris and traffic. Provide heat where required to prevent condensation.

C. Handling: Handle in accordance with Manufacturer's written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to Manufacturer.

1.07 WARRANTY

A. Units and components offered under this Section shall be covered by a ***1*** year parts and labor warranty for malfunctions resulting from defects in materials and workmanship. Warranty shall begin upon acceptance by the Owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Lighting fixtures: Refer to Fixture Schedule.

2. LEDs & LED drivers: As provided by the light fixture manufacturer, and meeting the requirements herein.

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.02 FIXTURES

A. Refer to the fixture schedule on the plans.

B. All fixtures shall have LED light source.

C. Maximum color temperature shall be 3000 K for exterior lighting.

D. Standard lumen output shall meet or exceed the State of California Title 24 Energy Code for high efficiency luminaries.

E. Luminaires shall not draw power in the off state. Luminaires with integral occupancy, motion, photo-controls, or individually addressable luminaires with external control and intelligence are exempt from this requirement. The power draw for such luminaires shall not exceed 0.5 watts when in the off state.

F. Luminaire manufacturers shall adhere to device manufacturer guidelines, certification programs, and test procedures for thermal management.

G. Luminaires shall be fully accessible from below ceiling plane for changing drivers, power supplies and arrays

H. The finish of all fixtures and trim shall be submitted to and approved by the Architect prior to ordering.

I. All standard fixtures must bear UL label. Attaching of labels after delivery of fixtures is not acceptable.

J. All labels affixed to the fixture shall be in a location not visible from normal viewing angles.

K. Ferrous mounting hardware and accessories shall be finished using either a galvanic or phosphate primer/baked enamel process to prevent corrosion and discoloration of adjacent materials.

L. Fasteners shall be manufactured of galvanized steel.

M. Fixtures shall be free of light leaks and shall be designed to provide sufficient ventilation of LED arrays.

N. All sheet metal Work shall be free from tool marks and dents and shall have accurate angles bent as sharp as compatible with the gauges of the required metal. All intersections and joints shall be formed true and of adequate strength and structural rigidity to prevent any distortion after assembly. All surfaces shall be finished so as to eliminate all exposed sharp edges. All mitered corners or joints shall be accurately aligned with abutting intersecting members. Sheet metal Work shall be properly fabricated so that planes will not deform (i.e. become concave or convex) due to normal expected ambient and operating conditions.

O. Wiring channels and LED array mountings shall be rigid and accurately constructed.

P. Architectural Coordination

1. Consult Architectural Drawings for details of ceiling construction, finish, reflected ceiling plans and other applicable details and provide lighting fixtures suitable for the particular type of ceiling at each location.

2. Recessed fixtures installed in direct contact with insulation shall carry an IC rating.

3. Where fixtures are mounted in architectural coves, soffits, valances or cabinets and are given an overall length, the Contractor shall verify all lengths in the field prior to releasing fixture order.

4. Where fixtures are surface mounted or suspended to match the length of walls or other architectural elements, the Contractor shall verify all lengths in the field prior to releasing fixture order.

2.03 LIGHT EMITTING DIODES (LED):

A. Refer to the Fixture Schedule for size and type of LED lamps required.

B. All diodes shall come from the same manufacturer and carry the same bin number.

C. All diodes shall be tested and tuned for the optimal Kelvin color point.

D. Color correlated temperature: Refer to Fixture Schedule

E. Minimum CRI (Color Rendering Index): 80

F. Diodes shall have a minimum life of 50,000 hours and maintain at least 70% of initial lumens throughout this period.

G. LED fixture components shall be free of all toxic materials to include lead, cadmium and mercury, and shall be RoHS compliant.

H. Groups of three or more diodes in a single housing shall be tested for even distribution.

I. All LED fixtures shall have an IES formatted electronic photometric report.

J. Comply with IES LM-79-08 Approved Method for measuring lumen maintenance of LED light sources.

K. Comply with IES LM-80-08 Approved Method for electrical and photometric measurement of SSL product.

L. LED arrays shall be sealed, high performance, long life type; minimum 70% rated output at 50,000 hours.

M. LEDs shall be "Bin No. 1" quality.

N. The LED light source shall be fully dimmable with use of compatible dimmers switch designated for low voltage loads.

2.04 LED DRIVERS:

A. LED drivers shall be integral to fixture housing or remotely located, when specified, within 15 feet of diode assembly.

B. Drivers shall have a minimum life of 50,000 hours and maintain at least 70% of initial lumens for that period.

C. Typical LED drivers shall be electronic, 0-10V dimming.

D. Drivers shall be solid state and accept 120 through 277 VAC at 60 Hz input.

E. Power Factor: 0.90 or higher.

F. Maximum driver case temperature not to exceed driver manufacturer recommended operational parameters.

G. Output operating frequency: 60Hz.

H. Interference: EMI and RFI compliant with FCC 47 CFR Part 15.

I. Total Harmonic Distortion Rating: 20% Maximum.

J. Meet electrical and thermal conditions as described in LM-80 Section 5.0. 7.

2.05 POLES

A. Wind-load strength: 80 mph and 1.3 gust factor for total support assembly, including pole, base and anchorage, where used, to carry the fixtures, supports and appurtenances at the indicated heights above grade without deflection or whipping.

B. Arm, bracket and tenon mount materials: Match the poles.

C. Mountings, fastenings and appurtenances: Corrosion-resistant components compatible with the poles and fixtures that will not cause galvanic action at contact points. Provide mountings that will correctly position the luminaire to provide the indicated light distribution.

D. Pole shafts: Square straight.

E. Handhole: Provide handhole and cover near base of pole shaft for access to wiring compartment.

F. Fuse protection: Each pole mounted light fixture shall be in-line fuse protected. The fuse protector shall be Cooper/Bussmann in-line type HEB-A or equal, with an approved manufactured rubber cover 'boot' to be inserted over the crimped area of the fuse holder. The fuse holder shall be accessible through the handhole. Where pole mounted fixtures are provided by the manufacturer with internal fuse holding device, these fuses shall be bypassed. Refer to Section 262816 for additional requirements.

G. Grounding lug: Provide grounding lug for grounding conductor with access through handhole.

H. Pole bases: Anchor type with galvanized steel hold-down or anchor bolts, leveling nuts and bolt covers.

I. Steel poles: Steel tubing conforming to ASTM A 500, Grade B, carbon steel with a minimum yield of 46,000 psi. Poles are 1-piece construction up to 40 feet in length and have access handhole in wall.

J. Pole-top tenons: Fabricated to support the fixture indicated and securely fastened to the pole top.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of site lighting fixture installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.02 PREPARATION

A. Consult Architectural or Landscape Drawings for details of ceiling and wall construction, finish, landscape features and other applicable details and provide backboxes and trims suitable for the particular type of ceiling or wall at each location.

3.03 INSTALLATION

A. Install lighting fixtures in accordance with Manufacturer's written instructions, as indicated on the Drawings and as specified herein.

B. Contractor shall be responsible for all supports, hangers and hardware necessary for a complete installation.

C. Fixtures shall be plumb, level, square, in straight lines and without distortion. Remedy light leaks that may develop after installation of recessed or enclosed fixtures.

D. Turn over Project with all lamps in new and operating condition. Lamps that are burned less than 100 hours at Project closeout are considered new.

3.04 FIXTURE SUPPORTS

A. Support outlet boxes as specified in Section 260533: Boxes. Provide all boxes with grounding pigtail.

3.05 IDENTIFICATION SYSTEM

A. All junction box coverplates for the lighting branch circuit system shall be clearly marked with permanent black ink felt pen identifying the branch circuit (both panel designation and circuit number) contained in the box.

3.06 INSTALLATION OF POLES

A. General: Store poles on decay-resistant treated skids at least 1 ft. above grade and vegetation. Support pole to prevent distortion and arrange to provide free air circulation.

B. Metal poles: Retain factory-applied pole wrappings until just before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.

C. Pole installation: Use fabric web slings (not chain or cable) to raise and set poles.

3.07 CONCRETE FOUNDATIONS

A. Construct concrete foundations with 3000 pound, 28 day concrete conforming to Division 03, Section "Cast-In-Place Concrete." Comply with details and Manufacturer's recommendations for reinforcing, anchor bolts, nuts and washers.

3.08 FIELD QUALITY CONTROL

A. Refer to Specification Section 260800: Electrical Commissioning.

B. Visual and mechanical inspection:

1. Inspect for physical damage, defects, alignment and fit.

2. Perform operational test of each lighting fixture after installed, circuited and energized.

3. Perform emergency operational test of all lighting fixtures connected to emergency circuiting by interrupting normal power source.

C. Contractor shall replace at no cost to the Owner all equipment which is found defective or do not operate within factory specified tolerances.

D. Field mock-up: Where noted in the Fixture Schedule, the Contractor shall provide sample(s) for use in full-size field mockup of specific individual fixtures. The Contractor shall allow time in the bid and be responsible prior to installation of the light fixtures, for installing a sample fixture on the Project for review. This mock-up will be required to be coordinated and reviewed with the Owner's Representative and the Architect or Engineer. The Contractor shall be responsible for providing the labor and materials for the field mock-up including, but not limited to, special rigging or scaffolding and adjusting fixtures in field, as directed by the Architect or Engineer.

3.09 ADJUSTING

A. Field aiming: Where noted in the Fixture Schedule, the Contractor shall allow time in the bid and be responsible upon the installation of the light fixtures, for aiming and lamping fixtures as described in the fixture schedule. This aiming will be performed at night under the direction of the Owner's Representative and the Architect or Engineer. The Contractor shall be responsible for providing the labor and materials for field aiming. This will include, but not limited to, special rigging or scaffolding, adjusting fixtures in field, testing of various lamps with each fixture and/or testing of various lenses or louvers with fixtures, as directed by the Architect or Engineer.

3.10 CLEANING

A. Clean lighting fixtures prior to Project closeout in accordance with Manufacturer's recommended materials and methods.

END OF SECTION

SECTION 27 13 23

COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING

PART 1 GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Backbone fiber optic cabling.

2. Fiber Optic Cable testing.

1.2 RELATED SECTIONS

A. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

SECTION NO.	SECTION TITLE
260010	BASIC ELECTRICAL REQUIREMENTS
270010	BASIC COMMUNICATIONS REQUIREMENTS

1.3 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:

1. Federal Communications Commission (FCC) Regulations:

FCC Part 15; Radio Frequency Devices & Radiation Limits.

FCC Part 68; Connection of Terminal Equipment to the Telephone Network.

2. Electronics Industries Alliance (EIA):

EIA; Testing Standards.

3. American National Standards Institute, Inc. (ANSI) / Telecommunications Industry Association (TIA) / Electronics Industries Alliance (EIA):

ANSI/TIA/EIA-568-C; Commercial Building Telecommunications Cabling Standards, including the following:

• Part 3: Optical Fiber Cabling Components Standard.

ANSI/TIA/EIA-598-C; Optical Fiber Cable Color Coding.

ANSI/TIA/EIA-606-A; Administration Standard for Commercial Telecommunications Infrastructure.

ANSI/TIA/EIA-758; Customer-Owner Outside Plant Telecommunications Cabling Standard (TIA/EIA-758-1: Addendum No. 1).

4. Building Industry Consulting Service International, Inc. (BICSI):

BICSI (TDMM);	Telecommunication Distribution Methods Manual.
BICSI;	Customer-Owner Outside Plant Design Manual.
ICEA S-83-596-1994;	Fiber Optic Premises Distribution Cable.
ICEA S-87-640-1999;	Fiber Optic Outside Plant Communications Cable.
ICEA S-104-696-2001;	Standard for Indoor-Outdoor Optical Cable.

5. Underwriters Laboratories, Inc. (UL):

UL 1651;	Optical Fiber Cable.
UL 2024A;	Optical Fiber Cable Routing Assemblies.

1.4 DEFINITIONS

A. Above finish floor (AFF) - Standard mounting height (e.g., 18 inch AFF) for a device using the center line of the device as the measurement point.

B. Administration - The methodology defining the documentation requirements of a cabling system and its containment, the labeling of functional elements and the process by which moves, additions, and changes are recorded.

C. ANSI/TIA/EIA - Associations involved in developing telecommunications industry standards.

D. Attenuation - The decrease in magnitude of transmission signal strength between points, expressed in dB as the ratio of output to input signal level.

E. Attenuation-to-crosstalk ratio (ACR) - The ratio obtained by subtracting insertion loss (attenuation [dB]) from near-end crosstalk (dB). ACR is normally stated at a give frequency.

F. Auditory assistance device - An intentional radiator used to provide auditory assistance to a handicapped person or persons. Such a device may be used for auricular training in an educational institution, for auditory assistance at places of public gatherings, such as a church, theater, or auditorium, and for auditory assistance to handicapped individuals, only, in other locations.

G. Backboard - Backboard generally refers to the 3/4" A-C grade plywood sheeting, lining the walls of the telecommunications room. Plywood shall be void-free, with two coats of fire retardant paint matching the painted interior walls covering both sides.

H. Backbone - A facility (e.g., pathway, cable, or conductors) between any of the following spaces: telecommunications rooms, common telecommunications rooms, floor-serving terminals, entrance facilities, equipment rooms, and common equipment rooms.

I. Basic link test configuration - Horizontal cable of up to 90m (295 ft) plus up to 2m (6.5 ft) of test equipment cord from the main unit of the tester to the local connection, and up to 2m (6.5 ft) of test equipment cord from the remote connection to the remote unit of the tester. Maximum length is 94 m (308 ft).

J. Bonding Conductor (BC) - A conductor used specifically for the purpose of bonding.

K. Cable Labeling System –

1. The scheme employed when identifying cable or its associated hardware.

2. Scheme adapted for labeling cables to identify them based on ANSI/TIA/ EIA-606-A, Administration Standard for Commercial Telecommunications Infrastructure. See administration.

L. Cable Runway - Hardware designed and manufactured for horizontal pathway distribution of cable and inside wiring inside the MC, IC, or TR rooms.

M. CAT - Category used when identifying the performance characteristics of twisted pair cabling.

N. Ceiling Distribution System - A distribution system that utilizes the space between a suspended or false ceiling and the structural surface above.

O. Closed-Circuit Television (CCTV) - A private television system, typically used for security purposes, in which the signal is transmitted to a limited number of receivers.

P. Communications plenum cable (CMP) - Type CMP communications plenum cable shall be listed as being suitable for use in ducts, plenums, and other spaces used for environmental air and shall also be listed as having adequate fire-resistant and low smoke-producing characteristics. (NEC)Cables must pass required test for fire and smoke characteristics of wires and cables, NFPA 262 or UL 910.

Q. Communications Riser Cable (CMR) - Type CMR communications riser cable shall be listed as being suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor. (NEC) Cables must pass requirements for flame propagation.

R. Electromagnetic Interference (EMI) - Radiated or conducted electromagnetic energy that has an undesirable effect on electronic equipment or signal transmissions.

S. Entrance Conduit - Conduit that connects the campus underground infrastructure with the building's Telecommunications Room.

T. Fire Retardant - Any substance added to delay the start or ignition of fire or slow the spread of the flame of any material.

U. Firestopping - The process of installing [specialty] listed fire-rated materials into penetrations of fire-rated barriers to reestablish the fire-resistance rating of the barrier.

V. Firestopping Location. A penetration through a fire-rated wall with a sleeve.

W. Firestop System - A specific installation consisting of the material(s) (firestop penetration seals) that fill the opening in the wall or floor assembly, and around and between any items that penetrate the wall or floor (e.g., cables, cable trays, conduit, ducts, pipes), and any termination devices (e.g., electrical outlet boxes) along with their means of support.

X. Grounding Conductor - A conductor used to connect the grounding electrode to the buildings main grounding busbar.

Y. Grounding System - A system of hardware and wiring that provides an electrical path from a specified location to an earth ground point.

Z. Horizontal Cabling - The part of the cabling system that extends from the work area telecommunications outlet to the horizontal cross-connect in the telecommunications room.

AA. Hybrid Cable - An assembly of two or more cables, of the same or different types or categories, covered by one overall sheath.

BB. Infrastructure (Telecommunications) - A collection of those telecommunications components, excluding equipment, that together provide the basic support for the distribution of all information within a building or campus.

CC. Intermediate Cross-connect (IC) - the connection point between a backbone cable that extends from the main cross-connect and the backbone cable from the horizontal cross-connect.

DD. Loose Tube - A type of optical fiber cable construction where one or more fibers are laid loosely in a tube. Also called loose tube fiber.

EE. Main Cross-connect (MC) - The cross-connect normally located in the Telecommunications Equipment Room for cross-connection and interconnection of entrance cables, first-level backbone cables, and equipment cables.

FF. Metropolitan Area Network (MAN) - A data communications network that covers an area larger than a campus area and smaller than a wide area network. Typically interconnects two or more LANs and usually covers an entire metropolitan area.

GG. MPOE - Minimum Point of Entry, Utility Partnerships/Alternate Carrier, usually located within the Telecommunications Room.

HH. Multimode Fiber (MMF) - An optical fiber that carries many paths of light or an optical waveguide that allows many bound modes to propagate.

II. Single-mode Fiber (SMF) - An optical fiber, usually step-index grade, which supports only one mode of light propagation. This does not necessarily imply single wavelength operation. The light source is normally a laser.

JJ. Strand (STR) - A single unit of optical fiber within a cable (e.g., a 12-strand fiber cable has 12 individual optical fibers within the cable sheath).

KK. Telecommunications Entrance Facility - Utility Partnerships/Alternate Carrier Minimum Point of Entry that is usually located within the Main Cross-connect Room (MC).

LL. Telecommunications Equipment Room (TER) - A centralized space that provides space and maintains a suitable operating environment for the termination of backbone and campus cabling and house centralized communications and/ or computer equipment (such as Core Switches and Servers). *Note:* An equipment room is considered distinct from a telecommunications closet because of the nature or complexity of the equipment housed by the equipment room.

MM. Telecommunications Main Grounding Busbar (TMGB) - A grounding busbar, located in the MC, connected to the main building ground electrode by a continuous 2/0 - #4 AWG wire (Wire size is dependant on the distance between the busbar and the building main).

NN. Telecommunications Room (TR) – A room dedicated to housing a group of telecommunications connectors (e.g., patch panel or punch-down block) that allows equipment and backbone cabling to be cross connected with patch cords or jumpers.

OO. Underwriters Laboratories (UL) - A United States-based independent testing laboratory that sets safety tests and standards.

PP. Uninterruptible Power Supply (UPS) - A device that is inserted between a primary power source (e.g., a commercial utility) and the primary power input of equipment to be protected (e.g., a computer system) to eliminate the effects of transient variances or temporary outages. Retain acronyms, abbreviations, and terms that remain after this Section has been edited.

1.5 SYSTEM DESCRIPTION

A. Provide a complete telecommunication fiber optic cabling system installation as specified herein and as shown on the Drawings. In general, system shall include, but not be limited to, the following:

1. OSP backbone fiber optic cable:

   a. Refer to riser diagrams on the plans for cabling requirements.

   b. OSP backbone fiber optic cable shall be fusion spliced to singlemode fiber pigtails with LC connectors.

   c. Fiber optic cable connector standard shall be Type LC.

2. ISP backbone fiber optic cabling:

   a. Backbone fiber optic cable shall route between IC Telecom room on the 1st floor and 2nd floor TR, and shall consist of one 24-strand singlemode fiber optic cable.

   b. ISP backbone fiber optic cable shall be fusion spliced to fiber optic LC pigtails in the IC.

   c. The TR ends of the fiber shall terminate at the equipment racks with LC connectors and installed in a rack mounted, 24 port patch panel as required with patch cord management integrated into each panel. Locate rack mounted, 24-port patch panels at top of equipment rack with patch cord management integrated into the patch panels.

   d. Fiber optic backbone cables shall terminate on backside of fiber patch panels.

   e. ISP backbone fiber optic patch panel field shall interface with routing/switching equipment, furnished by Owner, at the TR via fiber patch cords from modular connectors on patch panel front side.

   f. ISP Fiber optic cable connector standard shall be Type LC. Connectors shall be singleplex type.

3. Patch cords:

   a. Provide duplex patch cords as required to patch between Backbone (LC) and equipment (SC/LC/FC etc...) as required. Coordinate with owners representative.

B. Refer to Drawings for complete documentation of above requirements and all additional requirements.

1.6 SUBMITTALS

A. Submit in accordance with the requirements of Section 270010: Basic Communications Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.

2. Describe system operation, equipment, dimensions and indicate features of each component.

3. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

4. Shop Drawings prepare in AutoCAD Release 2012, to include the following:

   a. Building floor plans showing location of all outlets and cable routing to each device at same scale as construction documents.

   b. Riser diagram(s) indicating all major components of fiber optic system with required cable inter-ties and backbone cable identification labels.

c. Provide 1/4" scale plans of equipment layout in MPOE, MC, IC and TR rooms.

d. Provide wall elevations of MPOE, MC, IC and TR rooms at 1/2" scale.

e. Provide equipment rack elevations at 1/2" scale.

f. Use identical symbols as those used in construction documents.

g. Text shall be a minimum of 3/32" high when plotted at full scale.

h. Screen all background information.

5. Furnish structural calculations for equipment anchorage as described in Section 270010: Basic Communicaions Requirements.

6. Complete bill of materials listing all components.

7. Warranty.

B. Installer's qualifications: Furnish satisfactory proof of required experience specified herein for system installer.

C. Record Drawings:

1. Furnish Record Drawings as described in Section 270010: Basic Communications Requirements, utilizing Shop-Drawing submissions with updated field conditions. These Drawings shall include but not be limited to the following:

a. Plot plans and building floor plans, showing point-to-point wiring location of all devices.

b. Block Diagram/Riser Diagram showing the system components and all conduit and wire type/sizes between each.

2. Drawings shall be incorporated into the Record Drawing submission.

3. Final acceptance will not be made until the Engineer has approved the Record Drawings.

1.7 OPERATION AND MAINTENANCE MANUAL

A. Supply operation and maintenance manuals in accordance with the requirements of Section 270010: Basic Communications Requirements, to include the following:

1. A detailed explanation of the operation of the system.

2. Pictorial parts list and part numbers.

3. Schematic wiring diagrams.

4. Telephone numbers for the authorized parts and service distributor.

5. Final testing reports.

1.8 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this section may be used on the Project unless otherwise submitted.

C. Manufacturer qualifications: Manufacturer must have a minimum 5 continuous years of experience in design and manufacturing of the materials and equipment specified herein.

D. Installer's qualifications:

1. Installer must have a minimum 5 continuous years of experience in satisfactory completion for Projects similar in scope and cost. Provide backup information on 5 such Projects.

2. Installer shall possess a current, active and valid C7 or C10 California State Contractors License.

3. The installer shall be the Manufacturer's certified reseller/installer of the telecommunication equipment provided. Provide evidence of this certification.

1.9 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: Telecommunication system components shall not be delivered to the Project site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Equipment damaged during shipping shall be replaced and returned to Manufacturer at no cost to Owner.

B. Storage: Store in clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris and traffic.

C. Handling: Handle in accordance with Manufacturer's written instructions. Be careful to prevent internal components damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to Manufacturer.

1.10 WARRANTY

A. ISP riser and Horizontal Fiber cable and components offered under this Section shall be covered by a minimum 25 year product and application warranty for malfunctions resulting from defects in materials, workmanship and performance as specified by the manufacturer. Warranty shall begin upon acceptance by the Owner.

1.11 MAINTENANCE

A. Maintenance services:

1. Distributor of the major system components shall maintain a replacement parts department and provide testing equipment when needed. A complete parts department shall be located close enough to supply replacement parts within a 4 hour period.

2. Service must be rendered within 4 hours of system failure notification.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The following Manufacturer shall be acceptable and in compliance with the owners standards as specified herein and indicated on the Drawings. If any discrepancy between the products listed and the owners standard, the owners standard products shall apply.

1. Backbone fiber optic cable:

a. BerkTek

2. Fiber optic terminations:

a. Leviton

3. Fiber Splice Trays

a. Leviton

4. Fiber Innerduct and duct plugs:

a. Max Cell

5. Test equipment:

a. Corning Cable Systems

b. Fluke Networks.

c. Laser Precision.

d. Tektronix.

B. Substitutions: Substitutions will not be accepted.

2.2 BACKBONE FIBER OPTIC CABLING

A. ISP backbone fiber optic cable:

1. Application:

a. Suitable for indoor installations, between floors exposed in equipment rooms as vertical risers, or above suspended ceilings and below raised floors exposed in cable trays, hangers or on deck. If space is used as an air plenum, cable shall either be plenum rated or installed in EMT conduit.

b. Exhibit stable performance in a building environment.

c. Optical transmission performance is not significantly affected by environmental fluctuations, installation or aging.

d. Materials do not evolve hydrogen in quantities that will increase light attenuation.

2. Singlemode fiber strands shall meet or exceed the following physical criteria:

a. Core diameter: 8.3µm.

b. Cladding diameter: 125µm, ±1.0µm.

c. Core/cladding offset: ≤0.5µm.

d. Coating diameter: 254µm, ±7.0µm.

e. Coating/cladding concentricity: 12.0µm.

f. Minimum tensile strength: 100,000psi.

3. Singlemode fiber strands shall meet or exceed the following performance criteria:

    a. Attenuation: 0.35dB/km at 1310nm and 0.25dB/km at 1550nm wavelengths, maximum.

    b. Mode field diameter: 9.2µm ±0.3µm at 1310nm and 10.5µm ±1.0µm at 1550nm.

    c. Cutoff wavelength: ≤1260nm.

    d. Dispersion: 3.2ps/nm•km at 1285-1330nm and 18ps/nm•km at 1550nm.

4. Primary coating:

    a. Each fiber shall be completely covered with a "primary coating" (acrylate material).

    b. Coating diameter: 250µm, ±5µm.

5. Buffering:

    a. Each coated fiber shall be fully covered with a material extruded over and directly onto the coating. This shall be the tight buffer.

        1) Tight buffer diameter: 900µm, ±5µm.

        2) Material: PVC or equivalent flame retardant thermoplastic.

    b. Buffer strands shall be individually color-coded to meet the requirements of ANSI/TIA/EIA-598-A-1995 (also reference ANSI/ICEA S-83-596-1994 and EIA-230).

6. Cable sheath:

    a. Strength element: The cable shall have an internal strength element such as aramid yarn.

    b. Outer jacket: The cable shall have a seamless outer jacket, LS-PVC or equal, applied to and completely covering the internal components (fiber strands, strength element, etc.).

    c. Tensile strength: The cable shall have a 300 lb minimum install rated load and a 90 lb minimum long term load.

    d. Flame rating: OFNP for plenum rated or OFNR for non-plenum riser rated, according to NEC Article 770, tested to NFPA 262 and UL Listed as such.

7. Manufacturer:

    a. BerkTek (24 Strand SMF)

B. OSP backbone fiber optic cable:

1. Application:

    a. Suitable for outdoors, in underground PVC conduit installations where protection against water and moisture entry is required.

    b. Optical transmission performance is not significantly affected by environmental fluctuations, installation or aging.

    c. Materials do not evolve hydrogen in quantities that will increase light attenuation.

2. Singlemode fiber strands shall meet or exceed the following physical criteria:

   a. Core diameter: 8.3µm.

   b. Cladding diameter: 125µm, ±0.7µm.

   c. Core/cladding offset: ≤0.5µm.

   d. Coating diameter: 254µm, ±7.0µm.

   e. Coating/cladding concentricity: 12.0µm.

   f. Minimum tensile strength: 100,000psi.

3. Singlemode fiber strands shall meet or exceed the following performance criteria:

   a. Attenuation: 0.4dB/km at 1310nm and 0.3dB/km at 1550nm wavelengths, maximum.

   b. Mode field diameter: 8.4µm ±0.6µm at 1310nm and 8.9µm ±0.6µm at 1550nm.

   c. Cutoff wavelength: ≤1260nm.

   d. Dispersion: 8.0ps/nm•km at 1310nm and 2.6-6.0ps/nm•km at 1530-1565nm.

4. Buffering:

   a. Fibers shall be loosely buffered, either in a core tube or in multiple tubes around central member.

   b. Buffering tube(s) shall be filled with compound to protect against moisture penetration. Filling compound shall be non-hygroscopic and non-nutritive to fungus ("FLEXGEL," or equivalent). The compound shall be easily removed with conventional nontoxic solvents.

   c. Fibers and buffer tube(s) shall be individually color-coded to meet the requirements of ANSI/TIA/EIA-598-A-1995 (also reference ANSI/ICEA S-83-596-1994 and EIA-230).

5. Cable and sheath:

   a. Central member: Dielectric rod (glass-reinforced plastic, GRP).

   b. Fillers (where required to maintain circularity): Plastic rods matched to buffer tube diameter.

   c. Water blocking tape: Applied longitudinally over the central member/buffer tube(s)/filler core.

   d. Strength element: The cable shall have an internal strength element such as aramid yarn.

   e. Rip cord: Nylon or similar (to aid splitting the outer jacket).

   f. Outer jacket: The cable shall have a seamless outer jacket, high or medium density polyethylene or equal, applied to and completely covering the internal components (central member, buffer tube(s), fillers, strength element, etc.). The outer jacket shall contain UV inhibitors for stable performance in direct sunlight. The outer jacket shall be non-hygroscopic and non-nutritive to fungus.

   g. Printing: The jacket shall be printed/permanently marked with the manufacturer, sequential length (feet), fiber type, month and year or quarter and year of manufacture.

6. Tensile strength: The cable shall have a 600 lb minimum install rated load and 200 lb minimum long term rated load..

7. Operating temperature range: -30°C to 75°C.

C. Manufacturer

1. BerkTek Fiber Count: 24 Strand and 48 Strand

2. Part #

a. 24 Strand SMF: #PDPK024-I/OAB0707

b. 48 Strand SMF: #PDPK12B048HE(BLA)-I/OAB0707

3. Fiber optic patch panels:

a. Patch panels shall be an enclosed housing for protecting, storing and organizing the termination of fiber cables and fiber strands. Shall also contain facilities to store fiber slack and provide patch cord management.

b. Patch panels shall be passive physical equipment and apparatus used in terminating, interconnecting and cross-connecting fiber optic cabling. Panel shall possess a minimum fire resistant rating of UL94V-1 and shall conform to existing OSHA Health and Safety Laws.

c. Patch panels shall come equipped with safety labels such as laser identification or warning labels as required by system considerations.

d. Panels shall be 1U, 2U or 4U high, 19" rack mountable, accepting up to adapter panels with 6-ports in each panel. Panels shall contain rear fiber entry slots, wire retainers and fiber storage drums. Furnish with slide out rails for front access and jumper troughs for cable management. Panels shall be suitable for fusion splicing singlemode fiber cable.

e. Panels shall be provided with SC couplings for termination of fiber cables with matching connectors.

f. Provide patch panel and port quantities as required for cable terminations.

g. Manufacturer

1) Leviton

a) 2U Panel: #5R2UH-S06

b) 4U Panel: #5R4UH-S12

c) Connector Panels: 5F100-2LC

4. Fiber optic singlemode pigtails

a. Singlemode

1) Materials:

a) Ferrule ceramic (zirconia or alumina) with pre-radiused finish/face.

b) Connector housing: Plastic.

2) Connector shall meet or exceed Ultra PC performance.

3) Connector shall have an integral strain relief feature, including a bend limiting rear boot.

4) Connector shall be installable via either epoxy or anaerobic method.

5) Connector type shall be LC.

6) Manufacturer:

a) Leviton

b) Part #: UPPLC-S03

5. Fiber Splice Trays:

a. Splice trays shall support 12-24 fusion splices.

b. Trays shall be compatible with the splice closure application and product and match existing trays.

c. Provide the required quantity of fiber trays and splicing materials as required for a complete system.

D. Fiber optic patch cords:

1. Suitable for indoor installations within equipment rooms.

2. Cords shall be factory-assembled from a single, continuous length of cordage, homogenous in nature, and terminated at both ends via connectors as required. Splices are not permitted anywhere.

3. Cordage:

a. Conductors: 2 optical conductors/strands, matching physical and optical performance parameters of the singlemode cable plant specified above.

b. Construction: "Mini Zipcord" type with strength member (aramid yarn) and jacket of PVC.

c. Flame rating: NEC OFN rated or higher, and UL Listed as such.

4. Connectors:

a. Singlemode patch cords shall be terminated with duplex LC-LC Ultra PC connectors at both ends for connection with the new cable plant.

5. Patch Cords shall be

a. Leviton duplex LC-LC: UPDLC-S**03**

b. **03** = length in meters: Coordinate with owners IT representative prior to ordering

E. Labels:

1. Label type shall be a durable plastic tag, suitable for indoor and/or outdoor use, and shall contain UV inhibitors. The tag shall attach to the cable via a separate steel or plastic tie wrap.

2. Labels shall have a self-laminating feature.

3. Printable area shall be 3.5" x 2", minimum.

4. Color shall be yellow with black legend test.

F. Miscellaneous:

1. Fiber slack storage rings.

a. Leviton

1) ISP #48900-IFR

2) OSP #48900-OFR

2. Velcro cable ties:

a. Width: 0.75" or larger.

b. Color: Same color as the cable to which it is being applied.

G. Labels:

1. Label type shall be a durable plastic tag, suitable for indoor and/or outdoor use, and shall contain UV inhibitors. The tag shall attach to the cable via a separate steel or plastic tie wrap.

2. Labels shall have a self-laminating feature.

3. Printable area shall be 3.5" x 2", minimum.

4. Color shall be yellow with black legend test.

5. Plenum cable ties:

a. Suitable for use in plenums or air handling spaces.

b. Color: Maroon or other distinctive non-white color.

H. Innerduct:

1. Suitable for outdoor installations within underground duct banks to create multiple "cells" within a single conduit for fiber optic cables installed during the same phase of construction or for future installations of cables.

2. Innerduct shall be manufactured from internally processed polyester and nylon resins, factory lubricated. Materials shall be halogen-free.

3. Innerduct shall be flexible engineered fabric sub-ducting, stitched into multi-cell design. Cells shall come equipped with pulling tape/rope and shall be color-coded via printing and/or stitching.

4. MaxCell Part #MXC2002PRxxx (xxx=Length)

I. Miscellaneous:

1. Fiber slack storage rings.

a. Leviton

1) ISP #48900-IFR

2. Velcro cable ties:

a. Width: 0.75" or larger.

b. Color: Same color as the cable to which it is being applied.

2.3 CABLE TESTING EQUIPMENT

A. Fiber optic cabling:

1. Fiber optic light source:

a. Connection interfaces shall be factory installed.

b. Output shall be continuous wavelengths.

c. The light sources may contain internal lenses, pigtails, and modal conditioners, provided they meet the launch conditions as described in "Post-Installation" Passive Link Attenuation Testing Procedures.

d. LASER-based light source foe singlemode fiber testing shall have the following:

1) Center wavelength of 1320nm ±20nm and 1550nm ±20nm

2) Special width (FWHM) of ≤5nm at 1310nm and ≤5nm at 1550nm.

3) Minimum output power level of ≥3dBm.

2. Fiber optic power meter:

a. Power meter for singlemode testing shall be capable of measuring relative of absolute power (or both) and must be independent of modal distribution.

b. Power meters used must be calibrated and traceable to the National Bureau of Standards.

c. Power meter used shall have the following:

1) Dynamic range of 0dBm to -40dBm minimum.

2) Accuracy of ±0.2dBm.

d. Singlemode fiber optic test cords:

1) The fiber of the singlemode test cords shall have the core diameter and numerical aperture nominally equal to that of the singlemode fiber optic passive link.

2) Test cord length for testing insertion loss: 1m to 5m.

3) Connectors of the test cords shall be compatible with the connector types of the light source and the power meter, and with the cabling plant.

4) The connectors shall exhibit ≤0.5 dB loss per connection @ both 1300 nm and 1550 nm, as measured per FOTP-171 D3. The connectors shall inhibit Fresnel reflections (i.e. have a "PC" finish).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of the telecommunication fiber optic cabling system installation to verify conformance with manufacturer and specification tolerances. Do not commence with installation until all conditions are made satisfactory.

B. Verify that pathways and supporting devices are properly and completely installed prior to cable installation.

C. Verify dimensions of pathways to include length, i.e. "true tape" conduit runs.

D. Prior to installation, verify that equipment rooms are ready to accept cables and terminations.

E. ISP backbone fiber optic cabling:

1. Cabling:

a. Cable runs shall have continuous sheath continuity, homogenous in nature, without any splices.

b. Maximum cable length of 1,600 feet (500m) between the terminations at IC, and TR.

c. Placement:

1) Place cables within designated pathways.

2) Maintain a minimum bend radius of 20 times the cable diameter during installation and a minimum bending radius of 10 times the cable diameter after installation.

3) Maintain pulling tension within manufacturer's limits.

4) Place and suspend cables in a manner to protect them from physical interference or damage. Place cables with no kinks, twists, or impact damage to the sheath. Replace cables damaged during installation.

5) Do not use cable-pulling compounds for indoor installations.

6) Provide 20 feet minimum sheath cable slack at each end of the run within the equipment rooms. Store cable slack in a fiber slack storage ring mounted on wall.

7) Place a pull rope along with cables where run in conduit and spare capacity still exists in the conduit. Tie off ends of pull rope.

d. Routing:

1) Within equipment rooms, neatly dress and organize cables on designated cable routing facilities and fasten cables to routing facilities via tie wraps or Velcro type straps.

2) When routing horizontally within equipment rooms, utilize the overhead cable support system. When routing vertically within equipment rooms, utilize the vertical cable support system and provide approved cable straps at 24" intervals.

3) Provide 20' of slack cable on each end and place in a fiber storage ring on backboard.

e. Terminations:

1) Properly relieve strain from cables at termination points, at or within the fiber optic termination panels) per manufacturer's instructions.

2) Provide breakout kits to furcated fibers from buffer tubes. Provide required accessories and consumables for the complete termination of fiber strands.

3) Terminate fiber strands at both ends using the specified fiber optic connectors appropriate for the mode type of the fiber. Perform termination in accordance with manufacturer's instructions.

4) Provide 3 feet of unsheathed fiber (tight buffer) slack within the patch panel/termination enclosure at each end of the link. Properly store fiber slack in rear of patch panel into the routing rings, per manufacturer's instructions.

2. Termination apparatus:

a. Provide fully assembled termination patch panels in designated equipment racks, located a top of rack. "Fully assembled" includes installation and mounting components and accessories such as adapter panels, coupling adapters, etc. required for operation.

b. Provide accessories required for proper installation of each termination patch panel, including connector panels and adapters.

c. Termination sequence:

1) Rack-mount panels: Terminate singlemode fibers in sequential strand order.

3.2 LABELING

A. General requirements:

1. Labeling, label colors, and identifier assignments shall conform to EIA/EIA-606-A Administration Standards and as approved by the Owner.

2. Provide permanent and machine-generated labels. Hand written labels will not be accepted.

B. Backbone and horizontal fiber optic cable labeling:

1. Cables:

a. Text color shall be black with #10 font size.

b. Identifier assignment:

1) First field: Type of cable.

2) Second field: Total strand count.

3) Third field: Cable number.

4) Fourth field: Strands in use and dead strands.

5) Fifth field: Source and destination.

6) Sixth field: Terminal number (MPOE, MC, IC, TR).

c. Label installation:

1) Provide labels on both ends of cables.

2) Install such that they are visible by a technician from normal stance.

3) Fully wrap label around the cable jacket (self lamination).

4) Provide one label within 12" of the termination apparatus.

5) Provide one label at the point where the cable enters/exits the equipment room.

6) Provide one label at the approximate mid-point between where the cable enters/exits the room and the termination apparatus.

2. Fiber patch panels:

a. Text color shall be black, #10 font size.

b. Label installation:

1) Provide labels at each port.

2) Install labels into label window.

3.3 FIELD QUALITY CONTROL AND TESTING

A. General:

1. Calibrate test sets and associated equipment per the manufacturers instructions at the beginning of each day's testing and after each battery charge. Fully charge the test sets prior to each day's testing to ensure proper operation.

2. Ensure test equipment and test cords are clean and undamaged during testing activities. Per the Engineer's discretion, halt testing activity and clean testing equipment, test cords and related apparatus.

3. Permanently record test results electronically within test equipment at the time of testing.

B. Fiber optic testing:

1. Test fiber optic passive links as follows:

TESTS FOR FIBER OPTIC CABLING TABLE				
Subsystem	**Type**	**Test**	**Direction**	**Wavelength**
ISP backbone	Singlemode	Passive link insertion loss	Both	1310nm and 1550nm

2. Precautions:

a. Adhere to the equipment manufacturer's instructions during testing.

b. Prior to testing activity or measurements taken, complete the following activities:

1) Ensure the test equipment is at room temperature, approximately 70°F.

2) Turn the light source and power meter power on for at least 5 minutes.

3) Clean test/launch cords and system cords, if applicable, connectors and the cabling system adapters with a lint-free wipe and 90% (or higher) isopropyl alcohol.

c. Do not power off OTDR's light source during testing activity.

d. Do not remove launch cord from the OTDR's light source at any time (unless the testing is complete or the equipment is being put away for the evening or during trouble shooting).

e. Do not bend the launch cord smaller than 20 times the cord diameter during testing activities, as this may induce loss into the cord reducing the accuracy of the measurements).

C. Fiber optic characterization testing:

1. Equipment settings/measurement parameters:

a. Index of refraction: Match cable-under-test fiber parameters, default settings as follows:

1) Singlemode: 1.466-1.467 @ 1310nm and 1.467-1.4677 @ 1559nm.

b. Pulse width (50ns for singlemode):

1) Singlemode: 10ns for cable lengths up to 6,560 feet (2,000m); 50ns for cable lengths between 6,560 feet (2,000m) and 32,800 feet (10,000m).

c. Backscatter:

1) Singlemode: -74dB @ 1310nm and 1550nm.

d. Event threshold: 0.05dB.

e. Reflection threshold:

1) Singlemode: -60dB.

f. Fiber break/end-of-fiber: 3dB.

2. Waveform: The waveform shall be real-time and normal density.

3. Obtain measurements using a "launch" cord connected to the test instrument and the cable under test.

a. The fiber of the launch cord shall match the fiber of the cable under test in physical and performance parameters (i.e. type, core/cladding size, index of reflection, refraction profile, etc.). The fiber of the launch cord should match the fiber of the cable under test in manufacturer and product.

b. Use launch cord length between 25 and 100 meters.

D. Fiber optic passive link insertion loss testing:

1. Test cords performance verification:

a. Connect test cord #1 between the light source and the power meter.

b. The value displayed on the power meter is the Reference Power (P_{ref}) measurement. If the power meter has a Relative Power Measurement Mode, enter this Reference Power Measurement (P_{ref}) value into the meter. If it does not, hand-write P_{ref} onto the record document for future reference.

c. Disconnect test cord #1 form the power meter. Do not disconnect test cord #1 from the light source.

d. Connect the "open" end of test cord #1 to an adapter of matching connector type. Connect one end of test cord #2 to the adapter and the other end to the power meter.

e. The value displayed on the power meter is the Power Measurement (P_{sum}). If the power meter is in Relative Power Measurement Mode, the meter reading represents the test cord #2 connection attenuation. If the meter does not have a Relative Power Measurement Mode, perform the following calculation to determine the connection attenuation:

1) If P_{sum} and P_{ref} are in the same logarithmic units (dBm, dBu, etc.): Connection attenuation (dB) = (P_{sum} - P_{ref})

2) If P_{sum} and P_{ref} are in watts: Connection attenuation (dB) = [10 x $\log_{10}$ (P_{sum}/P_{ref})]

3) The measured connection attenuation must be less than or equal to the value found in the Table below.

f. Flip the ends of test cord #2, so that the end connected to the power meter is now connected to the adapter, and the end connected to the adapter is now connected to the power meter.

g. The meter reading is the reversed Power Measurement (P_{sum}). Perform the proper calculations if not using Relative Power Measurement Mode.

h. Verify that both connection attenuation measurements are less than or equal to the value found in the following Table:

ACCEPTABLE TEST CORD CONNECTION ATTENUATION	
Cable Type	**SC (or other Mini-Connector) Cord**
Singlemode	0.30dB maximum

i. If both measurements are found to be less than or equal to the values found in the Table, then test cord #1 is acceptable for testing purposes. Unacceptable attenuation measurements may be attributable to test cord #1 or #2. Examine each cord with a portable microscope and clean, polish or replace as necessary.

j. Repeat this test procedure from the beginning, reversing the test cords in order to verify the performance of test cord #2.

2. Test equipment set-up:

a. Follow the test equipment manufacturer's initial adjustment and set-up instructions.

b. If the meter has a Relative Power Measurement Mode, select this mode.

c. If the meter can display power levels in dBm, select this unit of measurement to simplify subsequent calculations.

d. Set the light source and power meter to the same wavelength.

3. Singlemode passive link insertion loss testing procedure:

a. Determine the launch conditions:

1) Use the launch conditions as described in FOTP-78.

2) Employ a method to remove high-order propagating modes as described in FOTP-77.

b. Test method: Perform the passive link insertion loss testing of singlemode fibers according to the "Test Method A.1: One Jumper Reference," per OFSTP-7.

1) After setting up the test equipment and verifying the performance of the test cords, the insertion loss of the passive link segments can be measured.

2) Connect test cord #1 between the light source and the power meter.

3) The meter reading is the Reference Power Measurement (Pref). If the power meter has a Relative Power Measurement Mode, enter the Pref value into the meter. If it does not have this mode, then hand-write the Pref for future reference and to be included in the Record Documents.

4) Disconnect test cord #1 from the power meter. Do not disconnect test cord #1 from the light source.

5) Connect test cord #1 to the passive link segment input.

6) At the opposite end of the passive link segment, connect test cord #2 to the link segment input and the power meter.

7) The meter reading is the Power Measurement (Psum). If the power meter is in Relative Power Measurement Mode, the meter reading represents the insertion loss. If the meter does not have this mode, perform the following calculation to determine the insertion loss:

a) If Psum and Pref are in the same logarithmic units (dBm, dBu, etc.): Link segment attenuation (dB) = (Psum - Pref)

b) If Psum and Pref are in watts: Link segment attenuation (dB) = [10 x log10 (Psum/Pref)]

8) Record Psum for inclusion into the record documents.

4. Acceptable measurement values:

a. Remove and replace any cabling links failing to meet the criteria described in this Specification, at no cost to the Owner, with cables that prove to meet the minimum requirements.

b. The general insertion loss equation for any link segment is as follows:

1) Insertion loss = cable loss + connection loss + splice loss + CPR adjustment.

2) Note: A connection is defined as the joint made by two mating fibers terminated with remateable connectors.

c. 50/125µm multimode attenuation coefficients:

1) Cable loss = Cable length (km) x (3.0dB/km @ 850nm) or (1.0dB/km @ 1300nm).

2) Connection loss = (Connections x 0.14dB) + 0.24dB.

3) Splice loss = Splice x 0.05dB.

4) CPR adjustment = See Table below.

MULTIMODE LIGHT SOURCE CPR ADJUSTMENT TABLE

	Cat-1	Cat-2	Cat-3	Cat-4	Cat-5
Links w/ SC connectors	+0.25	0.00	-0.10	-0.20	-0.30

d. Singlemode attenuation coefficients:

1) ISP cable loss = Cable length (km) x (0.650dB/km @ 1310nm) or (0.50dB/km @1550nm).

2) Connection loss = (Connection x 0.24dB) + 0.24dB.

3) Splice loss = Splices x 0.07dB.

4) CPR adjustment = Not applicable for singlemode.

E. Record documents:

1. Permanently record all test results.

2. Export test results' numerical values to a single Microsoft Excel spreadsheet.

3. Submit test results in a format acceptable to the Owner, Owner's Representative and the Engineer before system acceptance.

4. Cable, and fiber identifiers of the test reports shall match the identifiers as labeled in the field, i.e. use the same ID on the cable/termination label as what appears on the test report.

5. Measurements shall carry a precision through one significant decimal place, minimum.

6. Use feet for the units for measurements shown on the print of the test measurements.

7. Print report such that fiber strands of a given cabling link have matching axis scales. The "X" and the "Y" axis shall be the same from report-to-report.

8. The trace of the printed test report shall show the launch cord.

9. For each fiber optic backbone cable test, report shall contain the following information:

a. Project name and address.

b. Test company's and Operator's name.

c. Date measurements were taken.

d. Test equipment type to include model and serial numbers.

e. Cable identification number, fiber/strand number and fiber type (i.e. multimode, singlemode, etc).

f. Measurement direction.

g. Set-up parameters (i.e. wavelength, pulse width, refractive index, event threshold, etc.)

h. OTDR trace.

i. Length of fiber.

j. Overall link loss.

k. Passive link insertion loss testing:

1) Wavelength.

2) Loss measurement.

10. For each cabling link, include either a schematic graphic or a brief narrative accurately describing the test set-up. The description shall include test/launch cord (with length), expected events (connectors, slices, etc.) with expected distances, etc. This information will eliminate many questions the Engineer will have while reviewing the reports.

11. For each twisted pair backbone and horizontal cable test, report shall contain the following information:

a. Project name and address.

b. Test company's and Operator's name.

c. Date measurements were taken.

d. Test equipment type to include model and serial numbers.

e. Cable identification number and pair number.

f. Measurement results.

3.4 INSPECTION AND ADJUSTMENTS

A. Contractor shall inspect all installed Work in conjunction with the General Contractor and develop a "punchlist" for all items needing correction. Provide punchlist to the Engineer prior to their final walk of Project.

B. Punchlist work and the required remediation shall be performed prior to system final acceptance.

C. Replace or repair work completed by others that was defaced or destroyed during the installation of the telecommunication cabling system by this contractor.

D. Make changes to adjust the system to optimum operation for final use. Contractor is responsible for making changes to the system such that any defects in workmanship are correct and all cables and the associated termination hardware passes the minimum test requirements.

3.5 CLEANING

A. Remove all unused, excess and left over products, to include debris, spills, and installation equipment.

B. Leave finished work and adjacent surfaces in neat, clean conditions with no evidence of damage.

C. Legally dispose of debris.

D. Clean installed products in accordance with manufacturer's instructions prior to final punchlist.

END OF SECTION

SECTION 27 15 00

COMMUNICATIONS HORIZONTAL CABLING

PART 1 GENERAL

1.01 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Horizontal twisted pair cabling.

2. Horizontal fiber optic cabling.

3. Telecommunication testing.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

SECTION NO.	SECTION TITLE
260010	BASIC ELECTRICAL REQUIREMENTS
270010	BASIC COMMUNICATIONS REQUIREMENTS

1.02 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:

1. Federal Communications Commission (FCC) Regulations:

FCC Part 15; Radio Frequency Devices & Radiation Limits.

FCC Part 68; Connection of Terminal Equipment to the Telephone Network.

2. Electronics Industries Alliance (EIA):

EIA; Testing Standards.

3. American National Standards Institute, Inc. (ANSI) / Telecommunications Industry Association (TIA) / Electronics Industries Alliance (EIA):

ANSI/TIA/EIA-568-C; Commercial Building Telecommunications Cabling Standards, including the following:

• Part 1: General Requirements.

• Part 2: Balanced Twisted-Pair Cabling Components.

• Part 2, Addendum 1: Transmission Performance Specifications for 4-Pair 100 Ohm Category 6 Cable.

• TIA SP 3-4426 (12/28/06 or latest version): Transmission Performance Specifications for 4-Pair 100 Ohm Augmented Category 6 Cable (to be published as TIA-568-C.2-10).

ANSI/TIA/EIA-569-A; Commercial Building Standard for Telecommunications Pathways and Spaces, including the following:

- TIA/EIA-569-A-1: Perimeter Pathway Addendum.
- TIA/EIA-569-A-2: Furniture Pathway Fill Addendum.
- TIA/EIA-569-A-3: Access Floors.
- TIA/EIA-569-A-4: Poke-Thru Devices.
- TIA/EIA-569-A-6: Multi-Tenant Pathway and Spaces.
- TIA/EIA-569-A-7: Cable Trays and Wireways.

ANSI/TIA/EIA-598-B; Optical Fiber Cable Color Coding.

ANSI/TIA/EIA-606-A; Administration Standard for Commercial Telecommunications Infrastructure.

ANSI/J-STD-607-A; Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.

ANSI/TIA/EIA-758; Customer-Owner Outside Plant Telecommunications Cabling Standard (TIA/EIA-758-1: Addendum No. 1).

TIA TSB-155; Guidelines for the Assessment and Mitigation of Installed Category 6 Cabling to Support 10GBase-T.

4. Building Industry Consulting Service International, Inc. (BICSI):

BICSI (TDMM); Telecommunication Distribution Methods Manual.

BICSI; Customer-Owner Outside Plant Design Manual.

BICSI (WDRM); Wireless Design Reference Manual.

BICSI (NDRM); Network Design Reference Manual.

5. Insulated Cable Engineers Association (ICEA):

ICEA S-80-576-2002; Category 1 & 2 Individually Unshielded Twisted Pair Indoor Cables for Use in Communications Wiring Systems.

ICEA S-83-596-1994; Fiber Optic Premises Distribution Cable.

ICEA S-87-640-1999; Fiber Optic Outside Plant Communications Cable.

ICEA S-90-661-2002; Category 3, 5 & 5e Individually Unshielded Twisted Pair Indoor Cable for Use in General Purpose and LAN Communication Wiring Systems.

ICEA S-104-696-2001; Standard for Indoor-Outdoor Optical Cable.

6. Underwriters Laboratories, Inc. (UL):

UL 444; Communication Cables.

UL 497;	Protectors for Paired-Conductor Communication Circuits.
UL 1651;	Optical Fiber Cable.
UL 1690;	Data-Processing Cable.
UL 1963;	Communications-Circuit Accessories.
UL 2024A;	Optical Fiber Cable Routing Assemblies.

1.03 DEFINITIONS

A. Above finish floor (AFF) - Standard mounting height (e.g., 18 inch AFF) for a device using the center line of the device as the measurement point.

B. Administration - The methodology defining the documentation requirements of a cabling system and its containment, the labeling of functional elements and the process by which moves, additions, and changes are recorded.

C. ANSI/TIA/EIA - Associations involved in developing telecommunications industry standards.

D. Attenuation - The decrease in magnitude of transmission signal strength between points, expressed in dB as the ratio of output to input signal level.

E. Attenuation-to-crosstalk ratio (ACR) - The ratio obtained by subtracting insertion loss (attenuation [dB]) from near-end crosstalk (dB). ACR is normally stated at a give frequency.

F. Auditory assistance device - An intentional radiator used to provide auditory assistance to a handicapped person or persons. Such a device may be used for auricular training in an educational institution, for auditory assistance at places of public gatherings, such as a church, theater, or auditorium, and for auditory assistance to handicapped individuals, only, in other locations.

G. Backboard - Backboard generally refers to the 3/4" A-C grade plywood sheeting, lining the walls of the telecommunications room. Plywood shall be void-free, with two coats of fire retardant paint matching the painted interior walls covering both sides.

H. Backbone - A facility (e.g., pathway, cable, or conductors) between any of the following spaces: telecommunications rooms, common telecommunications rooms, floor-serving terminals, entrance facilities, equipment rooms, and common equipment rooms.

I. Basic link test configuration - Horizontal cable of up to 90m (295 ft) plus up to 2m (6.5 ft) of test equipment cord from the main unit of the tester to the local connection, and up to 2m (6.5 ft) of test equipment cord from the remote connection to the remote unit of the tester. Maximum length is 94 m (308 ft).

J. Bonding Conductor (BC) - A conductor used specifically for the purpose of bonding.

K. Cable Labeling System –

1. The scheme employed when identifying cable or its associated hardware.

2. Scheme adapted for labeling cables to identify them based on ANSI/TIA/ EIA-606-A, Administration Standard for Commercial Telecommunications Infrastructure. See administration.

L. Cable Runway - Hardware designed and manufactured for horizontal pathway distribution of cable and inside wiring inside the MC, IC, or TR rooms.

M. CAT - Category used when identifying the performance characteristics of twisted pair cabling.

N. Ceiling Distribution System - A distribution system that utilizes the space between a suspended or false ceiling and the structural surface above.

O. Closed-Circuit Television (CCTV) - A private television system, typically used for security purposes, in which the signal is transmitted to a limited number of receivers.

P. Communications plenum cable (CMP) - Type CMP communications plenum cable shall be listed as being suitable for use in ducts, plenums, and other spaces used for environmental air and shall also be listed as having adequate fire-resistant and low smoke-producing characteristics. (NEC)Cables must pass required test for fire and smoke characteristics of wires and cables, NFPA 262 or UL 910.

Q. Communications Riser Cable (CMR) - Type CMR communications riser cable shall be listed as being suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor. (NEC) Cables must pass requirements for flame propagation.

R. Electromagnetic Interference (EMI) - Radiated or conducted electromagnetic energy that has an undesirable effect on electronic equipment or signal transmissions.

S. Entrance Conduit - Conduit that connects the campus underground infrastructure with the building's Telecommunications Room.

T. Fire Retardant - Any substance added to delay the start or ignition of fire or slow the spread of the flame of any material.

U. Firestopping - The process of installing [specialty] listed fire-rated materials into penetrations of fire-rated barriers to reestablish the fire-resistance rating of the barrier.

V. Firestopping Location. A penetration through a fire-rated wall with a sleeve.

W. Firestop System - A specific installation consisting of the material(s) (firestop penetration seals) that fill the opening in the wall or floor assembly, and around and between any items that penetrate the wall or floor (e.g., cables, cable trays, conduit, ducts, pipes), and any termination devices (e.g., electrical outlet boxes) along with their means of support.

X. Grounding Conductor - A conductor used to connect the grounding electrode to the buildings main grounding busbar.

Y. Grounding System - A system of hardware and wiring that provides an electrical path from a specified location to an earth ground point.

Z. Horizontal Cabling - The part of the cabling system that extends from the work area telecommunications outlet to the horizontal cross-connect in the telecommunications room.

AA. Hybrid Cable - An assembly of two or more cables, of the same or different types or categories, covered by one overall sheath.

BB. Infrastructure (Telecommunications) - A collection of those telecommunications components, excluding equipment, that together provide the basic support for the distribution of all information within a building or campus.

CC. Intermediate Cross-connect (IC) - the connection point between a backbone cable that extends from the main cross-connect and the backbone cable from the horizontal cross-connect.

DD. Loose Tube - A type of optical fiber cable construction where one or more fibers are laid loosely in a tube. Also called loose tube fiber.

EE. Main Cross-connect (MC) - The cross-connect normally located in the Telecommunications Equipment Room for cross-connection and interconnection of entrance cables, first-level backbone cables, and equipment cables.

FF. Metropolitan Area Network (MAN) - A data communications network that covers an area larger than a campus area and smaller than a wide area network. Typically interconnects two or more LANs and usually covers an entire metropolitan area.

GG. MPOE - Minimum Point of Entry, Utility Partnerships/Alternate Carrier, usually located within the Telecommunications Room.

HH. Multimode Fiber (MMF) - An optical fiber that carries many paths of light or an optical waveguide that allows many bound modes to propagate.

II. Single-mode Fiber (SMF) - An optical fiber, usually step-index grade, which supports only one mode of light propagation. This does not necessarily imply single wavelength operation. The light source is normally a laser.

JJ. Strand (STR) - A single unit of optical fiber within a cable (e.g., a 12-strand fiber cable has 12 individual optical fibers within the cable sheath).

KK. Telecommunications Entrance Facility - Utility Partnerships/Alternate Carrier Minimum Point of Entry that is usually located within the Main Cross-connect Room (MC).

LL. Telecommunications Equipment Room (TER) - A centralized space that provides space and maintains a suitable operating environment for the termination of backbone and campus cabling and house centralized communications and/ or computer equipment (such as Core Switches and Servers). *Note:* An equipment room is considered distinct from a telecommunications closet because of the nature or complexity of the equipment housed by the equipment room.

MM. Telecommunications Main Grounding Busbar (TMGB) - A grounding busbar, located in the MC, connected to the main building ground electrode by a continuous 2/0 - #4 AWG wire (Wire size is dependant on the distance between the busbar and the building main).

NN. Telecommunications Room (TR) – A room dedicated to housing a group of telecommunications connectors (e.g., patch panel or punch-down block) that allows equipment and backbone cabling to be cross connected with patch cords or jumpers.

OO. Underwriters Laboratories (UL) - A United States-based independent testing laboratory that sets safety tests and standards.

PP. Uninterruptible Power Supply (UPS) - A device that is inserted between a primary power source (e.g., a commercial utility) and the primary power input of equipment to be protected (e.g., a computer system) to eliminate the effects of transient variances or temporary outages.Retain acronyms, abbreviations, and terms that remain after this Section has been edited.

1.04 SYSTEM DESCRIPTION

A. Provide a complete telecommunication cabling system installation as specified herein and as shown on the Drawings. In general, system shall include, but not be limited to, the following:

1. Horizontal twisted pair cabling:

a. Horizontal twisted pair cables shall route between the TR and workstation outlets, and shall consist of Category 6 and/or Category 6A, 4-pair, UTP, riser rated copper cables.

b. Horizontal twisted pair cable will support communication devices such as but not limited to the following:

1) Data work stations

2) Telephones

3) Emergency Phones

4) Fax Machines

5) Wireless Access Points

6) Projectors

7) Projection Screens

8) Controllers

9) AV equipment

10) HVAC Equipment

11) Security Cameras

12) Security Alarm Panels

13) Fire Alarm Panels

c. Horizontal twisted pair cables shall terminate on back of rack mounted, Category 6, 48-port, 19" patch panels with modular 8-pin connector front for interface with Owner furnished routers/switches or voice patch panel field via Category 6 patch cords. Patch panels shall have 110 type terminations at rear for horizontal cable terminations.

d. Wire management shall be provided above and below each patch panel and shall be 2 RU.

e. Category 6, RJ-45 connectors at workstation, security, and BAS, outlets.

f. Category 6A, RJ-45 connectors at WAPs and Camera outlets.

2. Patch cords:

a. UTP patch cords shall match the physical and performance criteria of the specified horizontal twisted pair cable and be terminated at each end with 8-postion modular plugs.

b. Patch cords shall be furnished in varying lengths as required.

c. Patch cord quantities shall match the following:

1) Two patch cords for each category 6 and 6A data cable installed. This includes one standard line cord at the work station and one patch cord at the equipment room.

B. Workstation outlets: Cat 6

1. Standard telecommunication outlets shall consist of the following, unless otherwise noted on the Drawings:

   a. Two horizontal twisted pair cable(s) (White) per office outlet.

   b. 4 11/16" Square, 2-1/8" deep box, with single gang ring and single -gang cover plate with 4 ports.

   c. Two RJ-45 connector jacks, Orange for twisted pair terminations.

   d. Blanks as required.

C. Wireless Access Point and Camera Outlets (Cat 6A)

1. WAP telecommunication outlets shall consist of the following, unless otherwise noted on the Drawings:

   a. Two horizontal twisted pair category 6A cable(s) (White) per outlet.

   b. Single -gang cover plate with 2-ports when wall mounted.

   c. Surface mount box with 2-ports when above accessible ceiling.

   d. Two RJ-45 connector jack, (Purple) for twisted pair terminations.

   e. Blanks as required.

2. Surveillance Camera Outlets (Cat 6A)

   a. Camera telecommunication outlets shall consist of the following, unless otherwise noted on the Drawings:

   b. One horizontal twisted pair cable(s) (Green) cat 6A per outlet.

   c. 4 11/16" Square, 2-1/8" deep box, with single gang ring and single -gang cover plate with 2 ports.

   d. One RJ-45 connector jack, Green for twisted pair terminations.

   e. Blanks as required.

D. Wall Mounted Telephone outlets (Cat 6)

1. Wall mounted telephone outlets shall consist of the following, unless otherwise noted on the Drawings:

   a. One horizontal twisted pair cable (White) per outlet.

   b. Single-gang metal cover plate with 1-port and two support studs.

   c. One RJ-45 connector jack (Orange) for twisted pair terminations.

E. Video (AV) (Cat 6A)

1. AV network system cables

   a. Horizontal twisted pair cable(s) (Yellow).

b. RJ-45 connector jack, Yellow for twisted pair terminations.

F. E-Phone

1. Wall mounted and pedestal mounted

a. One cat 6 horizontal twisted pair cable (White) per outlet, wall mounted.

b. One cat 6 indoor/outdoor twisted pair cable (black) per outlet, pedestal mounted.

c. Surface mount box

d. One RJ-45 connector jack (Orange) for twisted pair terminations. Terminate on the miscellaneous 110 field at backboard.

G. Building Automation System (BAS)

1. Control Panel Location

a. One horizontal twisted pair cable(s) (Green) cat 6 per outlet.

b. Surface mount box with 2-ports.

c. One RJ-45 connector jack, Green for twisted pair terminations.

H. Refer to Drawings for complete documentation of above requirements and all additional requirements.

1.05 SUBMITTALS

A. Submit in accordance with the requirements of Section 270010: Basic Communications Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.

2. Describe system operation, equipment, dimensions and indicate features of each component.

3. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

4. Shop Drawings prepare in AutoCAD Release 2012, to include the following:

a. Building floor plans showing location of all outlets, raceways, cable trays, conduits and cable routing to each device at same scale as construction documents.

b. Provide 1/4" scale plans of equipment layout in MPOE, IC and TR rooms.

c. Provide wall elevations of MPOE, IC and TR rooms at ½" scale.

d. Provide equipment rack elevations at 1/2" scale.

e. Use identical symbols as those used in construction documents.

f. Text shall be a minimum of 3/32" high when plotted at full scale.

g. Screen all background information.

5. Furnish structural calculations for equipment anchorage as described in Section 270010: Basic Communications Requirements.

6. Complete bill of materials listing all components.

1.06 WARRANTY.

A. Installer's qualifications: Furnish satisfactory proof of required experience specified herein for system installer.

1. The installing contractor shall be certified by the manufacturer for the product installed to provide a manufacturers product and application warranty.

2. Technicians shall be certified by the manufacturer of the system components installed per the manufacturers requirements to provide a certified structured cabling system. The structured cable system shall be warranted by Leviton corporation with a Life Time Warranty. The warranty certification shall be provided to the owner at the completion of the project. All required drawings and test results shall be provided to the manufacturer by the contractor as required by the manufacturer to provide the manufacturers warranty.

1.07 RECORD DRAWINGS:

A. Furnish Record Drawings as described in Section 270010: Basic Communications Requirements, utilizing Shop-Drawing submissions with updated field conditions. These Drawings shall include but not be limited to the following:

1. Plot plans and building floor plans, showing point-to-point wiring location of all devices.

2. Block Diagram/Riser Diagram showing the system components and all conduit and wire type/sizes between each.

B. Drawings shall be incorporated into the Record Drawing submission.

C. Final acceptance will not be made until the Engineer has approved the Record Drawings.

1.08 OPERATION AND MAINTENANCE MANUAL

A. Supply operation and maintenance manuals in accordance with the requirements of Section 270010: Basic Communications Requirements, to include the following:

1. A detailed explanation of the operation of the system.

2. Pictorial parts list and part numbers.

3. Schematic wiring diagrams.

4. Telephone numbers for the authorized parts and service distributor.

5. Final testing reports.

1.09 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this section may be used on the Project unless otherwise submitted.

C. Manufacturer qualifications: Manufacturer must have a minimum 5 continuous years of experience in design and manufacturing of the materials and equipment specified herein.

D. Installer's qualifications:

1. Installer must have a minimum 5 continuous years of experience in satisfactory completion for Projects similar in scope and cost. Provide backup information on 5 such Projects.

2. Installer shall possess a current, active and valid C7 or C10 California State Contractors License.

3. The installer shall be the Manufacturer's certified reseller/installer of the telecommunication equipment/cable system provided. The certification shall have been completed 60 days prior to project bid date. Provide evidence of this certification.

1.10 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: Telecommunication system components shall not be delivered to the Project site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Equipment damaged during shipping shall be replaced and returned to Manufacturer at no cost to Owner.

B. Storage: Store in clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris and traffic.

C. Handling: Handle in accordance with Manufacturer's written instructions. Be careful to prevent internal components damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to Manufacturer.

1.11 WARRANTY

A. Units and components offered under this Section shall be covered by a Life Time product and application warranty for malfunctions resulting from defects in materials and workmanship. Warranty shall be provided from the component manufacturer and shall name the owner on the warranty certificate. Warranty shall begin upon acceptance by the Owner.

B. Contractor shall provide required drawings, test results, application and any other items required by the manufacturer to produce the required warranty.

1.12 MAINTENANCE

A. Maintenance services:

1. Distributor of the major system components shall maintain a replacement parts department and provide testing equipment when needed. A complete parts department shall be located close enough to supply replacement parts within a 4 hour period.

2. Service must be rendered within 4 hours of system failure notification.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be in compliance with all features specified herein and indicated on the Drawings.

1. Horizontal twisted pair cable:

a. BerkTek (No substitutions accepted)

2. Twisted pair patch cord cable:

a. Leviton (No substitutions accepted)

3. Horizontal Structured Cable Systems

a. Leviton/BerkTek (No substitutions accepted)

4. Test equipment:

a. Fluke Networks.

b. Agilent Technologies

c. Tektronix.

B. Substitutions: Components specified are per the owners component standards for Structured cabling systems and substitutions will not be accepted.

C. Horizontal cable support bar:

1. Application: Suitable to horizontally support cables at termination points on back of patch panels.

2. Finish: Shall match the rack.

D. Horizontal management panels:

1. Application: Suitable to horizontally support cord management within rack bay on front of patch panels.

2. Configuration: The horizontal management panels shall be single-sided.

3. Size: 2U high by 19" mounting width.

4. Finish: Black, guide and cover.

a. Minimum tensile strength: 100,000psi.

2.02 HORIZONTAL TWISTED PAIR CABLING

A. Horizontal cables:

1. Application:

a. Suitable for indoor installations, exposed within equipment rooms, above suspended ceilings and below raised floors in cable trays, hangers or on deck, or within walls. If space is used as an air plenum, cable shall either be plenum rated or installed in EMT conduit.

b. Each cable run shall be continuous single cable, homogenous in nature, without splices.

c. Cables shall meet CAT6 performance criteria for all applications except WAP's and surveillance cameras,

d. Cables shall meet CAT6A performance criteria for all applications for WAP's and surveillance cameras.

e. Cables shall be CMR or CMP rated as required for rating of space..

2. Conductors:

a. Insulated conductors: Eight #23 AWG, solid copper wire insulated with FEP for plenum applications or thermoplastic polyethylene or high-density polyolefin for non-plenum rated applications.

b. Twisted pairs: Two insulated conductors twisted together to form a pair and four such paired cables to form a unit with individually color-coded pairs to conform to industry standards (ANSI/ICEA Publication S-80-576-1994 and EIA-230).

3. Cable sheath:

a. Outer jacket: Seamless outer jacket, flame-retardant PVC, applied to and completely covering the internal components (twisted pairs).

b. Flame rating: CMP according to NEC Article 800, tested to NFPA 262 and UL Listed as such.

4. Electrical performance: Meet or exceed TIA/EIA-568-C.2 Enhanced and ISO 11801 Class E specifications for CAT6e UTP cabling.

5. Manufacturer:

a. Cat 6: BerkTek Lanmark 1000, cable color per 1.04

1) Part #:

a) Plenum (CMP) #10032092

b) Riser (CMR) #10032459

b. Cat 6A: Color per 1.04

1) Part #:

a) Plenum (CMP) #11082058

b) Riser (CMR) #11082063

B. Modular patch cords:

1. Application: Suitable for indoor installations within equipment rooms or workstation environments.

2. Cords assembled from a single, continuous length of cordage, homogenous in nature and terminated at both ends via 8-position modular plugs. Splices are not permitted anywhere.

3. Cordage:

a. Insulated conductors: Eight #23 AWG, solid copper wire insulated with thermoplastic polyethylene or high-density polyolefin for non-plenum rated applications.

b. Twisted pairs: Two insulated conductors twisted together to form a pair and four such paired cables to form a unit with individually color-coded pairs to conform to industry standards (ANSI/ICEA Publication S-80-576-1994 and EIA-230).

4. Cable sheath:

   a. Outer jacket: Seamless outer jacket, flame-retardant PVC, applied to and completely covering the internal components (twisted pairs).

   b. Flame rating: CM according to NEC Article 800, tested to UL listed as such.

5. Electrical performance: Meet or exceed TIA/EIA-568-C.2 Enhanced and ISO 11801 Class E specifications for CAT6 and CAT6A UTP cabling.

6. Manufacturer:

   a. Leviton

   b. Part #:

      1) Cat 6 Work Station Cords 10': #62460-10L (100% Cat 6 cables installed)

      2) Cat 6 Patch Panel Cords 5': #62460-05L (50% Cat 6 cables installed)

      3) Cat 6 Patch Panel Cords 3': #62460-07L (50% Cat 6 cables installed)

   c. WAP Cords

      1) Cat 6A Work Station Cords 10': #6210G-10* (100% Cat 6A cables installed) Purple

      2) Cat 6A Patch Panel Cords 5': #6210G-05* (50% Cat 6A cables installed) Purple.

      3) Cat 6A Patch Panel Cords 5': #6210G-03* (50% Cat 6A cables installed) Purple.

C. Crossconnect wires:

1. Crossconnect wires shall be suitable for installation within equipment rooms and fully compatible with the termination apparatus specified within this Section.

2. Crossconnect wires shall be manufactured from a single, continuous length of insulated wire, homogenous in nature. Splices are not permitted anywhere.

3. Conductors:

   a. Insulated conductors: #23 AWG, solid copper wire insulated with thermoplastic polyethylene or high-density polyolefin for non-plenum rated applications.

   b. Twisted pairs: Two insulated conductors twisted together to form a pair with individually color-coded pairs to conform to industry standards (ANSI/ICEA Publication S-80-576-1994 and EIA-230).

2.03 COPPER DISRIBUTION PATCH PANELS

A. Application: To terminate horizontal distribution cable for data and telephone systems. The patch panels shall match the category of the horizontal cable and be from the same cable manufacturer or matched to the cable manufacturer for maximum warranty as required by the manufacturer.

1. Copper patch panels shall be 19" rack mountable 48 ports per rack mounting unit and shall be no more than two rack mounting units in height.

2. All copper patch panels for Cat 5e cable shall have IDC-type terminating blocks. Provide Flat QuickPort patch panels for Category 6 and 6A. Refer to 2.04.b

3. There shall be port identifier label space on the front and shall also include a port identifying number.

4. Manufacturer:

   a. Leviton

   b. Part #:

      1) Category 6, 48 port Patch Panel: #49255-L48, With appropriate colored jacks

      2) Category 6A, 48 port Patch Panel: #6A586-U48, With appropriate colored jacks

      3) Category 6A, 24 port Patch Panel: #6A586-U24, With appropriate colored jacks

2.04 TIE COPPER DISRIBUTION PATCH PANELS

A. Application: To terminate 25 pair tie copper cable from the telephone backboard. Allows telephone circuits on the Entrance and/or riser copper cable to be cross connected at the backboard and appear at the equipment rack on seperate patch panels from the distribution patch panels.

1. Copper patch panels shall be 19" rack mountable with at least 24 ports per rack mounting unit and shall be no more than two rack mounting units in height.

2. All copper patch panels shall have IDC-type terminating blocks.

3. There shall be port identifier label space on the front and shall also include a port identifying number.

4. Patch Panels shall match the category of the Tie Cable specified.

5. Manufacturer:

   a. Leviton

      1) Part #: Category 5e, 48 port Patch Panel: #5G596-U48

      2) Part #: Category 5e, 24 port Patch Panel: #5G596-U24

2.05 COPPER 110 STYLE TERMINATION BLOCKS

A. Application: To terminate 25 pair tie copper cable, riser copper cable and miscellaneous telephone circuits such as Fire Alarm, Security Alarm, Elevator Phones, and Emergency Phones at the telephone backboard.

B. Materials

1. 110 style wiring blocks shall be wall mounted, Category 5, 5e and Cat-6 and 110-style C-4/C5 clips. as required to match terminated cable.

2. Supply a crossconnect wire manager above and below each 100 pair 110 termination block.

C. Manufacturer:

1. Leviton

2. Part #:

   a. Miscellaneous Distribution: Category 6 Misc. 110/100 Blocks: #41AB6-1F4

   b. 25 Power Sum Cable: Category 5e Tie, 110/100 Blocks: #41AB2-1F4

   c. ARMM Riser Cable: Category 5e Riser, 110/100 Blocks: #41AB2-IF5

2.06 WORKSTATION JACKS AND WALLPLATES

A. Outlet faceplates shall be suitable for indoor installations to standard single or double-gang flush wall mounted outlet box plaster rings, and floor boxes.

B. Refer to Specification Section 262726: Wiring Devices for device cover plate finish.

C. Outlets:

1. Data Jacks shall be 8 pin, 110/IDC termination and rated Category 6 and 6A.

2. Manufacturer: Leviton

3. Part #:

   a. Standard Cat 6 Data Jack: #61110-RO6 (Orange)

   b. Wall Phone Jack: #61110-RO6 (Orange)

   c. BAS Outlet Jack: #61110-RV6 (Green)

   d. AV Network Jack: #61110-RY6 (Yellow)

   e. WAP Outlet Jack: #6AUJK-RP6 (Purple)

   f. Camera Outlet Jack: #6AUJK-RV6 (Green)

   g. Security Panel Jack: #6AUJK-RV6 (Green)

4. Standard wall mounted faceplates:

   a. Voice/Data outlets will be of modular design, color-coded to distinguish between data service and Wireless data service. Each outlet shall be configured with Modular 8-Pin jacks wired to the T568B pin assignment sequence.

   b. All outlet jacks will be rated for category 6/6A systems. Data jacks will be Orange. All wall face plates will white.and have 4 ports minimum with Identification windows.

   c. All unused ports will be filled with a blank insert to match the color of the plate.

   d. Manufacturer: Leviton

      Part #: Wall Plate: #42080-4WS

5. Surface mounted outlet boxes

a. Surface outlets shall be fully compatible with the specified modular connector/jacks.

b. Surface mount boxes shall have breakouts to accomodate surface mount raceway and cable entry. Boxes shall be a 2 piece design with a minimum 2 jack configuration.

c. Outlets can be secured with screws, adhesive or mounting magnets.

d. Outlet box shall have a ID window with plastic cover.

e. Manufacturer: Leviton

Part #: Wall Plate: #4S089-2WP

6. Above Ceiling Outlets

a. Leviton: Quick Port Ceiling Bracket

1) #49223-CBC

7. Wall mounted phone faceplates:

a. Faceplate shall be single-gang, flush mounted with 1 recessed port and shall include required accessories.

b. Faceplate shall include two mounting studs for standard wall phone instrument.

c. Faceplate shall be stainless steel.

d. Manufacturer: Leviton

e. Part #: Wall Plate: #4108W-1SP

8. Surface Raceway Mounted Plates

a. Decora Inserts with 2 ports and shall include required accessories, such as icons, blank inserts, label windows and labels.

b. Manufacturers Faceplate as required for Wiremold 4000 raceway.

c. Manufacturer: Leviton

d. Standard Data Jack: #61110-RO6 (Orange)

9. Partition furniture mounted faceplates:

a. Faceplates shall have 4-ports and shall include required accessories, such as icons, blank inserts, label windows and labels.

b. Furniture plate shall match the type furniture installed for a seamless snap in fit to the base knock out of the installed furniture.

c. Faceplates shall match the color of the furniture base.

d. Manufacturer: Leviton

e. Part #: Furniture Plate: #49910-Sx4 (x=Color)

D. Horizontal cable management: 2RU horizontal cable manager.

1. Chatsworth

2. Part #35441-702

E. Labels:

1. Labels shall be machine printable with a laser printer, ink jet printer, thermal transfer printer or hand-held printer.

2. Labels for horizontal cables:

a. Adhesive backed labels and self-laminating feature.

b. Fit the horizontal cables specified herein by fully wrapping around the cable jacket.

c. Size: 2" x .05" printable area, minimum.

d. Color: White.

F. Miscellaneous components:

1. Velcro cable ties:

a. Width: 0.75".

b. Color: Velcro cable ties the same color as the cable to which it is applied.

2. Plenum cable ties:

a. Suitable for use in plenums or air handling spaces.

b. Color: Maroon or other distinctive non-white color.

2.07 CABLE TESTING EQUIPMENT

A. Twisted pair cabling:

1. Horizontal cable tester:

a. Equipment shall meet TIA/EIA-568C.2 Addendum 1 requirements for Level III accuracy, as applicable for cable type specified herein.

b. Test standards: ISO/IEC 11801 Class C and D; ISO/IEC 11801-2000 Class C and D, 1000Base-Y, 100Base-TX; IEEE 802.3 10Base-T; ANSI TP-PMD; IEEE 802.5.

c. Areas of test measurement (minimum):

1) Wire Map.

2) Length.

3) Insertion Loss.

4) The following at both master unit and remote unit:

a) Near End Crosstalk (NEXT) loss.

b) Power Sum NEXT (PSNEXT) loss.

c) Equal Level Far End Crosstalk (ELFEXT).

d) Power Sum ELFEXT.

e) Return Loss (RL).

f) Attenuation-to-Crosstalk Ratio (ACR).

g) Power Sum ACR (PSACR).

5) Propagation Delay and Delay Skew.

6) Characteristic Impedance.

7) DC Loop Resistance.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of the telecommunication cabling system installation to verify conformance with manufacturer and specification tolerances. Do not commence with installation until all conditions are made satisfactory.

B. Verify that pathways and supporting devices are properly and completely installed prior to cable installation.

C. Verify dimensions of pathways to include length, i.e. "true tape" conduit runs.

D. Prior to installation, verify that equipment rooms are ready to accept cables and terminations.

3.02 INSTALLATION

a. Horizontal management panels:

1) Provide the horizontal management panels mounted to racks with one above each patch panel and one below the bottom patch panel in each rack bay where patch panels occur.

2) Provide fasteners and parts required to complete the installation.

b. Accessories: Provide all accessories as required for a complete installation. Include one bag of rack mounting screws, as come packaged with rack product. Attach the screws directly to the rack, which shall constitute turn-over to the Owner.

B. Horizontal twisted pair cabling:

1. Horizontal cable installation and routing:

a. Cable runs shall have continuous sheath continuity, homogenous in nature with no splicing.

b. No cabling shall exceed a cable length of 295' (90m) from the termination point at the equipment room to the termination at the workstation outlet, including service slack, when measured using test equipment.

c. Place cables within the designated pathways, such as cable tray or basket tray, cable runway, cable hangers, etc. Do not fasten, support or attach cables to other building infrastructures (i.e. ducts, pipes, conduits, etc.), other systems (i.e. ceiling support wires, wall studs, etc.), or to the outside of conduits, cable trays and non0approved pathway systems.

d. Place and suspend cables during installation and termination in a manner to protect them from physical damage or interference. Place cables with no kinks, twists, or impact damage to the sheath. Replace cables damaged during installation or termination at no additional cost.

e. Route cables at 90° angles, allowing for bending radius.

f. Do not exceed pulling tension of 25 lbs.

g. Do not use cable-pulling compounds.

h. Do not exceed a minimum bend radius of 6 times the cable diameter during and after installation.

i. Route cables beneath other building infrastructures (i.e. ducts, pipes, conduits, etc.) in above ceiling applications. Do not route cables over building infrastructures. The installation shall result in easy accessibility to the cables in the future.

j. Place cables 6" minimum away from power sources to reduce interference from EMI.

k. Do not set 360° service loops in place for slack storage. Instead, set slack as forward-and-back or as figure eights.

l. Place a pull string along with cables where run in conduits and spare capacity in conduit remains. Tie off ends of the pull string to prevent the string from falling onto the conduit.

m. When exiting the primary pathway, such as cable or basket tray, to the workstation outlets, exit via the top of the pathway. Secure the cables to the pathway using an approved cable tie.

2. Cable routing and dressing within equipment rooms:

a. Within equipment rooms, only use Velcro type straps.

b. Place cables within the overhead cable support system. When routing vertically on walls, fasten the cables onto vertical supports every 24" on center.

c. Provide 12" minimum sheath cable slack, length not to exceed permanent link maximum length requirement. Place the slack in the overhead cable support system.

d. At the rack bay, route and neatly dress cables from the overhead cable support system into the back of the vertical management sections. Divide the cables equally between both sides of an equipment rack such that a cable does not travel past the midpoint of the rack prior to termination. Fasten the cables to the cable support bar at the back of the patch panel using approved ties.

3. Termination in the equipment rooms:

a. Provide termination apparatus and accessories required for a complete installation. Install and assemble termination apparatus, accessories and associated management apparatus according to the manufacturer's instructions.

b. Properly relieve strain from the cables to and at termination points per manufacturer's instructions. Provide a strain relief bar at the back of the modular patch panels for proper strain relief.

c. Terminate cables and twisted pairs in accordance with manufacturer's latest installation requirements and TIA/EIA-568-C standard installation practices. Terminate cable pairs onto the termination apparatus compliant to T568B wiring.

d. Modular patch panels and horizontal management panels:

1) Provide quantity of modular patch panels to support the terminations of cables served from respective Telecom Room. Provide quantity of horizontal management panels based on the quantity of patch panels.

2) Install and assemble modular patch panels and horizontal management panels according to the manufacturer's instructions.

3) Install the patch panels and the horizontal management panels as shown on the Drawings.

4) Terminate cables in sequential order using the link's identifier starting at the top left and completing a panel before moving to the next panel below.

4. Cable routing and dressing at workstations:

a. Provide 18" cable slack at each workstation outlet, length not to exceed permanent link maximum length requirement. Place the slack within ceiling space neatly on a cable hanger or other approved cable support device.

b. Route to partition furniture mounted faceplates:

1) Route cables from primary or secondary pathway within ceiling through the furniture partition feed pathway (stub from wall or floor box) into opening at bottom of furniture system. Exercise caution to prevent scraping, cutting or other damage to cable jacket.

2) Provide spiral wrap around cables from furniture-feed pathway to point where cables enter furniture.

5. Termination at the workstation outlets:

a. Provide device components, connectors, and accessories required for a complete installation. Install and assemble connectors, jacks, adapters, termination apparatus, accessories and associated management apparatus according to the manufacturer's instructions.

b. Provide orange connectors for data links and green connectors for wireless data.

c. Wall mounted standard devices:

1) Install devices at heights indicated on drawings.

2) Mount faceplates plumb, square and at the same level as adjacent power receptacles.

3) Patch gaps around faceplates so that faceplate covers the entire wall opening.

d. Partition furniture mounted devices:

1) Coordinate installation of the faceplate adapters with the furniture contractor, including color.

2) Mount faceplate adapters into the designated openings for horizontal cables.

e. Terminate cables and twisted pairs in accordance with the manufacturer's latest installation requirements and TIA/EIA-568-B standard installation practices. Terminate cable pairs onto the connector compliant to T568B wiring.

6. Patching and cross connecting:

a. In equipment rooms, provide one modular patch cord for each data connector in each workstation outlet. Install from the horizontal termination field to the network switches/equipment. Neatly dress patch cords within the horizontal and vertical cable management components.

b. At work station, provide one modular patch cord for each cable jack installed in each workstation outlet.

3.03 LABELING

A. General requirements:

1. Labeling, label colors, and identifier assignments shall conform to EIA/EIA-606-A Administration Standards and as approved by the Owner.

2. Provide permanent and machine-generated labels. Hand written labels will not be accepted.

3. Modular patch panels:

a. Text color shall be black, #10 font size.

b. Label installation:

1) Provide labels at each port.

2) Install labels into label window.

B. Horizontal twisted pair labeling:

1. Cables:

a. Text color shall be black, #10 font size.

b. Label installation:

1) Provide labels on both ends of cable.

2) Install labels such that they are visible by technician from a normal stance.

3) Fully wrap label around the cable jacket (self lamination).

4) Provide one label within 4" of the termination apparatus.

2. Modular patch panels:

a. Text color shall be black, #10 font size.

b. Label installation:

1) Provide labels at each port.

2) Install labels into label window.

3. Outlets:

a. Text color shall be black, #10 font size.

b. Label installation:

1) At faceplates, provide labels above and below jacks.

2) At surface boxes, provide labels on the top of the box.

C. General:

1. Calibrate test sets and associated equipment per the manufacturer's instructions at the beginning of each day's testing and after each battery charge. Fully charge the test sets prior to each day's testing to ensure proper operation.

2. Ensure test equipment and test cords are clean and undamaged during testing activities. Per the Engineer's discretion, halt testing activity and clean testing equipment, test cords and related apparatus.

3. Permanently record test results electronically within test equipment at the time of testing.

D. Twisted pair testing:

1. Test for UTP cabling as follows:

TESTS FOR CATEGORY 6 CABLING TABLE				
Subsystem	**Type**	**Test**	**Configuration**	**Notes**
Horizontal	CAT6, CAT6A	Category 6, & 6A	Permanent Link	Per TIA/EIA-568-C.2

2. Precautions:

a. Adhere to the equipment manufacturer's instructions during all testing.

b. Prior to any testing activity or any measurements taken, ensure the test equipment is at room temperature, approximately 70°F.

c. Fully charge power sources before each day's testing activity.

3. Horizontal twisted pair testing:

a. Test equipment set-up:

1) Set-up the tester to perform a full CAT6/Cat 6A test, as a Permanent Link configuration.

2) If the tester has the capability, set the cable type as product specific setting. If not, set as generic CAT6, 6A cable.

3) Set the tester to save the full test results (all test points, graphs, etc.).

4) Save the test results with associated cable link identifier.

5) Calibrate the test set per the manufacturer's instructions.

b. Acceptable test results measurements:

1) Overall test results:

a) Links which report a Fail, Fail or Pass for any of the individual tests shall result in an overall link Fail. All individual test results must result in a Pass to achieve an overall Pass.

b) Any reconfiguration of link components required as a result of a test Fail, must be re-tested for conformance.

c) Remove and replace any cabling links failing to meet the criteria described in this Specification, at no cost to the Owner, with cables that prove to meet the minimum requirements.

2) Wire map: Provide continuous pairs and terminate all of the cabling links correctly at both ends, no exceptions taken.

3) Length: Ninety-four meters (308 feet) is the maximum acceptable electrical length measurements for any cabling link measured under a Permanent Link configuration, including test cords.

4) Insertion loss: The acceptable insertion loss measurements for any horizontal cabling link is that which is no greater than that listed in TIA/EIA-568-C.2.

5) Worst pair-to-pair near end crosstalk (NEXT) loss: The acceptable worst pair-to-pair NEXT loss for any horizontal cable is that which is no greater than that listed in TIA/EIA-568-C.2.

6) Power sum NEXT loss: The acceptable power sum PS-NEXT loss for any horizontal cable is that which is no greater than that listed in TIA/EIA-568-C.2.

7) Worst pair-to-pair ELFEXT and FEXT loss: The acceptable worst pair-to-pair ELFEXT and FEXT loss for any horizontal cable is that which is no greater than that listed in TIA/EIA-568-C.2.

8) Power sum ELFEXT and FEXT loss: The acceptable PS-ELFEXT and PS-FEXT loss for any horizontal cable is that which is no greater than that listed in TIA/EIA-568-C.2.

9) Return loss: The acceptable return loss measurements for any horizontal cabling link is that which is no greater than that listed in TIA/EIA-568-C.2.

10) Propagation delay and delay skew: The acceptable propagation delay and delay skew measurements for any horizontal cabling link is that which is no greater than that listed in TIA/EIA-568-C.2.

E. Record documents:

1. Permanently record all test results.

2. Export test results' numerical values to a single Microsoft Excel spreadsheet.

3. Submit test results in a format acceptable to the Owner, Owner's Representative and the Engineer before system acceptance.

4. Cable, fiber and pair identifiers of the test reports shall match the identifiers as labeled in the field, i.e. use the same ID on the cable/termination label as what appears on the test report.

5. Measurements shall carry a precision through one significant decimal place, minimum.

6. Use feet for the units for measurements shown on the print of the test measurements.

7. Print report such that fiber strands of a given cabling link have matching axis scales. The "X" and the "Y" axis shall be the same from report-to-report.

8. The trace of the printed test report shall show the launch cord.

9. For each cabling link, include either a schematic graphic or a brief narrative accurately describing the test set-up. The description shall include test/launch cord (with length), expected events (connectors, slices, etc.) with expected distances, etc. This information will eliminate many questions the Engineer will have while reviewing the reports.

10. For each twisted pair horizontal cable test, report shall contain the following information:

    a. Project name and address.

    b. Test company's and Operator's name.

    c. Date measurements were taken.

    d. Test equipment type to include model and serial numbers.

    e. Cable identification number and pair number.

    f. Measurement results.

    g. Pass/Fail

3.04 INSPECTION AND ADJUSTMENTS

A. Contractor shall inspect all installed Work in conjunction with the General Contractor and develop a "punch list" for all items needing correction. Provide punch list to the Engineer prior to their final walk of Project.

B. Punchlist work and the required remediation shall be performed prior to system final acceptance.

C. Replace or repair work completed by others that was defaced or destroyed during the installation of the telecommunication cabling system by this contractor.

D. Make changes to adjust the system to optimum operation for final use. Contractor is responsible for making changes to the system such that any defects in workmanship are correct and all cables and the associated termination hardware passes the minimum test requirements.

3.05 CLEANING

A. Remove all unused, excess and left over products, to include debris, spills, and installation equipment.

B. Leave finished work and adjacent surfaces in neat, clean conditions with no evidence of damage.

C. Legally dispose of debris.

D. Clean installed products in accordance with manufacturer's instructions prior to final punch list.

3.06 TRAINING

A. At the completion of all Work, a period of not less than 16 hours shall be allocated by the Contractor for instruction and training for the Owner Representative. The Cabling Contractor will need to describe how the cable from each cover plate is separated between different patch panels, how cross-connects are made and other basic cable plant management skills.

B. Contractor shall schedule training with a minimum of 7 days advance notice.

END OF SECTION

SECTION 27 51 26

ASSISTIVE LISTENING SYSTEM (ALS)

PART 1 - GENERAL

1.1 WORK INCLUDED:

A. Provide a permanently installed Assistive Listening System for each instructional space/classroom as indicated on the Drawings and specified herein. The assistive listening system transmitter shall be installed in the AV cabinet and shall be connected to the classroom AV system. The interconnection of the two systems shall not void any warranties.

B. Provide portable Assistive Listening Systems for Conference Room 121 as indicated on the Drawings and specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

A. Due to the nature of the project, this section may relate directly to, or requires coordination with all sections of the Contract Documents. Special attention should be given to:

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

SECTION NO.	SECTION TITLE
260010	BASIC ELECTRICAL REQUIREMENTS
270010	BASIC COMMUNICATIONS REQUIREMENTS
27 41 00	AUDIO VIDEO SYSTEM

1.3 QUALITY ASSURANCE:

A. All materials shall comply with applicable standards of the Underwriters Laboratories Inc.

C. Provide assisted listening system components from the same manufacturer.

D. Manufacturer qualifications: Firms regularly engaged in the manufacturing of Assistive Listening System of the type(s) specified for this Project and whose products have been in satisfactory use in similar service for not less than 5 years.

E. All products shall comply with applicable standards of the Underwriters Laboratories Inc., and conform to applicable U.S. Federal Communications Commission (FCC) requirements.

1.4 CONTRACTOR SUBMITTALS:

A. Shop drawings and catalog data submittals shall be made in accordance with Section, "Contractor Submittals." Submit sufficient information to indicate the scope and quality of the Assistive Listening System.

1. Block diagram showing system relationships of major components and quantities and interconnecting cable requirements.
2. Plans showing equipment location and conductor requirements.
3. Equipment outlet devices, and special mounting details.
4. Wiring diagrams showing terminal identification for field-installed wiring.
5. Catalog literature with component specifications.

1.5 DESCRIPTION:

A. Work under this section includes all equipment, labor, and materials necessary to furnish and install a complete assistive listening system conforming to the requirements of the 2016 California Building Code (CBC) Section 11B-219 and Section 11B-706.

B. The assistive listening system shall be a Frequency Modulated Radio Transmission system using the 72 MHz range assigned by the FCC exclusively for low power assistive listening systems.

C. The number of receivers provided shall be equal or greater than 4-percent of the total seating capacity. 25-

percent of the receivers required to be provided, but no fewer than two, shall be hearing aid compatible in accordance with the requirements of the 2016 California Building Code (CBC) Section 11B-706.3.

1. Provide a portable transmitter and receivers in conference room/s.
2. Provide a fixed transmitter in each classroom and lecture room and connect to the AV audio system.
3. Confirm occupancy totals with the Architectural plans.

D. The permanently installed system shall be a fixed, rack mounted transmitter and connected to the sound system. The ALS system shall be complete consisting of transmitter, portable receivers, antenna and earphones.

1.6 WARRANTY:

A. The assistive listening system transmitter and receiver units furnished under this Section shall be warranted to be free from defects in workmanship and material under normal use and conditions for a period of two (2) years. Accessories such as headphones, earphones, neckloops, and cords shall be warranted to be free from defects in workmanship and material for a period of 90 days; batteries are excluded. Warranty periods shall begin upon acceptance of the assistive listening system by the Owner's Representative.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Williams Sound
2. Listen Technologies

B. All equipment shall be the standard catalogued products of a single manufacturer.

C. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.2 GENERAL:

A. Stationary Transmitter (Classrooms and Lecture Rooms)

1. The stationary FM transmitter shall be capable of broadcasting on 57 channels.
2. The transmitter shall have a SNR of 80 dB or greater.
3. The output power shall be adjustable to quarter, half or full.
4. Channel tuning shall be capable of being locked.
5. The device shall broadcast on both wide and narrow band channels.
6. The device shall have an audio frequency response of 50 Hz to 15k Hz, ± 3 dB at 72 MHz, or of 50 Hz to 10k Hz, ± 3 dB at 72 MHz.
7. It shall have two mixing audio inputs. The device shall have the following:
   a. Audio device shall have an audio processor that is capable of automatic gain control and limiting.
8. Model Number:
   a. Williams T45
   b. Listen LT-800-072-01
9. Provide with Rack Mount Kit:
   a. Williams RPK 005
   b. Listen LA-326

B. Portable Transmitter (Conference Room/s)

1. The transmitter shall be a wide-band body-pack transmitter and shall operate on 17 selectable frequencies between 72MHz and 76MHz.

   a. It shall operate for up to 30 hrs with two AA Alkaline batteries and be housed in a black plastic enclosure with an aluminum faceplate.

   b. It shall have battery recharge ability utilizing drop-in chargers.

   c. The transmitter shall have a 3.5 mm microphone jack and a 2.5 mm auxiliary audio input jack. The microphone cord will serve as the transmitting antenna.

   d. The transmitter shall have three buttons on the front to access channel select, master and aux gain, compression on/off, channel lock and screen adjustments. There shall be an OLED screen on the front of the T46 displaying current operating status and menu information.

   e. The Transmitter shall have the ability to operate in dual channel mode whereby the user can switch between two different transmitting channel presets, each with its own set-up parameters (channel, master volume, aux volume).

2. There shall be a power switch which also serves as a microphone mute control on the top bezel of the transmitter.

3. The Transmitter shall have wide band FM modulation at 75 KHz peak with a frequency response of 180 Hz to 13 KHz.

4. The transmitter shall be equipped with an omni-directional conference microphone

   a. Model Number:

      i) Williams PPA T46

         a. Microphone: MIC 049

      ii) Listen LT-700-072

         a. Microphone: LA-277

C. Portable Receiver (All ALS rooms)

1. The FM receiver shall be capable of receiving on 57 wide band channels with a SNR of 80dB or greater.

   a. The device shall be able to be locked on a single channel.

   b. The receiver shall be capable of seeking channels.

   c. The device shall have an adjustable squelch.

   d. The device shall have an audio frequency response of 50 Hz to 15 KHz, ±3 dB.

   e. The device will incorporate a stereo headset jack that allows the user to plug in either a mono or stereo headset.

   f. The device shall incorporate an LCD display that indicates channel, battery level, low battery, battery charging, and RF signal strength.

   g. The receiver shall be able to function in both DX and Local mode.

   h. The unit shall operate off of 2 AA batteries. The receiver shall incorporate automatic battery charging circuitry for recharging of NiMH batteries.

   i. Model Number:

      i) Williams R38

      ii) Listen LR-400-072

2. The FM receivers shall be recharged using a charging carrying case for up to 8 units in each space.

a. Model Number:

i) Williams CHG 3512 PRO

ii) Listen LA-324

3. The FM receivers shall each be equipped with Ear Speakers.

a. Model Number:

i) Williams EAR 022

ii) Listen LA-164

4. The system shall include a neck loop that wirelessly connects to hearing aids equipped with a "T" coil.

a. Model Number:

i) Williams NKL 001

ii) Listen LA-166

5. Receivers shall be equipped with NiMH rechargeable batteries.

a. Model Number:

i) Williams BAT 026-2

ii) The Listen LA-362

D. Remote antennas shall be provided as required for the transmission of the audio from the transmitter to the receiver. The antenna shall be able to transmit signals at 72 Mhz.

1. The antenna shall be wall mounted to a BNC wall plate.

a. Model Number:

i) Williams ANT 028

ii) Listen LA-123

b. Provide RG58 coax cable with BNC connectors, length as required.

E. Provide sound reinforcement wall plaques per ADA requirements to indicate equipment available for the hearing impaired. Provide a plaque in space.

1. Verify location with general contractor prior to installation. Use the "international symbol of access for the hearing impaired".

2. Model Number:

a. Willaims IDP 008

b. Listen Technologies LA-304 ADA Access/Compliance signage kit.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The contractor shall supply all equipment required to provide a complete and functional assistive listening system.

B. The assisted listening system shall be an integral part of the sound reinforcement system for the required spaces.

3.2 TESTS AND ADJUSTMENTS

A. Under completion of the installation of all equipment and when same is in full operating condition, the contractor shall perform the initial completion tests and adjustments specified hereinafter. The Contractor is responsible to provide all necessary instruments, equipment, material, and labor necessary to complete the tests.

3.3 TRAINING:

A. Prior to establishing a training schedule, contractor will verify operational status of system with owners representative.

B. Owner personnel will be trained in the operation of the Assistive Listening System.

C. Training will be conducted no less than two times, four hours each. An initial familiarization and a follow up for detailed questions.

3.4 WARRANTY

A. The manufacturer shall guarantee the system and components to be free from defects of material and workmanship for a period of two years from the date of final acceptance by the owner.

B.

END OF SECTION

SECTION 28 23 00

SURVEILLANCE CAMERAS

PART 1 - GENERAL

1.01 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. This section provides the requirements for the surveillance camera system. The system shall include, but not be limited to, devices, panels, terminal cabinets, power supplies, backboards, programming, conduit/ raceway, wire/cabling, junction cans, terminal strips, testing and verification of a complete, operable and approved camera system.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1.02 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:

1. Underwriters Laboratories, Inc. (UL):

UL 13;	Power-Limited Circuit Cables.
UL 938;	Surveillance Camera Units.
UL 2044;	Commercial Closed-Circuit Television Equipment.
UL 3044;	Surveillance Closed Circuit Television Equipment.

2. Federal Communications Commission (FCC):

FCC Regulations:	Part 15 – Radio Frequency Devices & Radiation Limits.

3. Electronics Industries Alliance (EIA):

EIA:	Testing standards.

4. Related Specifications:

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

SECTION NO.	SECTION TITLE
260010	BASIC ELECTRICAL REQUIREMENTS
270010	BASIC COMMUNICATIONS REQUIREMENTS
271500	COMMUNICATIONS HORIZONTAL CABLING

1.03 ALTERNATES

A. Refer to section 012300 - Alternates, for description of work under this Section affected by alternates.

1.04 SYSTEM DESCRIPTION

A. The surveillance camera system is comprised of new IP cameras and recording system.

B. Provide a new IP fixed focus cameras, housings, and supports as shown on drawings.

C. Provide a Network Video Recorder/Server and required Software.

D. Provide a Power Over Ethernet (PoE) Network Switch for network connection of surveillance cameras and the Network server. The cameras will be powered with PoE.

E. Provide Category 6A data patch cords for interconnection of the surveillance components and cabling system.

F. Network Server shall be compatible with Windows 7

1.05 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. California State Contractors License (C7 or C10 required)
2. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
3. Describe system operation, equipment and dimensions and indicate features of each component.
4. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
5. Submit Manufacturer's installation instructions.
6. Complete bill of materials listing all components.
7. Warranty.

B. Record Drawings:

1. Furnish Record Drawings as described in Section 2760010: Basic Camera and Cable Systems Requirements.
2. Final acceptance will not be made until the Engineer has approved the Record Drawings.

1.06 OPERATION AND MAINTENANCE MANUAL

A. Supply operation and maintenance manuals to include the following:

1. A detailed explanation of the operation of the system.
2. Instructions for routine maintenance.
3. Pictorial parts list and part numbers.
4. Schematic Drawings of wiring system, including all peripheral devices, host computers, monitors, control devices, etc.
5. Telephone numbers for the authorized parts and service distributors.
6. Final testing reports.

1.07 QUALITY ASSURANCE

A. All construction shall be performed by a California State Licensed Contractor. C7 or C10.

B. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

C. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: Surveillance system components shall not be delivered to the Project site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Equipment damaged during shipment shall be replaced and returned to Manufacturer at no cost to Owner.

B. Storage: Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris and traffic. Provide heat where required to prevent condensation.

C. Handling: Handle in accordance with Manufacturer's written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to Manufacturer.

1.09 WARRANTY

A. The security system as described in this Specification shall be covered by a 3 year parts and service warranty at no additional cost to the Owner.

B. The warranty package shall include but not necessarily be limited to the following:

1. Emergency maintenance service on regular working hour basis.

2. Service by factory trained and employed service representatives of system Manufacturer.

C. Maintain regular service facilities and provide a qualified technician familiar with this Work at the Project site within four (4) hours of receipt of a notice of malfunction including weekends and holidays. Provide all material, devices equipment and personnel necessary for repairs. Install approved temporary, alternate equipment if required by the Owner, complete and operational within twenty four (24) hours after notification of a malfunction, at no additional cost.

D. Conduct all warranty repairs and service at the Project site unless in violation of Manufacturer's warranty; in the latter event, provide substitute systems, equipment and/or devices, acceptable to the Owner, for the duration of such off-site repairs. Transport warranty substitute and/or test systems, equipment, devices, material, parts and personnel to and from the Project site at no additional cost.

1.10 SYSTEM START-UP

A. Upon completion of installation, a factory trained dealer service representative shall perform initial start-up of the surveillance system. Sufficient time shall be allowed to properly check the system out and perform required minor adjustments before the Engineer's witnessed test shall begin.

PART 2 - PRODUCTS

2.01 GENERAL

A. All equipment and materials used shall be standard components that are regularly manufactured and used in the manufacturer's system.

B. All systems and components shall have been thoroughly tested and proven in actual use.

C. All systems and components shall be provided with the availability of a toll free 24- hour technical support phone number from the manufacturer. This no charge service shall be available to dealers, installers and end users.

2.02 MANUFACTURERS

A. The following manufacturers products shall be considered:

1. Cameras

a. Axis

b. Pelco

c. Bosch

2. NVR

a. Pelco

2.03 FIXED IP CAMERA DOME

A. Cameras shall be IP-based and comply with established network and video standards.

B. Cameras shall be powered by the switch utilizing the network cable. Power injectors (midspans) shall be provided by the contractor when required for proper operation.

C. Cameras shall be fully supported by an open and published API (Application Programmers Interface), which shall provide necessary information for integration of functionality into third party applications.

D. Cameras shall comply with relevant ONVIF profile as defined by the ONVIF Organization.

2.04 VIDEO SURVEILLANCE SCHEDULE

A. Camera types listed below describing various resolutions, form-factor and features shall be supplied by a single camera manufacturer video surveillance system.

B. The camera manufacture and model numbers will be as follows:

1. Interior fixed dome 1080p network camera shall be AXIS P3225-LV or approved equal.
2. Exterior fixed dome 1080p network camera shall be AXIS P3225-LVE or approved equal.
3. Exterior fixed dome 1080p network panoramic camera shall be AXIS Q3709-PVE or approved equal.

2.05 VIDEO SURVEILLANCE CAMERAS

A. Fixed dome 1080p network camera (Indoor and outdoor)

1. The fixed network camera shall meet or exceed the following design specifications:
   a. The camera shall operate on an open source; Linux-based platform, and including a built-in web server.
   b. The camera shall be equipped with an IR-sensitive progressive scan sensor.
   c. The camera shall provide a removable IR-cut filter, providing day/night functionality.
   d. The camera shall be equipped with a varifocal lens with P-iris.
   e. The camera shall provide local video storage utilizing a microSD/microSDHC/microSDXC memory card expansion, supporting memory up to 64 GB.
   f. The camera shall be manufactured with an IP52-rated, IK08 impact-resistant casing providing encapsulated electronics
   g. .The camera shall provide a manual 3-axis (pan/tilt/rotation) positioning to allow adjustment for optimum camera rotation and placement.
   h. The camera shall incorporate remote zoom functionality.
   i. The camera shall incorporate remote focus functionality.
2. The fixed dome network camera shall meet or exceed the following performance specifications:
   a. Illumination
      1) The camera shall meet or exceed the following illumination specifications:
         a) HDTV 1080p 25/30 fps with WDR - Forensic Capture - Color: 0.25 lux, B/W: 0.05 lux
         b) HDTV 1080p 50/60 fps - Color: 0.5 lux, B/W: 0.1 lux
   b. Resolution
      1) The camera shall be designed to provide at least two video streams in HDTV 1080p (1920x1080) at up to 30 frames per second (60Hz mode) or 25 frames per second (50Hz mode) using H.264 or Motion JPEG with WDR enabled.
      2) The camera shall be designed to provide at least two video streams in HDTV 1080p (1920x1080) at up to 60 frames per second (60Hz mode) or 50 frames per second (50Hz mode) using H.264 or Motion JPEG without WDR enabled.
      3) The camera shall be designed to provide 2 individually cropped out view areas
      4) The camera shall support video resolutions including:
         a) 1920x1200
         b) 1920x1080 (HDTV 1080p)
         c) 1600x1200
         d) 1400x1050
         e) 1280x720 (HDTV 720p)

5) The camera shall provide both landscape format (4:3 and 16:9 aspect ratio) as well as corridor format (3:4 and 9:16 aspect ratio).

c. Encoding

1) The camera shall support the following video encoding algorithms:

a) Motion JPEG encoding in a selectable range from 1 up to 25/30 frames per second in all resolutions with WDR enabled.

b) Motion JPEG encoding in a selectable range from 1 up to 50/60 frames per second in all resolutions without WDR enabled.

c) Baseline Profile H.264 encoding with motion estimation in up to 25/30 frames per second with WDR enabled.

d) Baseline Profile H.264 encoding with motion estimation in up to 50/60 frames per second without WDR enabled.

e) Main Profile H.264 encoding with motion estimation and context-adaptive binary arithmetic coding (CABAC) in up to 25/30 frames per second with WDR enabled.

f) Main Profile H.264 encoding with motion estimation and context-adaptive binary arithmetic coding (CABAC) in up to 50/60 frames per second without WDR enabled.

g) Support High Profile H.264 encoding with motion estimation up to 25/30 frames per second with WDR enabled.

h) Support High Profile H.264 encoding with motion estimation up to 50/60 frames per second without WDR enabled.

i) Support H.264 with automatic scene adaptive bitrate control in up to 50/60 frames per second.

2) The camera shall provide independently configured simultaneous H.264 and Motion JPEG streams.

3) The camera shall support both Maximum Bit Rate (MBR) and Variable Bit Rate (VBR) in H.264.

4) The camera shall provide configurable compression levels.

5) Support standard baseline profile H.264 with motion estimation.

6) Support motion estimation in H.264/MPEG-4 Part 10/AVC.

7) The camera shall for its H.264 implementation support scene adaptive bitrate control with automatic dynamic ROI to reduce bitrate in unprioritized regions in order to lowering bandwidth and storage requirements.

d. Transmission

1) The camera shall allow for video to be transported over:

a) HTTP (Unicast)

b) HTTPS (Unicast)

c) RTP (Unicast & Multicast)

d) RTP over RTSP (Unicast)

e) RTP over RTSP over HTTP (Unicast)

2) The camera shall support Quality of Service (QoS) to be able to prioritize traffic.

e. Image

1) The camera shall incorporate Automatic and Manual White Balance.

2) The camera shall incorporate an electronic shutter operating in the range of 1/142850s to 2s.

3) The camera shall incorporate Wide Dynamic Range - Forensic Capture functionality providing up to120dB dynamic range.

4) The camera shall provide backlight compensation functionality.

5) The camera shall support manually defined values for:

a) Color level

b) Brightness

c) Sharpness

d) Contrast

6) The camera shall incorporate a function for optimization of low light behavior.

7) The camera shall allow for rotation of the image in steps of 90°.

8) The camera shall incorporate local contrast functionality.

f. IR Illumination

1) The camera shall be equipped with built-in IR LEDs with adjustable angle of illumination and intensity.

a) The IR LEDs shall have a range of up to 25 m (82 ft).

b) The IR LEDs shall emit light with a wavelength of 850 nm.

g. User Interface

1) Web server

a) The camera shall contain a built-in web server making video and configuration available to multiple clients in a standard operating system and browser environment using HTTP, without the need for additional software.

b) Optional components downloaded from the camera for specific tasks, e.g. Active X, shall be signed by an organization providing digital trust services, such as Verisign, Inc.

2) Language Specification

a) The camera shall provide a function for altering the language of the user interface, and shall include support for at least 10 different languages.

3) IP addresses

a) The camera shall support both fixed IP addresses and dynamically assigned IP addresses provided by a Dynamic Host Control Protocol (DHCP) server.

b) The camera shall allow for automatic detection of the camera based on UPnP and Bonjour when using a PC with an operating system supporting this feature.

c) The camera shall provide support for both IPv4 and IPv6.

h. PTZ functionality

1) The camera shall provide:

a) Pan ±180°

b) Tilt -5 to +75°

c) Rotation ±95°

i. Event functionality

1) The camera shall be equipped with an integrated event functionality, which can be trigged by:

a) Live Stream Accessed

b) Day/Night Mode

c) Camera tampering

d) Manual Trigger/Virtual Inputs

e) PTZ functionality

f) Embedded third party applications

g) Edge storage disruption detection

2) Response to triggers shall include:

a) Send notification, using HTTP, HTTPS, TCP or email

b) Send images, using FTP, HTTP, HTTPS, network share or email

c) Send video clip, using FTP, HTTP, HTTPS, network share or email

d) Send SNMP trap message

e) Activate/Deactivate IR Illumination

f) DAY/Night Vision Mode

g) WDR Mode

h) Recording to local storage and/or network attached storage

i) PTZ control functionality

3) The camera shall provide memory for pre & post alarm recordings.

j. Edge storage

1) The camera shall support continuous and event controlled recording to:

a) Local memory added to the cameras SD-card slot

b) Network attached storage, located on the local network

2) The camera shall be able to detect and notify Edge storage disruptions.

k. Protocol

1) The camera shall incorporate support for at least IPv4/v6, HTTP, HTTPS, SSL/TLS, QoS Layer 3 DiffServ, TCP, ICMP, SNMPv1/v2c/v3 (MIB-II), RTSP, RTP, UDP, IGMP, RTCP, SMTP, FTP, DHCP, UPnP, ARP, DNS, DynDNS, SOCKS, SSH, NTP, CIFS/SMB and Bonjour.

2) The SMTP implementation shall include support for SMTP authentication.

l. Text overlay

1) The camera shall:

a) Provide embedded on-screen text with support for date & time, and a customer-specific text, camera name, of at least 45 ASCII characters.

b) To ensure accuracy, the camera shall accept external time synchronization from an NTP (Network Time Protocol) server.

c) Provide the ability to apply privacy masks to the image.

d) Allow for the overlay of a graphical image, such as a logotype, into the image.

m. Security

1) The camera shall support the use of HTTPS and SSL/TLS, providing the ability to upload signed certificates to encrypt and secure authentication and communication of both administration data and video streams.

2) The camera shall provide centralized certificate management, with both pre-installed CA certificates and the ability to upload additional CA certificates. The certificates shall be signed by an organization providing digital trust services.

3) The camera shall support IEEE 802.1X authentication.

4) The camera shall provide support for restricting access to pre-defined IP addresses only, so-called IP address filtering.

5) The camera shall restrict access to the built-in web server by usernames and passwords at three different levels.

n. API support

1) The camera shall be fully supported by an open and published API (Application Programmers Interface), which shall provide necessary information for integration of functionality into third party applications.

2) The camera shall support relevant ONVIF profiles as defined by the ONVIF Organization.

o. Embedded applications

1) The camera shall provide a platform allowing the upload of third party applications into the camera.

p. Installation and maintenance

1) The camera shall be supplied with Windows-based management software which allows the assignment of IP addresses, upgrade of firmware and backup of the cameras' configuration.

2) The camera shall support the use of SNMP-based management tools according to SNMP v1, 2c & 3 / MIB-II.

3) The camera shall allow updates of the software (firmware) over the network, using FTP or HTTP.

4) The camera shall provide the ability to apply a rectangle of customer-defined number of pixels to the image, which can be used as a pixel counter identifying the size of objects in number of pixels.

5) The camera shall store all customer-specific settings in a non-volatile memory that shall not be lost during power cuts or soft reset.

q. Access log

1) The camera shall provide a log file, containing information about the 250 latest connections and access attempts since the unit's latest restart. The file shall include information about the connecting IP addresses and the time of connecting.

2) Provide a connection list of all currently connected viewers. The file shall include information about connecting IP address, time of connecting and the type of stream accessed.

r. Camera diagnostics

1) The camera shall be equipped with LEDs, capable of providing visible status information. LEDs shall indicate the camera's operational status and provide information about power, communication with receiver, the network status and the camera status.

2) The camera shall be monitored by a Watchdog functionality, which shall automatically re-initiate processes or restart the unit if a malfunction is detected.

3) The camera shall send a notification when the unit has re-booted and all services are initialized.

s. Hardware interfaces

1) Network interface

a) The camera shall be equipped with one 100BASE-TX Fast Ethernet-port, using a standard male RJ45 connector and shall support auto negotiation of network speed (100 MBit/s and 10 MBit/s) and transfer mode (full and half duplex).

t. Enclosure

1) Be manufactured with an IP52-rated, IK08 impact-resistant casing providing encapsulated electronics.

u. Power

1) Power over Ethernet IEEE 802.3af/802.3at Type 1 Class 3

v. Environmental

1) Operate in a temperature range of 0 °C to +50 °C (+32 °F to 122 °F).

2) Operate in a humidity range of 10–85% RH (non-condensing).

2.06 SURVEILLANCE CONTROL AND MANAGEMENT SYSTEM

A. The video management system shall:

1. Support live view and recording of at least 12950 network video sources, in H.264, MPEG-4 Part 2 or Motion JPEG.
2. Support replay of up to 16 recorded network video streams in H.264, MPEG-4 Part 2 or Motion JPEG.
3. Utilize server software for recording and management of video and audio.
4. Be provided with client software used to access information from the server.
5. Be able to fast instant replay recorded material.
6. Provide enhancing image on live view.
7. Provide the capability to add action buttons to the live view interface and trig actions/events.
8. Provide the ability to drag and drop individual cameras and split views to the live view area at any time when live view mode across multiple monitors.

B. Hardware

1. The video management system shall support full functionality for the supported number of cameras when operated on a computer platform with the following specification:
   a. Be equipped with at least Intel Core i7 processor.
   b. 16GB RAM.
   c. Dedicated graphic card with full Direct X 9.0 hardware acceleration and at least 1GB onboard video memory
   d. 1000BaseT Ethernet network port.
   e. Hard drives with NTFS-file system and SATA 6Gb/sec.
2. The client software shall support full functionality when operated on a computer platform with the following specification:
   a. Be equipped with at least Intel Core i7 processor.
   b. 8GB RAM.
   c. Dedicated graphic card with full Direct X 9.0 hardware acceleration and at least 1GB onboard video memory
   d. 1000BaseT Ethernet network port.

C. Software requirements

1. The video management system shall support full functionality when operated in the following environment.
   a. One of the following versions of Microsoft Windows 32 & 64-bit
      1) Windows 8 Pro
      2) Windows 7 Professional
      3) Windows Server 2012
      4) Windows 2008 Server R2
      5) Windows 2008 Server
   b. Microsoft .Net runtime environment

2. The client software shall support full functionality when operated on a computer platform with the following specification:
    a. One of the following versions of Microsoft Windows 32 & 64-bit
        1) Windows 8 Pro
        2) Windows 7 Professional
    b. Microsoft .Net runtime environment

D. Video
1. The video management system shall accept video and audio from network cameras and video encoders compliant with the VAPIX open API as published by Axis Communications.
2. The video management software shall support traditional network cameras and video encoders as well as thermal network cameras.
3. The video management system shall, when operating in a fully supportive environment, be able to record at least 50 individually configured full frame rate video streams in Full HDTV 1080p (1920x1080 pixels) over IP networks.
4. The video management system shall provide a total recording capacity of at least 3000 frames per second.
5. The video management system shall, for each channel:
    a. Support Motion JPEG recording in a selectable range up to 30 fps (60z), 25 fps (50Hz) in all resolutions.
    b. Support MPEG4 Part 2 recording in a selectable range up to 30 fps (60z), 25 fps (50Hz) in all resolutions.
    c. Support H.264 recording in a selectable range up to 30 fps (60z), 25 fps (50Hz) in all resolutions.
6. Transmission
    a. The video management system shall allow for video to be transported over:
        1) Multipart HTTP (Unicast)
        2) RTP over RTSP over HTTP (Unicast)

E. Audio
1. The video management system shall support simplex audio encoded with the video stream.
2. Audio quality
    a. The video management system shall support:
        1) AAC LC at 8/16 kHz
        2) G.711 PCM at 8 kHz
        3) G.726 ADPCM at 8 kHz

F. I/O functionality
1. The video management system shall accept notifications and alarms from an unlimited number of auxiliary devices connected to the network.
2. Received notifications and alarms shall be able to generate events within the video management system.

G. Access control
1. The video management system shall accept notifications and alarms from an unlimited number of access control units connected to the network.
2. Received notifications and alarms shall be able to generate events within the video management system.

H. User Interface

1. The video management shall be equipped with a graphical user interface, providing the following functionality:
    a. Be able to display up to 25 different video streams.
    b. Be able to display up to 100 different video streams using multiple split views.
    c. Provide the functionality to quickly jump between multi-views using a quick view button.
    d. Support drag and drop of video sources within the user interface.
    e. Support multiple screens when operating on a computer supporting this.
    f. Provide map-based interface, allowing cameras to be selected based upon location of maps over the facility.
    g. Be available in at least 15 different languages, including English, French, Italian, German, Spanish, Polish, Russian, Korean, Japanese, Chinese, Swedish, Danish, Turkish, Arabic, Persian and Brazilian Portuguese.

I. Functionality
1. The following functionality shall be available from both server and client software, when operating in a fully supportive environment.
    a. Live view functionality
        1) Single camera live view
        2) Multi-views
        3) Sequence views
    b. Recording functionality
        1) Continuous recording
        2) Scheduled recording
        3) Event driven recording
        4) Manually initiated recording
    c. Provide individually and configurable resolution and frame rate for each video source.
    d. The duration of recorded material shall only be limited by the amount of available storage capacity.
        2. Video and audio shall be recorded using a non-standard format preventing manipulation of the content and shall contain information about date, time and source of the recorded material.

J. Replay functionality
1. The video management system shall be able to provide synchronized replay of at least 4 different recorded video streams.
2. The video management system shall be able to replay at least 8 simultaneous full frame rate Full HDTV 1080p (1920x1080 pixels) video streams.
3. Provide an ability to export multiple selected video and audio sequences to ASF-formats together with standalone player.

K. Search functionality
1. The video management system shall provide an ability to search for video based upon the following criteria's:
    a. Time & Date
    b. By camera
    c. Motion detection within a customizable area of the video
    d. Video streaming content

L. Map-based graphical user interface

1. The video management system shall be able to display facility maps with interactive camera icons, which can be used to call up live video and audio from the selected camera.
2. The video management system shall be able to import graphical map data in the following formats:
    a. JPEG
    b. BMP
    c. PNG
    d. GIF

M. IP addresses

1. The video management system shall operate using static or dynamic IP addresses.
2. The video management system shall provide support for addresses provided by a Dynamic Name Server (DNS).
3. The video management system shall allow for automatic detection of cameras and encoders using UPnP and Bonjour

N. PTZ functionality

1. The video management system shall for each video channel
    a. Provide the ability to control Pan, Tilt and Zoom functionality directly from the user interface.
    b. Provide at least 100 present positions, camera depending.
    c. Support guard tour functionality, which allows the PTZ device to automatically move between selected presets using an individual viewing time for each preset.

O. Event functionality

1. The video management system shall be equipped with integrated event functionality, which can be trigged by:
    a. Event trigged in a camera, encoder or other network connected device, including:
        1) - Video Motion Detection
        2) - Audio Detection
        3) - Camera Tampering
        4) - Cross Line Detection
    b. Lost Connection to network camera or encoder
    c. Schedule
    d. Failover recording recovery - recovery of local recordings in camera or encoder after connection disruption
2. Response to triggers shall include:
    a. Selecting predefined live-view
    b. Recording of video at defined image quality and frame rate
    c. Storing of pre-alarm video at the captured frame rate
    d. Activating external output
    e. Notification of event via email
3. The video management system shall provide an event history list, containing up to 1 year of history.

P. Protocol support

1. The video management system shall incorporate support for at least IP, HTTP, TCP, ICMP, RTSP, RTP, RTCP, SMTP, FTP, DHCP, UPnP, DNS, and Bonjour.
2. The SMTP implementation shall include support for SMTP authentication.

Q. Time

1. The video management system shall utilize NTP as provided by the server.

R. Security

1. The video management system shall provide the following:
   a. Authentication of nodes using Kerberos
   b. Authentication using Microsoft Active Directory
   c. Restrict access to the systems by usernames and passwords at a minimum of three different levels.

S. API support / Customization and Integration

1. The video management system shall be fully supported by an open and published API (Application Programmers Interface), which shall provide necessary information for integration with third party applications.

T. Maintenance and configuration functionality

1. The video management system shall:
   a. Provide the ability to create multiple users of the system, either from local PC users or through Active Directory, each with individual definable user rights.
   b. Provide the ability to assign IP address and configure new and replaced cameras and encoders.
   c. Provide an ability to back up system configuration.
   d. Provide the ability to upgrade firmware in individual cameras and encoders.
   e. When connected to Internet, be able to locate suitable firmware updates and download these

U. Supplied system

1. The video management system shall be an AXIS Camera Station Network Video Management system or equal.

2.07 WIRE AND CABLE

A. Category 6A Data Cable:
   a. Refer to Section 27 15 00
   b. All camera data jacks shall be green.

B. Patch Panels

1. Provide 24 port patch panels with green category 6A jacks for each camera cable.

C. Patch Cords

1. For connection to each camera, Network Switch Ports and NVR.
2. Category 6A, 4 pair, RJ45 - RJ45, Length as required
3. Color: Green

PART 3 - EXECUTION

3.01 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of the surveillance system installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

B. Examine the surfaces, anchors and ground that are to receive materials, fixtures, assemblies, components and equipment. Report the unsatisfactory conditions in writing to the Architect.

3.02 COORDINATION

A. Coordinate and disconnect existing electronic/electrical equipment, services and/or controls to items being removed by others.

B. Maintain a competent supervisor and supporting technical personnel, acceptable to the Engineer during the entire installation.

3.03 INSTALLATION

A. General:

1. The Contractors or subcontractors main resources within the project shall carry proper professional certification issued by the manufacturer and verified by a third party organization to confirm sufficient product and technology knowledge.
2. All equipment shall be tested and configured in accordance with instructions provided by the manufacturer prior to installation.
3. All firmware found in products shall be the latest and up-to-date provided by the manufacturer, or of a version as specified by the provider of the Video Management Application (VMA) or Network Video management system (NVR).
4. All equipment requiring users to log on using a password shall be configured with user/site-specific password/passwords.
5. Install surveillance camera systems in accordance with Manufacturer's written instructions, as indicated on the Drawings and as specified herein.
6. Use methods and lubricating compounds on cables and wires to prevent damage to cables and wires during pulling. Provide compounds that are not injurious to the cable and wire jackets and do not harden or become adhesive.
7. Perform this Work in accordance with acknowledged industry and professional standards and practices and the procedures specified herein.
8. A complete, operating system shall be provided. Include all devices specified including basic components and accessories, interconnecting wiring and other equipment and installation devices necessary for a complete system as specified.
9. Provide wire, system devices, etc., shall be in accordance with applicable codes for systems as specified. Label all wiring and equipment.
10. The equipment and wiring shall be installed in a neat and workmanlike manner by trained surveillance camera installers.

B. Wire and Cable:

1. Identify all wire and cable clearly with permanent labels wrapped about the full circumference within one (1) inch of each connection. Indicate the number designated on the associated field or Shop Drawings or run sheet, as applies. Assign wire or cable designations consistently throughout a given system; i.e., each wire or cable shall carry the same labeled designation over its entire run, regardless of intermediate terminations. Additionally, provide labels where wire and cable first enter and exit from conduit, junction or distribution boxes; labels shall be located within six (6) inches of the point of exit. Labels shall be by Brady or Thomas and Betts.
2. Secure all wire and cable run vertically in conduit for continuous distances greater than thirty (30) feet at the vertical run terminations. Cables shall be secured by screw-flange nylon cable ties or similar approved devices, Thomas and Betts or equivalent. Symmetrical clamping devices with split, circular or other wire conforming, nonmetallic bushings shall be provided for all other cables.
3. All wire and cable shall be continuous and splice-free for the entire length of run between designated connections or terminations.

4. Lace, tie or harness wire or cable as required herein and in accordance with accepted professional practice. Dress, lace or harness all wire and cable to prevent mechanical stress on electrical connections; no wire or cable shall be supported by a connection point.

5. Wiring for shielding certain conductors from others or routing in separate raceways, shall be as recommended by the Manufacturer's current requirements.

6. Label all cables at both ends of a run and within all pull and junction boxes using machine generated wrap-around labels.

C. Boxes:

1. Install all boxes square and plumb. Set "flush mounted" units so that the face of the cover, bezel or escutcheon shall be in the same place as the surrounding finished surface. Mount boxes and trim so that there are no gaps, cracks or obvious lines between the trim and the adjacent finished surface and ready them to receive final finish, as applicable.

2. Install insulating terminations in signal circuit boxes, and wire ways of this Section.

D. Labeling:

1. Label each device in a concealed location with the system point number and address.

3.04 PROGRAMMING

A. Prior to the completion of construction the Contractor shall schedule a meeting with the Owner to determine all of the programming criteria. The issues that shall be discussed are as follows:

1. CCTV camera call-up & recording features (including video motion detection)

B. The Contractor shall document the results of the meeting and perform all necessary programming to achieve the Owner's requests.

C. All programming shall be Windows 7 compatible.

3.05 FIELD QUALITY CONTROL

A. Manufacturer's field service: Contractor shall arrange and pay for the services of a factory-authorized service representative to supervise the initial start-up, pretesting and adjustment of the surveillance system.

B. Independent testing: Contractor shall arrange and pay for the services of an independent Testing Agency to perform all quality control electrical testing, calibration/adjustments and inspection required herein. Testing Agencies objectives shall be to:

1. Assure Camera system installation conforms to specified requirements and operates within specified tolerances.

2. Field test and inspect to ensure operation in accordance with Manufacturer's recommendations and Specifications.

3. Prepare final test report including results, observations, failures, adjustments and remedies.

4. Verify settings and make final adjustments.

C. At least five days prior to any testing, notify the Engineer so that arrangement can be made for witnessing test, if deemed necessary. All pretesting shall have been tested satisfactorily prior to the Engineer's witnessed test.

1. Testing:

a. Perform a 100% pretest of the system prior to final Engineer testing. Provide the Engineer with the contractor testing and the independent testing results prior to final punch.

D. Contractor shall replace at no costs to the Owner all devices which are found defective or do not operate within factory specified tolerances.

E. Contractor shall submit the Testing Agency's final report for review prior to Project closeout and final acceptance by the Owner. Test report shall indicate test dates, devices tested, results, observation, deficiencies and remedies. Test report shall be included in the operation and maintenance manuals.

3.06 TRAINING

A. Factory authorized service representative shall conduct a 4 hour training seminar for Owner's Representatives upon completion and acceptance of system. Instructions shall include safe operation, maintenance and testing of equipment with both classroom training and hands-on instruction.

B. Contractor shall schedule training with a minimum of 7 days advance notice.

END OF SECTION

SECTION 28 65 16

INTRUSION/ACCESS ALARM SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. This section provides the requirements for the intrusion/access alarm system. This system shall include, but not be limited to, devices, panels, terminal cabinets, power supplies, backboards, programming, conduit/ raceway, wire/cabling, junction cans, terminal strips, testing and verification of a complete, operable and approved intrusion alarm system.

1.02 WORK INCLUDED

A. General Requirements:

1. Provide all new devices comprising of door contacts, motion detectors, card readers, required 12v and 24v power supplies, backup battery/s and battery can, and all other accessories necessary as indicated on the project Drawings based on the intrusion alarm system and devices as specified herein. The intrusion and access control panels are existing.
2. Provide conduit/raceway and wire as indicated on the project Drawings based on the intrusion alarm system and devices as specified herein.
3. Terminate and program all panels and devices to the Owner standards.
4. Upon completion of the installation of the intrusion alarm system, a satisfactory test of the entire system shall be made in the presence of a contractor and the Owner.
5. Provide owner training.
6. Provide 'as-built' drawings and completion certificates.
7. Provide event log documenting the commissioning of the completed operational access-intrusion system.

1.03 AGENCY APPROVALS

A. All equipment shall be listed as power limited by Underwriters Laboratories, Inc. and approved by Factory Mutual Research. The manufacturers specified are ELK, Imron, Alarm Lock, Von Duprin, HID, GRI, Potter, LuNar and Visonic. These manufacturers are indicative of the quality and type of equipment to be furnished.

1. The intrusion alarm system and is its entirety shall be in compliance with all applicable electrical codes.
2. Panels and accessory components shall be catalogued by the manufacturer, U.L. listed to operate as a compatible system.
3. Specific U.L. Provisions:
   a. The system shall comply with the applicable provisions of the following Standards and Classifications:
      1) Underwriters Laboratories UL 294.
      2) Underwriters Laboratories UL 609.
      3) ANSI/BHMA A156.23. 1.4 CODES AND STANDARDS
4. State Codes:
   a. The system shall comply with all state codes with no exceptions.
   b. The California Electrical Code - NFPA 70 National Electrical Code with State of California amendments and Article 760.
   c. NFPA - 101 Life Safety Code.
   d. California Fire Code (CFC) - Uniform Fire Code with State of California amendments.
   e. California Building Code (CBC) - Uniform Building Code with State of California amendments.

1.04 SUBMITTALS

A. Submit all materials for approval arranged in the same order as specifications, individually referenced to specification paragraph. Submit number required in basic materials and methods. The following items shall be included:

1. Catalog sheets on all items proposed for the system.
2. Installation instructions.
3. Provide a full set of shop drawings showing device floor plans, riser diagrams, connection/termination diagrams to panels, power supplies, and devices.
4. Sequence of operations per the owners representative meeting with the contractor.
5. Commissioning instructions.
6. Operating instructions.
7. Maintenance and troubleshooting instructions.
8. Manufacturer's Product Data:
    a. List of Materials - for each item, include:
        1) Manufacturer.
        2) Model number.
        3) Listing: UL.
        4) Quantity.

1.05 CONTRACTOR'S AND SUPPLIER'S QUALIFICATIONS

A. Contractor shall supply License type (C-28)

B. Supplier shall have a minimum of 5 years documented experience specializing in intrusion detection and access systems.

C. Installer shall have a minimum of 5 years documented experience and factory authorization to furnish and install the equipment proposed.

1.06 QUALITY ASSURANCE

A. The manufacturer or their authorized representative shall confirm that within a reasonable distance of the project site there is an established agency which stocks a full compliment of parts and offers service during normal working hours as well as emergency service on all equipment.

1.07 OPERATION

A. System Operation:

1. Operation Sequence:
    a. Activation of an intrusion initiating device alarm condition shall activate the intrusion alarm system and will cause the following:
        1) Graphically illustrate the floor plan including icons for each element of the system. All icons must change state in conjunction with the remote device to identify normal, trouble and alarm conditions. These conditions must be identified with the following colors, green = normal, yellow = trouble and red = alarm conditions.
        2) Indicate type and location of alarm with English text at intrusion command station.
        3) Control panel contacts to change state as specified herein or as shown on the Drawings.
        4) Perform any additional functions as specified herein or as shown on the Drawings.
        5) Communicated alarm point to authorized UL 827 central monitoring station.
        6) Panel shall time out in 15 minutes and re-arm violated points automatically. Multiple alarms may be shunted as determined by the Owner.

b. Operation of an intrusion initiating device trouble or supervisory condition shall activate the intrusion alarm system and will cause the following:

1) Indicate type and location of trouble or supervisory with English text and trouble tone at the intrusion command station IS2000 work station.

2) Control panel trouble and supervisory contacts shall change state as specified herein or as shown on the Drawings.

3) Perform any additional function as specified herein or as shown on the Drawings.

4) Communicated trouble and supervisory point to authorized UL 827 central monitoring station and provide event log to document the proper English translation to remote monitoring station, identified by owner.

B. General System Operation:

1. Entry/Exit doors shall have delay times built in as determined be the Owner.

2. Interior detection devices shall have follower zones as required.

3. Command Stations shall provide entry pre alarm tone.

4. System shall have provisions to be sub-zoned.

C. Electronically Supervised:

1. Each detection device circuit shall be electronically supervised for opens and shorts in the wiring. Additionally, the panel shall sound a trouble condition at the command center in the event of a main power loss or battery trouble.

2. The occurrence of any fault shall activate the system trouble circuitry but shall not interfere with the proper operation of any circuit that does not have a fault condition.

3. The system loops shall be wired using Style A & Y (Class "B") supervised circuits.

PART 2 - PRODUCTS

2.01 INTRUSION PANEL

A. The following are the Customer's standard; Alternates must be an approved equal by the Customer. (see drawing details identifying all components for this panel).

1. Intrusion Panel

a. The Intrusion Panel shall be: ELK-M1GCB gold

1) Power Distribution - Altronix PD8ULCB

2) Network Board - Elk M1XEP

3) Input - Elk M1RB or M1XOVR

4) Surge Protected Telephone Jack - Elk 950

5) Misc Hardware as required for interconnection

B. Required Key pad with proximity card reader

1. Keypad - Elk M1KP2

2. Proximity Reader – HID iCLASS 900LNNNEK200D4

3. Backbox - Machine #keypadenclosurewhiteABS

C. Provide components for 50% growth

2.02 DETECTION DEVICES

A. The following are the Owner's standard - Devices shall be provided as required and indicated on the Drawings:

1. Motion:

a. Acceptable manufacturer - Visonic.

1) Wall mount corner model - Duet.

b. Acceptable manufacturer - Detection Systems.

1) Ceiling mount model – RK150DTGL

c. Acceptable manufacturer - Roconet, & Bosch

1) Ceiling mount model - Roconet 150T

2) Ceiling mount model, 18' - Bosch D59370

2. Interior door contacts:

a. Recessed - GRI 195-12WG 3/4"

b. Recessed - GRI 199-12WG 1"

c. Surface mount model – GRI 413PWG.

d. Overhead rollup - GRI 4532D-36.

e. Overhead rollup Latch - GRI 4482A

3. Magnets

a. GRI MC-25

b. GRI MC-180

4. Hold/Up and Durress Button

a. Potter HUB-T

2.03 ACCESS CONTROL

A. The following are the Customer's standard; Alternates must be an approved equal by the owner.

B. Devices shall be provided as required and indicated on the contract drawings.

C. Provide components for 50% growth.

D. Coordinate with Locksmith/Door Contractor for device compatibility and installation.

E. Equipment Manufacturer - Imron.

1. Model SCP-M (see drawing details identifying all components for this panel).

a. Imron MR-52 Door Controller

b. Imron 8 Port Multiplexer (RS 485 data expander

c. Imron output, S0-16

d. Imron Input, S1-16

F. Required Touch Entry Key on Keyfob and prox reader

1. Reader wall mount - HID920LNNNEK20452 Indala Format 18287

2. Reader slim line - HID900LNNNEK20452 Indala Format 18287Fire rated, UL listed.

3. Follow product specification for installation and clearance requirements.

2.04 DOOR DOGGING PUSH BUTTON

A. A push button switch will be required at card readers at each main entry door as shown on drawings. The switch shall allow for unlocking of the door when the first person enters with an access control card. When actuated, the door locking mechanism shall not engage allowing free access into the building.

B. Stainless Steel Vandal Resistant Single Pole Momentary Action Push To Make Switch. 12mm Prominent Button Actuator, Momentary Switch, Ring Illumination - Green, 24V Lamp Voltage.

1. Bulgin Part # MAV0120/3D2GN024

C. Dummy Plugs (Mount Mount)

1. GRI (George Risk Industries): Part # DP-1.0

2.05 POWER SUPPLY

A. Provide a 12-24 VDC system power supply.

1. Power supply shall be an AL1012ULXB (12V) & AL1024ULXB (24V)
2. Power Distribution - Altronix PD8ULCB
3. Misc Hardware as required for interconnectivity between components.

2.06 BATTERIES

A. Shall be a Power Sonic PS-12350 12 volt, Gel-Cell type (three required)

1. Battery shall have sufficient capacity to power the Intrusion alarm system for not less than 4 hours plus 5 minutes of alarm upon a normal AC power failure.
2. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks refilling, spills and leakage shall not be required.
3. Minimum shall be 6 amp hours.
   a. Installed battery amp hour capacity shall be minimum of 10% over calculated values.

2.07 EQUIPMENT CABINETS

A. The Intrusion, and Access Control hardware equipment cabinets shall be a Mier BW LRC103 REV.A (25) UL listed cabinet suitable for surface or semi-flush mounting. Cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.

B. The Power Supply and Spare equipment cabinets shall be a Mier BW LRC103 REV.A (25) UL listed cabinet suitable for surface or semi-flush mounting. Cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.

C. The Battery Cabinet shall be a FireLite BB25

2.08 CABLE

A. C1-Honeywell 5281 or Plenum 5381

B. C2-Honeywell 4978 or Plenum 5088

C. C3-Honeywell 1104 or Plenum 3104

D. C4-Honeywell 1125 or Plenum 3121

E. C5-Honeywell 1207 or Plenum 3206

PART 3 - EXECUTION

3.01 CONTRACTOR'S RESPONSIBILITIES

A. Installation of the intrusion alarm system shall be by the intrusion alarm system contractor.

B. The contractor shall coordinate the installation of the intrusion alarm equipment with the manufacturer or the authorized distributor.

C. All conductors and wiring shall be installed according to the manufacturer's recommendations, design plans and current code requirements.

D. The contractor shall be responsible for the correct location of all equipment. If there are any discrepancies between details in the Intrusion system design and real dimensions of rooms, building, etc. They shall be reported in writing immediately upon discovery to the architect.

E. The contractor shall install all conduit/raceway, wire/cable, devices, and terminal cabinets and make all connections of devices and circuits and all necessary material to provide a complete and operable system.

F. All lines/cables shall be permanently tagged and properly identified by the contractor at each terminal can and panel as to devices served, type and building with minimum of 3/16" printed letters.

G. Panels shall be labeled with 3/8" black letters on self adhesive tape as to (type-area served-zones).

H. Devices shall be labeled with 1/4" black letters on self adhesive tape as to (zone-point number).

I. All lines/cables shall be permanently tagged and properly identified by the contractor as to devices served, type, style and building.

J. Raceways shall be marked every 10 ft. with a permanent "blue" band to visually identify intrusion alarm circuits and junction boxes shall have blue painted lids.

K. Programming shall be performed by the contractor. The system programming shall be coordinated with the owners security systems representative prior to the system installation. The system shall be programmed for the following general sequence of operation.

1. Typical Door Card Reader:
    a. Red when inactive
    b. Green with successful read
    c. Stay green when dogged
    d. red w/failed read
2. Doors 100A & 100B (Main Entry)
    a. 1st card read disarms intrusion and sends user info to ELK Intrusion system.
    b. User has choice to push button and dog panic bars.
    c. Disables individual swipes card reader, dogs door then activates ADA button.
    d. Leaving: Present card, push dog button to release or times out, dogging auto releases @ predetermined time.
    e. Dogging at predetermined time: - Coordinate time parameters with owner security representative.
3. Doors 101A (Side Entry)
    a. 1st card read disarms intrusion and sends user info to ELK Intrusion system.
    b. User has choice to push button and dog panic bars.
    c. Leaving: Present card, push dog button to release or times out, dogging auto releases @ predetermined time.
    d. Dogging at predetermined time: - Coordinate time parameters with owner security representative.
4. 2nd floor Prep Room
    a. Card activates and unlatches door. User has option to dog door for student access.
5. 1st and 2nd floor IDF rooms.
    a. Card activates and unlatches door.

3.02 INSTALLATION OF SYSTEM COMPONENTS

A. System components shall be installed in accordance with 2013 revision of the appropriate standards of the California Electrical Code and state regulations in a neat and workmanlike manner.

B. In dusty environments such as new construction, motion detectors shall not be mounted until the construction is completed.

C. Ceiling motion detectors shall not be located within 60 inches of air handling supply grilles.

D. All door alarm and control devices shall be connected to the intrusion/access systems as required for a fully operational system.

E. The panel components of the system/s shall be installed for 50% growth.

3.03 CONDUIT/RACEWAYS AND WIRE

A. Conduit/Raceways:

1. In accordance with Basic Materials and Methods.
2. Conduit/Raceways shall be in accordance with the 2013 California Electric Code (CEC).
3. Conduit/raceway fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
4. Cable must be separated from any open conductors of power, or class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, as per CEC Article 760-29.
5. Wiring for 12-24 volt control, alarm notification and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference on loss of signals.
6. Conduit/raceway shall not enter the intrusion alarm control panel or any other remotely mounted control panel equipment or back-boxes, except where conduit entry is specified by the manufacturer.
7. Conduit shall be 41 inch (19.1 mm) minimum unless otherwise indicated on the project Drawings or devices as specified herein.
8. Surface Raceway (only used on Masonry surfaces) shall be Wiremold 800 or equal as a minimum unless otherwise indicated on the project Drawings or devices as specified herein.
9. All conduit, wires, etc except in Tel/Data closets shall be concealed.

B. Wire:

1. Wiring shall be in accordance with local, state and California codes (e.g. CEC Article 760) and as recommended by the manufacturer of the intrusion alarm system. Number and size of conductors shall be as recommended by the intrusion alarm system manufacturer, but not less than 22 AWG for detecting circuits and signaling Line circuits, and 18 AWG for alarm notification and power circuits.
2. Refer to drawing details identifying all accepted wire types for this system.
3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
4. Alarm wiring/cabling shall be installed and color-coded as per design plans.

C. Terminal Boxes, Junction Boxes, Panels and Cabinets:

1. All boxes and cabinets shall be UL listed for their use and purpose.
2. In the terminal box, circuits shall be arranged to serve like categories.
3. All Terminal box connections shall be made on terminal strips.
4. Mixed category circuitry shall not be permitted.
5. The intrusion alarm control panel and external power supply shall be connected to a dedicated branch circuit, 120vac 20 amperes. This circuit shall be labeled at the main power distribution panel as intrusion alarm.
6. Intrusion alarm control panel primary power wiring shall be 12 AWG.
7. The control panel cabinet shall be grounded securely to either a cold water pipe or a pipe or a grounding rod.
8. All Intrusion panels and external power supply shall have the electrical panel and circuit breaker location permanently and neatly written inside the enclosure. The circuit breaker shall be identified with a blue locking device.

9. No splices (joints) in wiring will be permitted except in terminal cabinets, junction boxes or equipment housing.

10. No splices will be allowed underground.

3.04 LABELING

A. All cables shall be permanently tagged and properly identified by the contractor at each terminal can and panel as to devices served, type and building with minimum of 3/16" printed letters.

B. Panels shall be labeled with 3/8" black letters on adhesive tape as to (type-area served-zones).

C. Devices shall be labeled with 1/4" black letters on self adhesive tape as to (zone-point number).

D. All cables shall be permanently tagged and properly identified by the contractor as to devices served, type, style and building.

E. Raceways shall be marked every 10 ft. with a permanent "blue" band to visually identify intrusion alarm circuits and junction boxes shall have blue painted lids.

3.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle products under provisions of Division 1.

B. Receive equipment at job site; verify applicable components and inventory quantity delivered.

C. Store equipment in clean, dry space and protect from dirt, fumes, water and construction debris and physical damage. Make arrangements with the Owner at the pre-construction meeting for storage of equipment on premises.

3.06 FINALIZATION

A. Final Test:

1. Before the installation shall be considered completed and acceptable by the Owner, a test on the system shall be performed as follows:

a. The inspector of record (IOR) shall operate every building device to ensure proper operation and correct annunciation at the command center and through the monitoring company.

b. When testing has been completed to the satisfaction of the IOR, a notarized letter co-signed by each attesting to the satisfactory completion of said testing shall be forwarded to the Owner, including event log documenting the successful operation of a complete working system.

c. The contractor shall leave the intrusion alarm system in proper working order and without additional expense to the Owner, shall replace any defective materials or equipment provided by him under this contract.

B. Burn-In:

1. Acceptance shall consist of the following:

a. Burn-in period.

b. The system shall be accepted for start of burn-in period upon successful completion and testing.

c. Burn-in period shall be a 30 day time frame to allow the system to operate free of defects, grounds, programming faults, etc.

d. The 30-day burn-in shall begin the day of acceptance by IOR and the Owner.

e. The burn-in period shall be 30 days of continuous use without system trouble, false alarm, open, short or ground condition present.

f. Should the system fail for any reason during the burn-in period, the Contractor shall respond immediately upon notification by Owner personnel and correct said deficiencies.

g. Upon correction and restoration, the burn-in period shall be re-set to "0" and the 30 day count shall begin again.

h. Warranty shall commence upon day 31 of successful burn-in period.

3.07 AS BUILT DRAWINGS, TESTING, AND MAINTENANCE INSTRUCTIONS

A. A complete set of reproducible "as-built" drawings in AutoCAD 2012 or newer format (disks and sheets) showing the revisions required by the architect's review and accepted by the owner.

1. The submitted drawings shall indicate the following;

a. Building floor plan

b. Power requirements

c. Conduit and wire pathway

d. Color coding, and wire tag notations for exact locations of all installed equipment

e. Location and type of devices

f. Complete point-to-point wiring diagrams

g. Specific interconnections between all equipment

h. Internal wiring of equipment

i. Single line and riser diagram

B. Reference Data for Operation, Maintenance and Repair:

1. In addition to the requirements of basic materials and methods, submit one (1) additional set. Submit in three post binders (not ring binder) with tabs.

2. Index.

3. Systems operating instructions.

4. Reduced set of system record drawings.

5. Key schedule.

6. Maintenance and spare parts schedules.

7. Equipment manuals:

a. Collate alphabetically by manufacturer.

b. Provide manufacturer's original operation, instruction and service manuals for each equipment item.

c. For each set, provide manufacturer's original printed copies only. Photocopies not acceptable.

C. Operating and Instruction Manuals:

1. Operating and instruction manuals shall be submitted prior to testing of the system. Three (3) complete sets of operating and instruction manuals shall be delivered to the Owner upon completion.

2. The Owner shall be furnished with all programming disks for each installation as well as hard copy printouts.

D. Testing Frequency Instruction:

1. Complete, accurate, step-by-step testing instructions giving recommended and required testing frequency of all equipment, methods for testing each individual piece of equipment, and a complete trouble-shooting manual explaining how to test the primary internal parts of each piece of equipment shall be delivered to the Owner upon completion of the system.

2. Test and verify intrusion system through the owners monitoring company, that devices are reporting, that phone communication for primary and secondary lines are tied in and connection to the owners network.

3. The contractor shall use the district construction server to program and test the intrusion and access control systems.

E. Maintenance instructions shall be complete, easy to read, understandable, and shall provide the following information:

1. Instruction on replacing any components of the system, including internal parts.

2. Instructions on periodic cleaning and adjustment of equipment with a schedule of these functions.

3. A complete list of all equipment and components with information as to the address and phone number of both the manufacturer and local supplier of each item.

4. User operating instructions shall be provided prominently displayed on a separate sheet located next to the control unit in accordance with U.L. Standard 864.

3.08 TRAINING

A. The Owner shall be thoroughly instructed in the use of system by the contractor.

B. Training shall include a minimum of three (3) one hour sessions, to be scheduled at the Owner's designated time and location.

C. Maintenance instruction shall be performed in the same manner as described above. Training shall include a minimum of three (3) one hour sessions, to be scheduled at the Owner's designated time.

3.09 SPARE PARTS

A. The Contractor shall provide the Owner the following spare parts by percent installed or minimum of 1, whichever is greater:

1. Motion detectors 2 ea..

2. Door Contacts 2 sets.

3. Card reader - 2ea.

4. Key Pad & Backbox - 2 ea.

B. The Manufacturer shall guarantee in writing the supply of system spare parts, test equipment and software for a minimum of three (3) years after completion of said system.

3.10 WARRANTY

A. Contractor shall provide a written warranty on all equipment, software, wiring and labor to be free from inherent mechanical and electrical defects for two (2) years from the date of final acceptance by Owner.

B. Contractor shall post the warranty period along with the company's name and telephone number inside the fire panel.

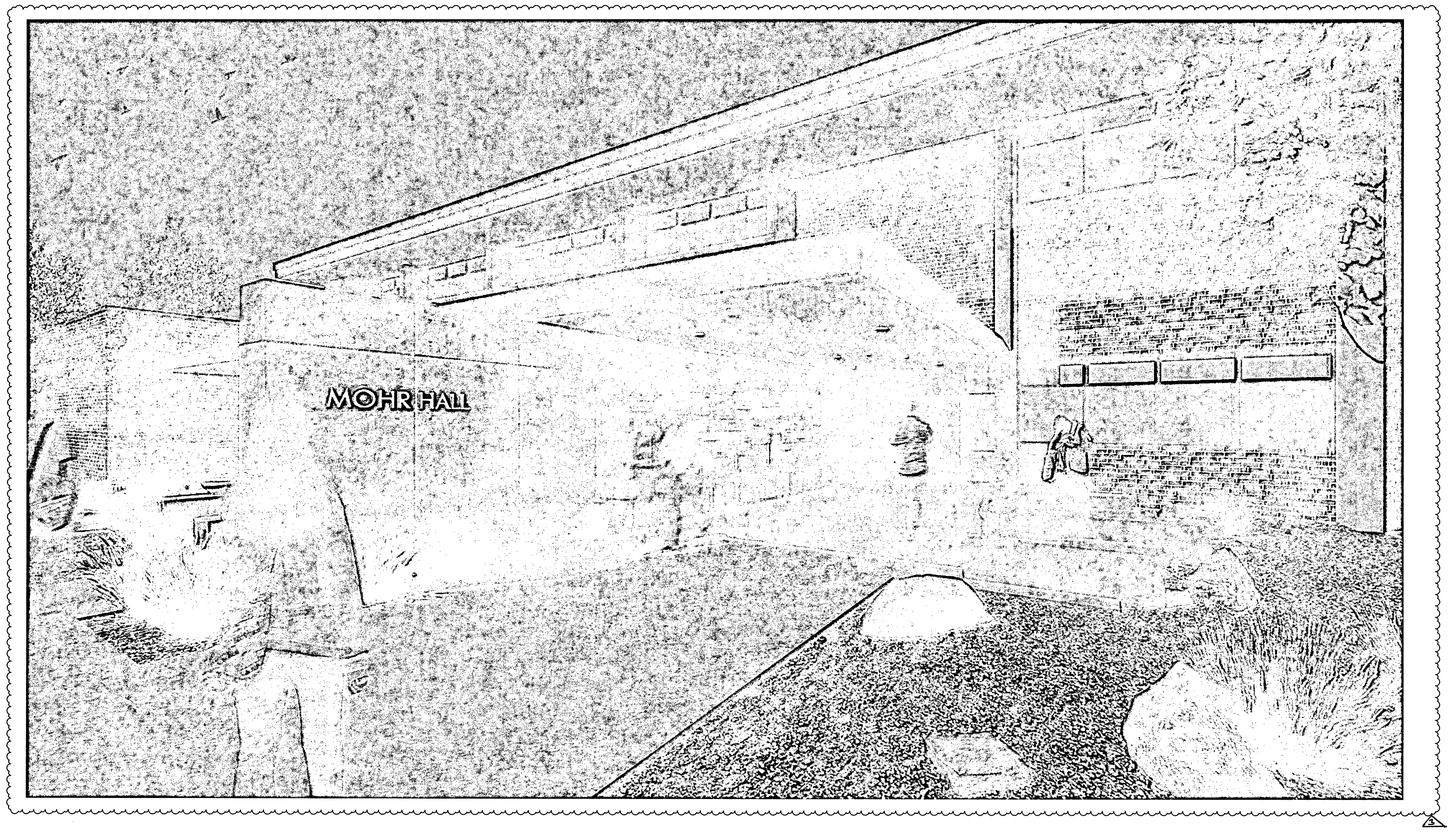
C. Contractor shall respond to trouble calls at the project site within 24 hours.

D. Warranty service for the equipment shall be provided by the qualified contractor. Further, warranty shall include all parts, labor and necessary travel.

3.11 MAINTENANCE/INSPECTION CONTRACT

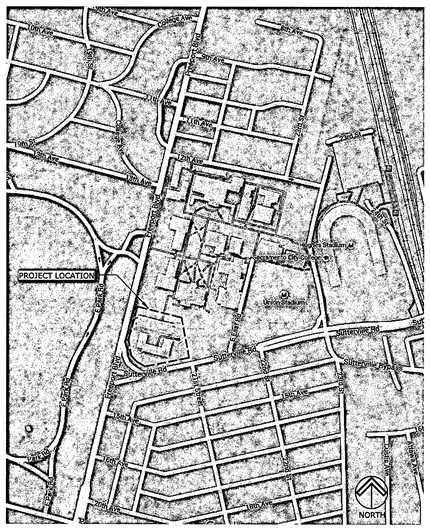
A. Contractor shall make available to the Owner a maintenance/inspection contract proposal to provide a minimum of two (2) inspection, tests per year and maintenance.

END OF SECTION



SYMBOLS

- GRID LINE TYPICAL
- WORK POINT, CONTROL POINT OR DATUM POINT
- ROOM NAME / ROOM NUMBER
- KEYNOTE TAG - CSI PREFIX — SEE NOTES ON SIDE OF SHEET
- DEMOLITION KEYNOTE TAG — SEE NOTES ON SIDE OF SHEET
- DOOR TAG — SEE DOOR SCHEDULE SHEET
- WINDOW TAG — SEE WINDOW SCHEDULE SHEET
- EQUIPMENT DESIGNATION — SEE EQUIPMENT SCHEDULE SHEET
- WI NUMBER / HEIGHT / DEPTH / WIDTH — MILLWORK TYPE TAG
- FINISH MATERIAL TAG
- FINISH MATERIAL TAG (CEILING)
- FINISH MATERIAL TAG (FLOOR)
- WALL TYPE TAG — SEE DETAILS
- REVISION TAG
- DETAIL TAG — SEE SHEET INDICATED
- INTERIOR ELEVATION TAG — SEE SHEET INDICATED
- SECTION CUT/EXTERIOR ELEVATION TAG — SEE SHEET INDICATED



#	POUND/NUMBER	DWG.	DRAWING	I.D.	INSIDE DIAMETER/DIMENSION	S.	SOUTH
&	AND	DWR.	DRAWER	I.D.F.	INTERMEDIATE DISTRUBUTION FACILITY	S.C.	SOLID CORE
(E)	EXISTING					S.S.	STAINLESS STEEL
(N)	NEW	E.	EACH	INSUL.	INSULATION	S.V.	SHEET VINYL
<	ANGLE	E.J.	EXPANSION JOINT	INT.	INTERIOR	SCHED.	SCHEDULE
@	AT	E.P.	ELECTRICAL PANELBOARD			SECT.	SECTION
C/L	CENTERLINE	E.W.C.	ELECTRIC WATER COOLER	JAN.	JANITOR	SH.	SHELF
P/L	PLATE/PROPERTY LINE	EA.	EACH	JT.	JOINT	SHT.	SHEET
ø/DIA.	DIAMETER/ROUND	EL.	ELEVATION			SHWR.	SHOWER
		ELEC.	ELECTRICAL	KIT.	KITCHEN	SIM.	SIMILAR
A.B.	AGGREGATE BASE	ELEV.	ELEVATION			SMH.	SEWER MANHOLE
A.C.	ASHPALT CONCRETE	EMER.	EMERGENCY	LAB.	LABORATORY	SMS.	SHEET METAL SCREW
A.D.	AREA DRAIN	ENCL.	ENCLOSURE	LAM.	LAMINATE	SPEC.	SPECIFICATION
A.F.F.	ABOVE FINISHED FLOOR	EQ.	EQUAL	LAV.	LAVATORY	SQ.	SQUARE
ACOUS.	ACOUSTICAL	EQUIP.	EQUIPMENT	LKR.	LOCKER	STA.	STATION
ADJ.	ADJUSTABLE	EXIST.	EXISTING	LT.	LIGHT	STD.	STANDARD
AHU.	AIR HANDLING UNIT	EXP.	EXPANSION	R.D.	ROOF DRAIN	STL.	STEEL
ALUM.	ALUMINUM	EXT.	EXTERIOR			STOR.	STORAGE
APPROX.	APPROXIMATE			M.C.	MEDICINE CABINET	STRUC.	STRUCTURAL
ARCH.	ARCHITECTURAL	F.A.	FIRE ALARM	M.O.	MASONRY OPENING	SUSP.	SUSPENDED
ASB.	ASBESTOS	F.B.	FLAT BAR	MAX.	MAXIMUM	SYM.	SYMMETRICAL
AUTO.	AUTOMATIC	F.D.	FLOOR DRAIN	MDF.	MEDIUM DENSITY FIBERBOARD		
		F.D.C.	FIRE DEPARTMENT CONNECTION	MECH.	MECHANICAL	T.	TREAD
B.D.F.	BUILDING DISTRIBUTION FACILITY	F.E.	FIRE EXTINGUISHER	MEMB.	MEMBRANE	T.BB.	TOP AND BOTTOM
B.F.P.	BACK FLOW PREVENTER	F.E.C.	FIRE EXTINGUISHER CABINET	MFR.	MANUFACTURER	T.&G.	TONGUE AND GROOVE
BD.	BOARD	F.F.	FINISH FLOOR	MH.	MANHOLE	T.C.	TOP OF CURB
BIT.	BITUMINOUS	F.F.E.	FINISH FLOOR ELEVATION	MIN.	MINIMUM	T.O.	TOP OF
BLDG.	BUILDING	F.H.	FIRE HYDRANT	MIR.	MIRROR	T.O.F.	TOP OF FRAMING
BLK.	BLOCK	F.H.V.C.	FIRE HOSE VALVE CABINET	MISC.	MISCELLANEOUS	T.O.S.	TOP OF STEEL
BLKG.	BLOCKING	F.O.	FACE OF	MTD.	MOUNTED	T.S.	TUBE STEEL
BM.	BEAM	F.O.C.	FACE OF CONCRETE/CURB	MTL.	METAL	T.V.	TELEVISION
BTM.	BOTTOM	F.O.F.	FACE OF FINISH	MUL.	MULLION	T.W.	TOP OF WALL
BW.	BACK OF WALK	F.O.M.	FACE OF MASONRY			TEL.	TELEPHONE
		F.O.S.	FACE OF STUDS	N.	NORTH	TER.	TERAZZO
C.B.	CATCH BASIN	F.R.T.	FIRE RETARDANT TREATED	N.I.C.	NOT IN CONTRACT	THK.	THICK
C.G.	CORNER GUARD	F.S.	FULL SIZE	N.T.S.	NOT TO SCALE	TYP.	TYPICAL
C.I.	CAST IRON	FDN.	FOUNDATION	NO.	NUMBER		
C.I.D.	CLEAR INSIDE DIMENSION	FIN.	FINISH	NOM.	NOMINAL	U.O.N.	UNLESS OTHERWISE NOTED
C.J.	CONTROL JOINT	FL.	FLOW LINE			UR.	URINAL
C.L.	CENTERLINE	FLASH.	FLASHING	O.A.	OVERALL		
C.M.U.	CONCRETE MASONRY UNIT	FLR.	FLOOR	O.C.	ON CENTER	VCT.	VINYL COMPOSITION TILE
C.O.	CASED OPENING/CLEAN OUT	FLUOR.	FLUORESCENT	O.D.	OUTSIDE DIAMETER/DIMENSION	VERT.	VERTICAL
C/L	CENTERLINE	FPRF.	FIREPROOF	O.H.	OVERHEAD	VEST.	VESTIBULE
CAB.	CABINET	FT.	FOOT/FEET	O/	OVER		
CEM.	CEMENT	FTG.	FOOTING	OFF.	OFFICE	W.	WEST
CER.	CERAMIC	FURR.	FURRING	OPNG.	OPENING	W.C.	WATER CLOSET
CLG.	CEILING	FUT.	FUTURE	OPP.	OPPOSITE	W/	WITH
CLKG.	CAULKING					W/O	WITHOUT
CLO.	CLOSET	G.B.	GRAB BAR/GRADE BREAK	P.C.	PRECAST	WD.	WOOD
CLR.	CLEAR	G.F.R.G.	GLASS FIBER REINFORCED GYPSUM	P.D.F.	POWDER DRIVEN FASTENER	WP.	WATERPROOF/WORK POINT
CNTR.	COUNTER	G.I.	GALVANIZED IRON	P.I.V.	POST INDICATOR VALVE	WSCT.	WAINSCOT
COL.	COLUMN	GA.	GAUGE	P.M.	PRESSED METAL	WT.	WEIGHT
CONC.	CONCRETE	GALV.	GALVANIZED	P.O.C.	POINT OF CONNECTION		
CONN.	CONNECTION	GL.	GLASS	P.T.	PRESSURE TREATED	XFMR.	TRANSFORMER
CONSTR.	CONSTRUCTION	GND.	GROUND	PL.	PLATE		
CONT.	CONTINUOUS	GR.	GRADE	PLAS.	PLASTER/PLASTIC		
COORD.	COORDINATE	GYP.	GYPSUM	PLYWD.	PLYWOOD		
CORR.	CORRIDOR			PR.	PAIR		
CPT.	CARPET	H.B.	HOSE BIBB	PT.	POINT		
CTSK.	COUNTERSINK	H.C.	HOLLOW CORE/ACCESSIBLE CURB RAMP	PTN.	PARTITION		
D.F.	DRINKING FOUNTAIN	H.G.	HARDWARE GROUP	Q.T.	QUARRY TILE		
D.O.	DOOR OPENING	H.M.	HOLLOW METAL				
D.S.P.	DRY STANDPIPE	HDWD.	HARDWOOD	R.	RISER/RADIUS		
DBL.	DOUBLE	HDWE.	HARDWARE	R.O.	ROUGH OPENING		
DEPT.	DEPARTMENT	HORIZ.	HORIZONTAL	R.W.L.	RAIN WATER LEADER		
DET.	DETAIL	HR.	HOUR	REF.	REFRIGERATOR		
DIA.	DIAMETER	HSS.	HOLLOW STEEL SECTION	REG.	REGISTER		
DIM.	DIMENSION	HT.	HEIGHT	REINF.	REINFORCED		
DISP.	DISPENSER			REQD.	REQUIRED		
DN.	DOWN			RESIL.	RESILIENT		
DR.	DOOR			RM.	ROOM		
DS.	DOWNSPOUT			RWD.	REDWOOD		

ADD-ALTERNATES

LEGEND #1 (SEE REFERENCED SHEETS FOR DETAILED INFORMATION)

ADD-ALT #1:
SITE FEATURES FOR ROCK DISPLAY AREA OUTSIDE GEOLOGY LAB INCLUDING:
- PRECAST BENCHES
- DECOMPOSED GRANITE
- ROCK GARDEN

REFERENCED SHEETS:
A1.01, A1.02, L1.0, L2.0

ADD-ALT #2:
LANDSCAPING AROUND LELAND HALL BUILDING

ADD ALT 2 AND 3 REMOVED FROM PROJECT

ADD-ALT #3:
LANDSCAPING FOR MOHR HALL REPLACEMENT BUILDING

ADD ALT 2 AND 3 REMOVED FROM PROJECT

ADD-ALT #4:
SUBSTITUTE POURED TERRAZZO FLOOR SYSTEM FOR VC2 AT FIRST FLOOR CORRIDOR AND ENTRY ROOMS: M114A, M114B, M114C, S140

REFERENCED SHEETS:
A2.51, A2.53

ADD-ALT #5:
ADD MOTORIZED ROLLER SHADES AT ALL EXTERIOR WINDOWS, BASE BID INCLUDES ALL ELECTRICAL WIRING TO FUTURE LOCATIONS AND SHADES IN LECTURE ROOM M126.

REFERENCED SHEETS:
A6.01, A6.02, A9.40, A9.41, E3.01, E3.02

ADD-ALT #6:
INCREASE NRC OF ACOUSTIC CEILING TILES FROM .75 TO 1.0

REFERENCED SHEETS:
A2.53

PROJECT SUMMARY

OWNER: LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE

PROJECT LOCATION: SACRAMENTO CITY COLLEGE
3835 FREEPORT BLVD. SACRAMENTO CA 95822

DESCRIPTION:

DEMOLISH AND REPLACE THE EXISTING MOHR HALL PROJECT WITH A (2) STORY MODERN ALLIED HEALTH AND PHYSICAL SCIENCES BUILDING.

PROJECT WILL CONSIST OF ROUGHLY 5,334 SF OF LECTURE, 9,169 SF OF LAB, 2,790 SF OF OFFICE, AND 375 SF OF OTHER ASSIGNABLE SPACE. RELOCATION AND INSTALLATION OF NEW EQUIPMENT IN EXISTING CENTRAL PLANT AND NEW ELECTRICAL EQUIPMENT ENCLOSURE.

THE PROJECT IS A BUILDING REPLACEMENT WITH NO ADDITIONAL USABLE ASSIGNABLE SQUARE FOOTAGE (ASF) AND NO INCREASE IN PLANNED OCCUPANT LOAD; THEREFORE NO NEW PARKING HAS BEEN PLANNED.

APN: 013-0010-014-000

ALL WORK SHALL CONFORM TO THE FOLLOWING CODES:

TITLE 19 CCR, PUBLIC SAFETY, STATE FIRE MARSHAL REGULATIONS
TITLE 24 CCR, PART 1 - 2016 CALIFORNIA BUILDING STANDARDS ADMINISTRATION CODE
TITLE 24 CCR, PART 2 - 2016 CALIFORNIA BUILDING CODE, VOL. 1&2 (CBC) (2015 IBC, AS AMENDED BY CA)
TITLE 24 CCR, PART 3 - 2016 CALIFORNIA ELECTRIC CODE (CEC) (2014 NEC, AS AMENDED BY CA)
TITLE 24 CCR, PART 4 - 2016 CALIFORNIA MECHANICAL CODE (CMC) (2015 IAPMO UMC, AS AMENDED BY CA)
TITLE 24 CCR, PART 5 - 2016 CALIFORNIA PLUMBING CODE (CPC) (2015 IAPMO UPC, AS AMENDED BY CA)
TITLE 24 CCR, PART 6 - 2016 CALIFORNIA ENERGY CODE
TITLE 24 CCR, PART 8 - 2016 CALIFORNIA HISTORICAL BUILDING CODE (CHBC)
TITLE 24 CCR, PART 9 - 2016 CALIFORNIA FIRE CODE (CFC) (2015 IFC, AS AMENDED BY CA)
TITLE 24 CCR, PART 11 - 2016 CALIFORNIA GREEN BUILDING STANDARDS CODE
TITLE 24 CCR, PART 12 - 2016 CALIFORNIA REFERENCED STANDARDS
2016 NFPA 13, INSTALLATION OF SPRINKLER SYSTEMS (CA AMENDED)
2013 NFPA 14, INSTALLATION OF STANDPIPE AND HOSE SYSTEMS
2013 NFPA 17, DRY CHEMICAL EXTINGUISHING SYSTEMS
2013 NFPA 17A, WET CHEMICAL EXTINGUISHING SYSTEMS
2016 NFPA 20, INSTALLATION OF STATIONARY PUMPS FOR FIRE PROTECTION
2013 NFPA 22, WATER TANKS FOR PRIVATE FIRE PROTECTION
2016 NFPA 24, INSTALLATION OF PRIVATE FIRE SERVICE MAINS
2016 NFPA 72, NATIONAL FIRE ALARM CODE (CA AMENDED); SEE UL STD 1971 FOR "VISUAL DEVICES"
2016 NFPA 80, FIRE DOOR AND OTHER OPENING PROTECTIVES
2015 NFPA 2001, CLEAN AGENT FIRE EXTINGUISHING SYSTEMS
REFERENCE CODE SECTION FOR NFPA STANDARDS - 2016 CBC (SFM) CHAPTER 35
SEE CHAPTER 35 FOR STATE OF CALIFORNIA AMENDMENTS TO NFPA STANDARDS
2005 UL 300, CLASS I HOOD FIRE SUPPRESSION SYSTEMS
2003 UL 464, AUDIBLE SIGNAL APPLIANCES
1999 UL 521, HEAT DETECTORS FOR FIRE PROTECTIVE SIGNALING SYSTEMS
2012 ICC 300, BLEACHERS, FOLDING AND TELESCOPIC SEATING, AND GRANDSTANDS (ICC 300-2012)

OCCUPANCY	A-3, ACCESSORY OCCUPANCY S-1
BUILDING CONSTRUCTION TYPE	II-B
NUMBER OF STORIES	2
ACTUAL BUILDING HEIGHT	40'-6"
PROJECT AREA	
FIRST FLOOR	15,215 GSF
SECOND FLOOR	13,158 GSF
TOTAL	28,373 GSF

SPECIAL INSPECTIONS

CLAY TILE ROOFING
THIN BRICK ADHESION TESTING
PENETRATION FIRE STOP INSPECTION

FOR ADDITIONAL INSPECTIONS:
STRUCTURAL SHEET S1.01

DEFERRED APPROVALS

1. THE FOLLOWING ITEMS REQUIRE DEFERRED APPROVAL FROM THE ENFORCEMENT AGENCY:
   A. ELEVATOR GUIDE RAILS AND SUPPORTS
   B. CURTAIN WALL SYSTEMS
2. THE DESIGN OF THE ABOVE ITEMS IS BY THE CONTRACTOR/MANUFACTURER. CONTRACTOR/MANUFACTURER MUST PREPARE ALL NECESSARY CALCUATIONS AND DRAWINGS PER THE CALIFORNIA BUILDING CODE UNDER THE SUPERVISION OF A STRUCTURAL ENGINEER, REGISTERED IN CALIFORNIA, AND SHALL OBTAIN ALL NECESSARY PLAN CHECK APPROVALS FROM THE ENFORCEMENT AGENECY.
3. INSTALLATION OF THE ABOVE ITEMS SHALL NOT BE STARTED UNTIL DETAILED PLANS, SPECIFITACIONS, AND ENGINEERING CALCULATIONS HAVE BEEN STAMPED AND SIGNED BY THE STRUCUTRAL ENGINEER WHO HAS BEEN DELEGATED RESPONSIBILITY COVERING THE WORK SHOWN ON A PARTICULAR PLAN OR SPECIFICATION REVIEWED BY THE ARCHITECT OR STRUCTURAL ENGINEER OF RECORD, AND APPROVED BY THE ENFORCEMENT AGENCY.

PROJECT TEAM

OWNER
LOS RIOS COMMUNITY COLLEGE DISTRICT
3753 BRADWIEW DRIVE
SACRAMENTO, CA 95827
TELEPHONE: 916 . 856 . 3457

ARCHITECTURAL
DREYFUSS & BLACKFORD ARCHITECTS
3540 FOLSOM BOULEVARD
SACRAMENTO, CALIFORNIA 95816
TELEPHONE: 916 . 453 . 1234
FACSIMILE: 916 . 453 . 1236

LAB CONSULTANT
RESEARCH FACILITIES DESIGN
3965 FIFTH AVENUE, SUITE 400
SAN DIEGO, CA 92103
TELEPHONE: 619 . 297 . 0159

MECHANICAL
CAPITAL ENGINEERING CONSULTANTS, INC.
11020 SUN CENTER DRIVE, SUITE 100
RANCHO CORDOVA, CA 95670
TELEPHONE: 916 . 631 . 1312

CIVIL
WOOD RODGERS
3301 C STREET, BLDG 100-B
SACRAMENTO, CA 95816
TELEPHONE: 916 . 341 . 7760

ELECTRICAL
THE ENGINEERING ENTERPRISE
1125 HIGH STREET
AUBURN, CA 95603
TELEPHONE: 530 . 886 . 8556

STRUCTURAL
BUEHLER & BUEHLER
STRUCTURAL ENGINEERS, INC.
600 Q STREET SUITE 200
SACRAMENTO, CA 95811
TELEPHONE: 916 . 443 . 0303

LANDSCAPE
CALLANDER ASSOCIATES
LANDSCAPE ARCHITECTURE
12150 TRIBUTARY POINT DRIVE, SUITE 140
GOLD RIVER, CA 95670
TELEPHONE: 916 . 985 . 4366

Dreyfuss+ Blackford architecture
3540 Folsom Blvd
Sacramento, CA
95816-6699
T 916.453.1234
dreyfussblackford.com

Lov#1
FILE NO.34-C3
IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
02-116163
AC TM FLS M SS
DATE 5/30/18

LICENSED ARCHITECT C32210 COURTNEY ALLYCE GOLDEN EXP. 08/31/19 STATE OF CALIFORNIA

THIS DRAWING IS NOT FINAL OR TO BE USED FOR CONSTRUCTION UNTIL IT IS SIGNED BY THE ARCHITECT/ENGINEER

PLAN CHECK SET

REVISION	BY	DATE
~~BACKCHECK 1~~		
1 REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

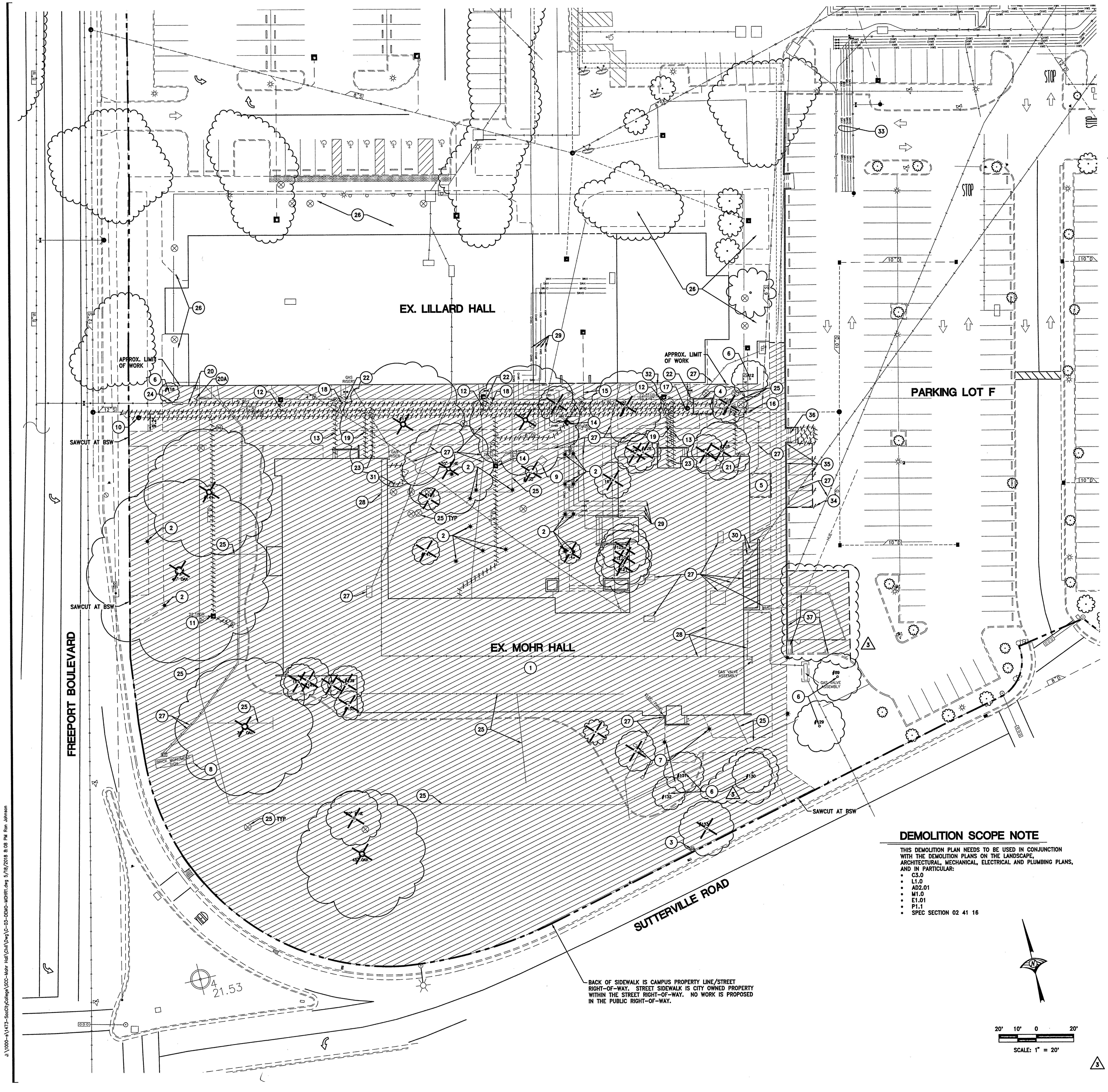
COVER SHEET

DSA - SAC
MAY 2 9 2018

B5017.00

May 22, 2018

GA0.00



DEMOLITION SCOPE NOTE

THIS DEMOLITION PLAN NEEDS TO BE USED IN CONJUNCTION WITH THE DEMOLITION PLANS ON THE LANDSCAPE, ARCHITECTURAL, MECHANICAL, ELECTRICAL AND PLUMBING PLANS, AND IN PARTICULAR:

- C3.0
- L1.0
- AD2.01
- M1.0
- E1.01
- P1.1
- SPEC SECTION 02 41 16

LEGEND

- - - - - -	SAWCUT LINE
—— ——	LIMIT OF PROJECT SURFACE IMPROVEMENTS
(hatched area)	APPROXIMATE AREA OF SURFACE DEMOLITION (SEE ALSO GENERAL NOTES THIS SHEET.)
X	TREE TO BE REMOVED (ALL TREES WITHIN AREA OF DEMOLITION NOT SHOWN WITH THIS SYMBOL ARE TO REMAIN.)
\\\\\\\\\\	LINEAL DEMOLITION ITEM AS SHOWN AND/OR NOTED IN PLAN.

GENERAL NOTES

1. ALL EXISTING IMPROVEMENTS SURROUNDING THE PROJECT SITE SHALL REMAIN UNDISTURBED UNLESS NOTED OTHERWISE.
2. SAWCUT SHALL BE PROVIDED WHERE SHOWN TO ENSURE A CLEAN EDGE TO PAVE TO. DO NOT OVERCUT AT ANGLE POINTS.
3. ALL SAWCUT LOCATIONS SHOWN AT WALKS IS SHOWN TO MINIMUM REMOVAL LIMITS ONLY WHICH ARE SOLELY BASED ON GEOMETRY. ALL SIDEWALKS SHALL BE REMOVED TO THE NEAREST JOINT.
4. AREA OF SURFACE DEMOLITION: IMPROVEMENTS SHOWN WITHIN AREA (INCLUDING PAVEMENT, CONCRETE, SUBBASE, STRIPING, CURBING, MISC LANDSCAPING, ETC) ARE TO BE DEMOLISHED OR REMOVED UNLESS NOTED OTHERWISE. SEE LANDSCAPE PLANS FOR SPECIFICS REGARDING LANDSCAPING AND IRRIGATION, AND SEE PLUMBING & ELECTRICAL PLANS FOR SPECIFICS REGARDING ALL LIGHTING, DRY UTILITIES AND APPURTENANCES.
5. CONTRACTOR TO DISPOSE OF ANY TREES REMOVED DURING GRADING BY MEANS OTHER THAN LANDFILL.
6. TREES TO REMAIN SHALL BE PROTECTED.
7. OWNER SHALL BE GIVEN OPTION TO SALVAGE ANY MATERIAL SHOWN TO BE DEMOLISHED. SALVAGED MATERIALS SHALL BE STOCKPILED AT A LOCATION ON SITE.
8. SAWCUT AND REMOVE ASPHALT PAVEMENT, CONCRETE PAVEMENT, CURBS, GUTTERS, SIDEWALKS, BOLLARDS AND BASE MATERIAL AS INDICATED BY HATCHED AREA. AT CONTRACTOR'S OPTION, ASPHALT AND BASE MATERIAL MEETING SPECIFICATIONS MAY BE PROCESSED AND USED AS FILL MATERIAL IN HARDSCAPE AREAS IN ACCORDANCE WITH THE GEOTECHNICAL REPORT.

DEMOLITION NOTES

(1) EXISTING BUILDING TO BE REMOVED.

(2) EXISTING SITE LIGHT AND ALL APPURTENANCES TO BE REMOVED. (SEE ELECTRICAL PLANS.)

(3) EXISTING LIGHT POLE AND ALL RELATED APPURTENANCES TO REMAIN UNDISTURBED.

(4) EXISTING SHED TO BE REMOVED.

(5) EXISTING OUTDOOR GATHERING AREA TO BE REMOVED. SEE ARCHITECTURAL AND/OR LANDSCAPE PLANS.

(6) EXISTING TREE TO REMAIN.

(7) EXISTING MEMORIAL AREA (LIMITS UNKNOWN) TO BE REMOVED. SEE LANDSCAPE PLANS FOR RELOCATION OF MEMORIALS, AND SEE ELECTRICAL PLANS FOR TREATMENT OF EXISTING LIGHTING.

(8) EXISTING MONUMENT SIGN TO REMAIN. SEE ELECTRICAL PLAN FOR REROUTING OF ELECTRICAL AND TELECOM LINES TO IT.

(9) SEE LANDSCAPE PLANS FOR TREATMENT OF EXISTING MEMORIAL.

(10) REMOVE DRAIN MANHOLE, DOWNSTREAM DRAIN PIPE TO WYE AT EXISTING 12" COMBINED SEWER, AND 326 LF OF DRAIN PIPE UPSTREAM OF MANHOLE. ALL OTHER PIPE NOT SHOWN AS BEING REMOVED TO REMAIN IN PLACE.

(11) REMOVE INLET AND ALL DRAIN PIPE.

(12) REMOVE INLET AND DRAIN PIPE DOWNSTREAM OF INLET AS SHOWN. SEE WET UTILITY PLAN FOR NEW CONNECTION.

(13) REMOVE EXISTING BUILDING SERVICE.

(14) REMOVE INLET AND ALL PIPE AS SHOWN.

(15) REMOVE DRAIN PIPE TO WITHIN 5' OF BUILDING. SEE WET UTILITY PLAN FOR NEW CONNECTION.

(16) END OF DRAIN REMOVAL. SEE WET UTILITY PLAN FOR NEW CONNECTION.

(17) REMOVE 303' OF SEWER PIPE DOWNSTREAM OF MANHOLE AS SHOWN. MANHOLE AND ALL UPSTREAM PIPE TO REMAIN IN PLACE.

(18) REMOVE SEWER SERVICE LINE TO WITHIN 5' OF BUILDING. SEE WET UTILITY PLAN FOR NEW CONNECTION.

(19) REMOVE EXISTING SEWER SERVICE LINE AS SHOWN.

(20) BEGIN REMOVAL 3' EAST OF EXISTING PUBLIC 4" WATER METER AND RP AND REMOVE 292' OF 4" WATER LINE TO EAST.

(20A) REMOVE WATER LINE 3' FROM EXISTING TEE.

(21) REMOVE EXISTING DOMESTIC WATER SERVICE AND RELATED APPURTENANCES.

(22) REMOVE WATER SERVICE LINE TO WITHIN 5' OF BUILDING. SEE WET UTILITY PLAN FOR NEW CONNECTION.

(23) REMOVE WATER SERVICE LINE AND RELATED APPURTENANCES AS SHOWN.

(24) EXISTING PUBLIC 4" WATER METER AND RP TO REMAIN UNDISTURBED.

(25) SEE LANDSCAPE PLANS FOR TREATMENT OF EXISTING IRRIGATION MAIN, VALVES, ETC.

(26) THESE LANDSCAPE PLANTERS ARE ALSO TO BE CLEARED AND GRUBBED AS PART OF AN ADD ALTERNATE, ALL OTHER NON-LANDSCAPE/IRRIGATION SHALL REMAIN UNDISTURBED. SEE LANDSCAPE PLANS FOR ALL DEMO AND OTHER IMPROVEMENTS FOR PLANTERS AROUND LILLARD HALL, NOT A PART OF CIVIL SCOPE.

(27) SEE ELECTRICAL PLANS FOR TREATMENT OF ALL ELECTRICAL AND TELECOM WITHIN OR SERVING PROJECT AREA.

(28) EXISTING GAS LINE TO BE REMOVED & REROUTED. (SEE PLUMBING PLANS.)

(29) SEE PLUMBING PLANS FOR TREATMENT OF EXISTING HYDRONIC LINES.

(30) EXISTING ABANDONED HYDRONIC LINES TO BE REMOVED TO BACK OF WALK.

(31) EXISTING FENCED EQUIPMENT ENCLOSURE TO BE REMOVED. (SEE PLUMBING PLANS)

(32) EXISTING MOW STRIP TO REMAIN.

(33) BANK OF UTILITIES EXTENDED AS PART OF THE CAMPUS "BIG DIG" PROJECT AND ARE SHOWN AS EXISTING FOR THIS PROJECT. BANK INCLUDES: 12" WATER LINE, 8" CHWS/CWR, 6" HWS/HWR, 2 ~ 4" TELECOM, 2 ~ 4" ELECTRICAL, AND 2" FIRE ALARM.

(34) REMOVE PORTION OF STRIPING BEYOND SAWCUT, TYP.

(35) REMOVE 34 LF OF EXISTING WALL AND 34'x14' OF ASPHALT FOR CONSTRUCTION OF NEW UTILITY ENCLOSURE.

(36) REMOVE EXISTING CONCRETE STAIRS, WING WALLS, AND 8.3'x1.3' OF ASPHALT FOR CONSTRUCTION OF NEW CONCRETE STAIRS. SEE ARCH. PLANS FOR ALL WALL REMOVAL INFORMATION. WALL TO NORTH OF NORTH WING WALL ANGLE POINT TO REMAIN.

3 (37) REMOVE EXISTING UTILITY YARD EQUIPMENT, CONCRETE PADS, FENCING, PAVEMENT. EXISTING WALL, STAIRS, AND CURB/WALL ALONG LANDSCAPE TO REMAIN TO REMAIN.

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REGISTERED PROFESSIONAL ENGINEER
PETER J. TOBIA
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STATE OF CALIFORNIA
3/20/2018

FILE NO.34-C3
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AC FLS SS
DATE 5-30-18

PLAN CHECK SET

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~~2~~	~~BACKCHECK CHANGES~~		
3	REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

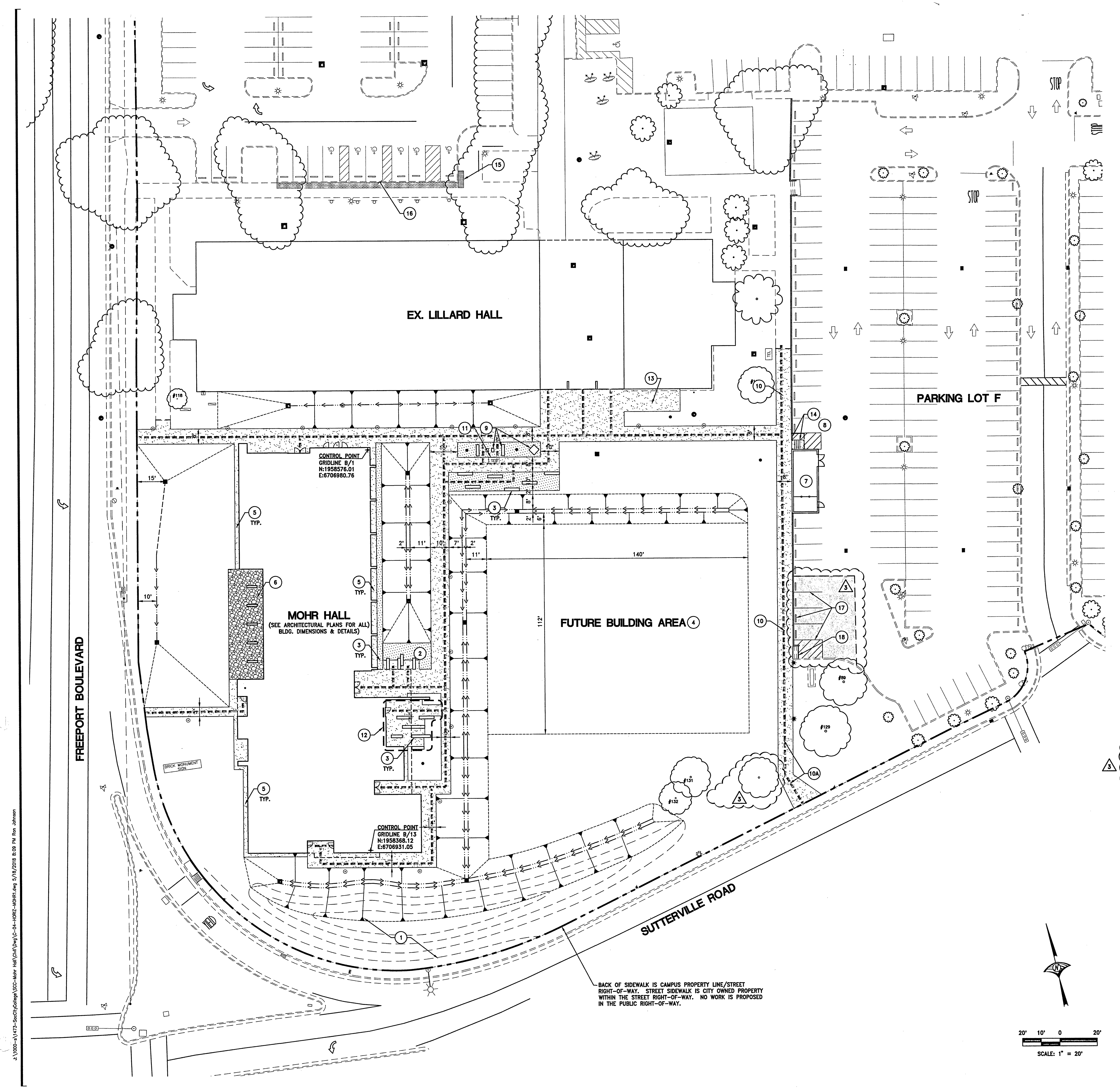
LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE

MOHR HALL REPLACEMENT

DEMOLITION PLAN

B5017.00
AS SHOWN
May 22, 2018

C3.0



LEGEND

(vertical curb line)	VERTICAL CURB (SEE DETAIL ON SHEET C7.0)
(drop inlet symbol)	DROP INLET (SEE WET UTILITY PLAN, SHEET C6.0)
(drainage swale line)	DRAINAGE SWALE
(hatch)	AREA OF CONCRETE (SEE GRADING PLAN, SHEET C5.0.)
(hatch)	AREA OF DECOMPOSED GRANITE (SEE LANDSCAPE PLANS FOR DETAILS)
(hatch)	AREA OF ASPHALT CONCRETE (SEE GRADING PLAN, SHEET C5.0)
(dashed line)	ACCESSIBLE PATH OF TRAVEL (SEE NOTES ON SHEET C1.0)

GENERAL NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ALL LANDSCAPED AREAS ARE CONSTRUCTED AS SHOWN TO ENSURE DRAINAGE AND OVERLAND RELEASE. CONTRACTOR SHALL NOT BE ALLOWED TO REGRADE WITHOUT PRIOR WRITTEN APPROVAL OF THE REVISION FROM THE CIVIL ENGINEER.
2. CONTRACTOR TO ENSURE THAT ANY ACCENT PAVING OR HARDSCAPE PROVIDED IS ACCESSIBLE FOR ADA REQUIREMENTS. (SEE ARCHITECTURAL PLANS FOR ALL DETAILS.)
3. PROVIDE DOWELING, CONCRETE THICKENING, ETC. AT ALL INTERFACES BETWEEN ON-SITE WALKS/HARDSCAPE AND ON-SITE CURBING IN ACCORDANCE WITH THE DETAILS BY THE ARCHITECT AND/ OR LANDSCAPE ARCHITECT.

CONSTRUCTION NOTES

(1) LANDSCAPE MOUNDING (SEE LANDSCAPE PLANS FOR CONFIGURATION. PROVIDE SWALE ALONG NORTH SIDE AS SHOWN WITH GRADING AS SHOWN ON GRADING PLAN.)

(2) DECOMPOSED GRANITE ROCK GARDEN (SEE LANDSCAPE PLANS.)

(3) CONCRETE BENCH (SEE ARCHITECTURAL PLANS.)

(4) AREA SHOWN IS NOT A BUILDING PAD, BUT RATHER A TEMPORARY FLAT GRADED AREA UNTIL THE PHASE 2 MOHR HALL BUILDING IS CONSTRUCTED. THE LIMITS SHOWN ARE NOT COINCIDENTAL WITH A FUTURE BUILDING FOOTPRINT, WHICH HAS NOT BEEN DETERMINED. TREES SHOWN WITHIN THE PAD ARE LARGELY AT GRADE AND SHALL BE PRESERVED. (SEE ALSO GRADING PLAN.)

(5) MOW STRIP (SEE ARCH PLANS FOR DETAILS.)

(6) GROUTED COBBLE (SEE LANDSCAPE PLANS FOR DETAILS & SPECS)

(7) ELECTRICAL & HYDRONICS EQUIPMENT ENCLOSURE (SEE ELECTRICAL AND ARCHITECTURAL PLANS FOR SIZE AND PLACEMENT.)

(8) STRIPE NO PARKING AREA NORTH OF ENCLOSURE AS SHOWN. (SEE ARCH PLANS FOR DETAILS.)

(9) RELOCATED MEMORIALS W/ CONCRETE BENCHES (SEE ARCHITECTURAL AND LANDSCAPE PLANS)

(10) RECONSTRUCT 8' WALK IN PLACE BEHIND WALL.

(10A) RECONSTRUCT 8' WALK IN PLACE, WIDENING TO MATCH EXISTING GEOMETRY AT SUTTERVILLE CONNECTION AS SHOWN.

(11) FORM CONCRETE AROUND VAULT TO PROVIDE A SMOOTH LINE, EDGE OF CONCRETE TO BE 2" NORTH OF NORTH EDGE OF EXISTING VAULT AS SHOWN. CONCRETE IS NOT TO BE FORMED SUCH THAT THERE IS A JOG AROUND THE VAULT, OR THE VAULT STRADDLES THE CONCRETE EDGE, CONTRACTOR SHALL NOTIFY OWNER REPRESENTATIVE IF FIELD CONDITIONS DIFFER FROM THAT SHOWN AND THE CONCRETE EDGE NEEDS TO BE ADJUSTED FURTHER NORTH.

(12) THE IMPROVEMENTS SHOWN HERE (CONCRETE WALK & GATHERING AREA, BENCHES, AND DOOR ACCESS) ARE AN ADD ALTERNATE. THE BASE BID IS NOT TO INCLUDE THESE ITEMS, BUT RATHER ONLY INCLUDES THIS AREA AS LANDSCAPING WITH A 24" MOW STRIP ADJOINING THE BUILDING SIMILAR TO OTHER LANDSCAPE AREAS.

(13) CONCRETE PAD FOR BIKE PARKING. SEE ARCH AND LANDSCAPE PLANS FOR DIMENSIONS AND RACKS/LOCKERS (NOT SHOWN).

(14) OLD STAIRS TO BE REPLACED WITH NEW CONCRETE STAIRS, WALL, & HANDRAILS (SEE ARCH PLANS FOR ALL DETAILS & DIMENSIONS.)

(15) AREA OF NEW DETECTABLE WARNING SURFACE (SEE ARCH PLANS FOR LIMITS AND RETROFIT DETAILS, SEE ALSO SITE ACCESSIBILITY NOTES ON SHEET C1.0.)

(16) SEE ARCH PLANS FOR TREATMENT OF FLUSH AREA BETWEEN THE EXISTING EDGE OF PAVEMENT AND EXISTING DETECTABLE WARNING SURFACE.

3 (17) RESTRIPE 8.5'W x 15'D STALLS AS SHOWN. REINSTALL WHEEL STOP AT NORTH STALL, AND INSTALL 3 NEW WHEELS STOPS AT NEW STALLS, MATCHING EXISTING. IN REMAINING AREA AROUND STAIRS, STRIPE NO PARKING AREA AS SHOWN. (SEE ALSO ARCHITECTURAL PLANS.)

(18) HANDRAILS TO BE ADDED TO EXISTING STAIRS (SEE ARCH PLANS FOR ALL DETAILS)

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rev 3

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~~2 BACKCHECK CHANGES~~		
3 REVISED PLANS		

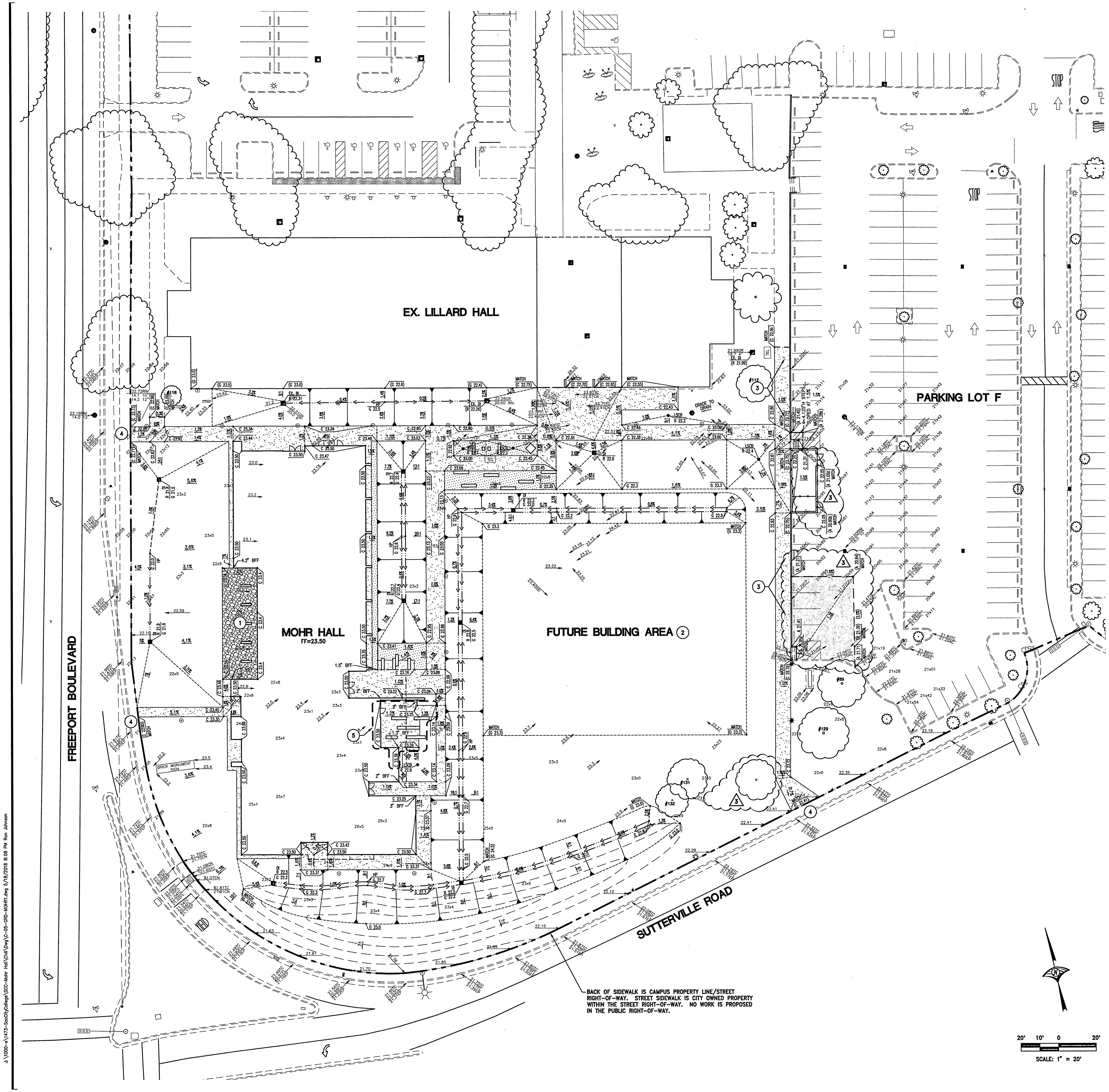
LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

HORIZONTAL CONTROL PLAN

B5017.00
AS SHOWN
May 22, 2018

C4.0



LEGEND

	VERTICAL CURB (SEE DETAIL ON SHEET C7.0)
23.2 23x2	EXISTING GRADE ELEVATION
C 91.50	PROPOSED CONCRETE ELEVATION
G 91.50	PROPOSED GROUND ELEVATION
R 91.50	PROPOSED INLET RIM ELEVATION
4.6%	SLOPE AND DIRECTION OF FLOW
RIDGE	RIDGE OR GRADE BREAK LINE
	OVERLAND RELEASE DIRECTION
	DRAINAGE SWALE
	DROP INLET (SEE WET UTILITY PLAN, SHEET C6.0)
	AREA OF CONCRETE 4" PCC WITH NO. 3 DEFORMED REINFORCING BARS AT 18" O/C OVER 6" AB OVER SUBGRADE PREPARED PER GEOTECH REPORT)
	AREA OF DECOMPOSED GRANITE (SEE LANDSCAPE PLANS FOR DETAILS)
	AREA OF ASPHALT CONCRETE (MATCH FULL SECTION OF ADJOINING EXISTING ASPHALT)

GENERAL NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ALL LANDSCAPED AREAS ARE CONSTRUCTED AS SHOWN TO PROVIDE DRAINAGE AND OVERLAND RELEASE. CONTRACTOR SHALL NOT BE ALLOWED TO REGRADE WITHOUT PRIOR WRITTEN APPROVAL OF THE REVISION FROM THE CIVIL ENGINEER.
2. CONTRACTOR TO ENSURE THAT ANY ACCENT PAVING OR HARDSCAPE PROVIDED IS ACCESSIBLE FOR ADA REQUIREMENTS. (SEE ARCHITECTURAL PLANS FOR ALL DETAILS.)
3. PROVIDE DOWELING, CONCRETE THICKENING, ETC. AT ALL INTERFACES BETWEEN ON-SITE WALKS/HARDSCAPE AND ON-SITE CURBING IN ACCORDANCE WITH THE DETAILS BY THE ARCHITECT AND/ OR LANDSCAPE ARCHITECT.

CONSTRUCTION NOTES

(1) GROUTED AREAS BETWEEN COBBLE TO BE CONSTRUCTED TO ENSURE SURFACE DRAINAGE AROUND THE COBBLES AND AWAY FROM THE BUILDING TOWARDS THE PLANTING AREA IS PROVIDED AS SHOWN.

(2) AREA SHOWN IS NOT A BUILDING PAD, BUT RATHER A TEMPORARY FLAT GRADED AREA UNTIL THE PHASE 2 MOHR HALL BUILDING IS CONSTRUCTED. THE ELEVATIONS SHOWN LARGELY MATCHES THE SURROUNDING GRADES, AND IS NOT A SUGRADE FOR THAT BUILDING. THE LIMITS SHOWN ARE ALSO NOT COINCIDENTAL WITH A FUTURE BUILDING FOOTPRINT, WHICH HAS NOT BEEN DETERMINED. TREES SHOWN WITHIN THE PAD ARE LARGELY AT GRADE AND SHALL BE PRESERVED.

(3) RECONSTRUCT WALK IN PLACE AS SHOWN. UNDULATE WALK AS NEEDED TO ENSURE POSITIVE DRAINAGE TO EXISTING DRAIN OPENINGS IN WALL, ENSURING A MINIMUM OF 1% SLOPE AND A MAX OF 1.8% X-SLOPE.

(4) WALKS SHOWN ALONG SUTTERVILLE ROAD AND FREEPORT BLVD. ARE PUBLIC SIDEWALKS OWNED BY THE CITY OF SACRAMENTO AND ARE NOT ON CAMPUS PROPERTY, MATCH GRADE AS SHOWN. ALL EXISTING PUBLIC CURB, GUTTER, AND SIDEWALK TO REMAIN UNDISTURBED.

(5) THE IMPROVEMENTS SHOWN HERE (CONCRETE WALK & GATHERING AREA, BENCHES, AND DOOR ACCESS) ARE AN ADD ALTERNATE. THE BASE BID IS NOT TO INCLUDE THESE ITEMS, BUT RATHER ONLY INCLUDES THIS AREA AS LANDSCAPING WITH A 24" MOW STRIP ADJOINING THE BUILDING SIMILAR TO OTHER LANDSCAPE AREAS. LANDSCAPING TO BE GRADED TO DRAIN TO LSCB SHOWN SOUTH OF THIS AREA.

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LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

GRADING PLAN

B5017.00
AS SHOWN
May 22, 2018

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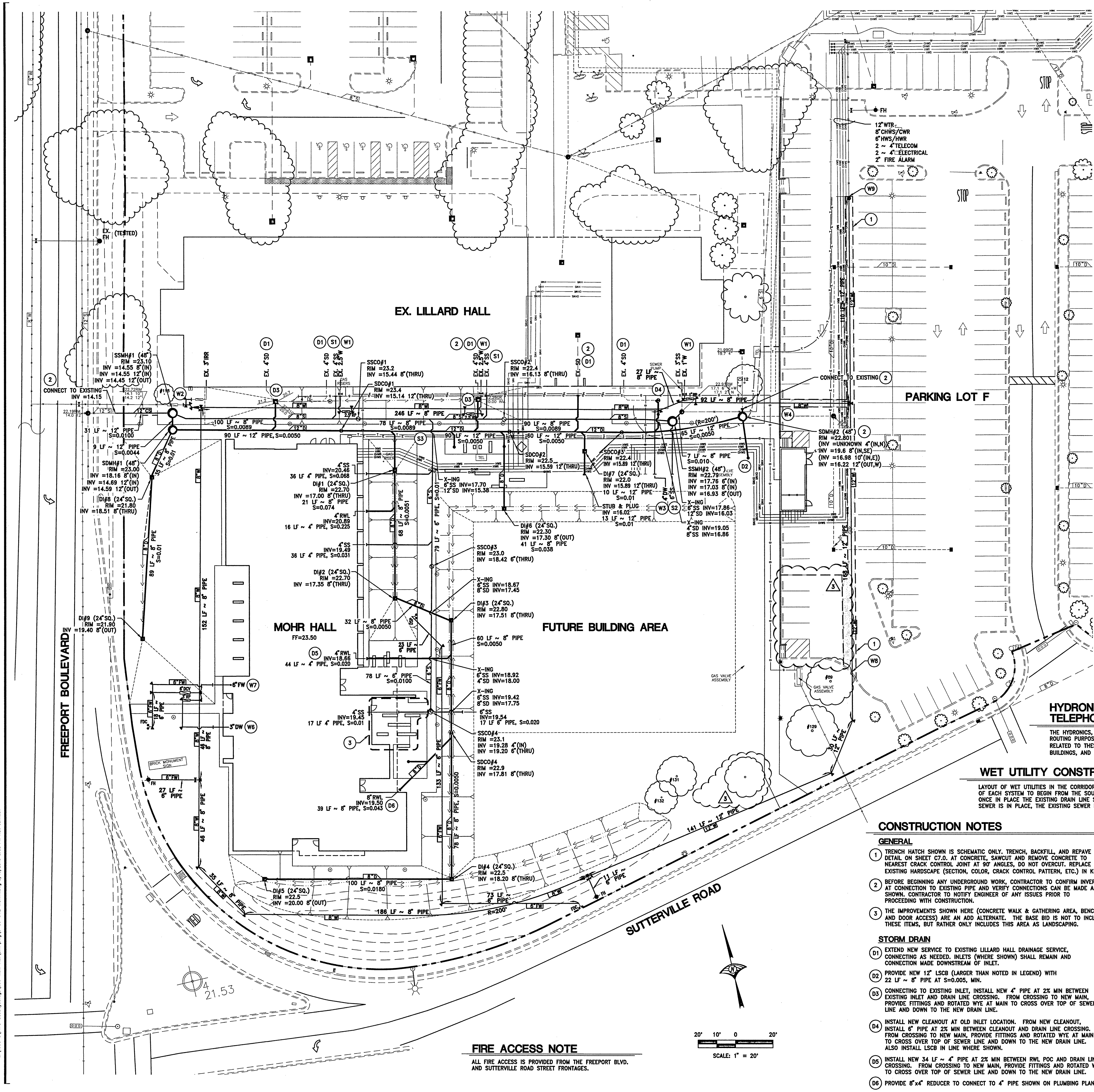

LEGEND

12"D	STORM DRAIN LINE
DI (XX"SQ.)	DROP INLET (SIZE) (SEE DETAIL ON SHEET C7.0)
	LANDSCAPE CATCH BASIN INSTALL NDS OR EQUAL 8" DIAMETER DRAIN (FLAT GRATE IN DG, BEEHIVE GRATE IN BARK AREAS) W/ 6" PIPE SLOPED AT 2%, MIN.
SDCO	STORM DRAIN CLEAN-OUT (SEE DETAIL ON SHEET C7.0)
SDMH	STORM DRAIN MANHOLE (SEE DETAIL ON SHEET C7.0)
6"S	SANITARY SEWER LINE
SSMH	SANITARY SEWER MANHOLE (SEE DETAIL ON SHEET C7.0)
10"W	CAMPUS MAIN WATER LINE
2"DW	DOMESTIC WATER LINE
8"FW	FIRE WATER LINE
	THRUST BLOCK (PER CITY OF SACRAMENTO STD. DWG. NO W-103)
	PIPE REDUCER
	GATE VALVE (PER CITY OF SACRAMENTO STD. DWG. NOS. W-303 & W-304)
4"RP	RED. PRESSURE BACKFLOW PREVENTOR (SIZED AS NOTED)
8"DCV	DOUBLE CHECK VALVE (SIZED AS NOTED) (PER CITY OF SACRAMENTO STD. DWG. NOS. W-303 & W-304)
FDC	FIRE DEPARTMENT CONNECTION (SEE DETAIL ON SHEET C7.0)
FDC DSP	FIRE DRY STAND PIPE APPARATUS (SEE DETAIL ON SHEET C7.0)
FH 6"FW	FIRE HYDRANT (INCLUDING LEAD & GATE VALVE) (PER CITY OF SACRAMENTO STD. DWG. NO. W-201)
HWS HWR CHWR CHWS G T E	HYDRONICS, GAS, TELEPHONE, & ELECTRIC LINES (SEE SPECIAL NOTE BELOW)

GENERAL NOTES

1. REFER TO PLUMBING PLANS FOR CONNECTIONS TO THE BUILDING.
2. ALL BUILDING SERVICES TO BE STUBBED TO 5' FROM BUILDING OR AS SHOWN AND SHALL BE CAPPED FOR FUTURE CONNECTION BY PLUMBING CONTRACTOR.
3. CONTRACTOR TO VERIFY LOCATION AND DEPTH OF ALL EXISTING UTILITIES PRIOR TO COMMENCEMENT OF WORK AND SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONTINUING WORK.
4. ALL ON-SITE STORM DRAIN INLETS, EXISTING OR PROPOSED, SHALL HAVE A PERMANENT STORM DRAIN MESSAGE IN THE FORM OF A CONCRETE STAMP OR EXPOSED PLACARD INDICATING "NO DUMPING- FLOWS TO CREEK".
5. NO CROSS-CONNECTIONS BETWEEN DOMESTIC WATER, LANDSCAPE WATER, OR FIRE WATER SHALL BE ALLOWED.
6. ALL TEES SHALL HAVE THRUST BLOCKS. AT ALL OTHER FITTINGS (ELBOWS, ETC.), PROVIDE RESTRAINED JOINTS OR THRUST BLOCKS. THRUST BLOCKS SHALL BE INSTALLED PER DETAIL ON SHT. 7.0
7. UNLESS NOTED OTHERWISE, ALL PRIVATE FIREWATER PIPES THAT CAN BE PRESSURIZED BY FIRE DEPARTMENT APPARATUS SHALL BE PVC C-900, CLASS 200 OR DIP CLASS 350.
8. PRIOR TO BEGINNING WORK, THE CONTRACTOR SHALL COORDINATE THE ADDITIONAL PIPE FROM THE POC TO THE FIRE RISER WITH THE ARCHITECTURAL, MEP, AND STRUCTURAL PLANS AS NECESSARY TO VERIFY EXACT RISER LOCATION AND IDENTIFY ANY POSSIBLE OBSTRUCTIONS SUCH AS FOOTINGS, PAD, ETC. THE RISER SHALL BE INSTALLED TO TERMINATE 6" TO 24" ABOVE FINISH FLOOR, AND SHALL MAINTAIN 12" INCHES MINIMUM CLEARANCE TO ANY ADJACENT WALL. ALSO PROVIDE 1" CONDUIT SLEEVE TO BUILDING FOR ELECTRONIC MONITORING OF PIV.
9. THE POST INDICATOR VALVES (PIV) SHALL BE INSTALLED SO THAT THE TOP OF THE POST WILL BE AT 36" ABOVE FINISHED GRADE.
10. ALL FIRE HYDRANTS, PIV'S AND FDC'S SHALL BE LOCATED SO AS NOT TO BE BLOCKED BY LANDSCAPING, PARKING STALLS, LOADING ZONES, ETC.
11. PROVIDE CONDUIT SLEEVING AS REQUIRED PER THE ELECTRICAL SITE PLAN AND THE LANDSCAPE IRRIGATION PLAN PRIOR TO CONSTRUCTION OF HARDSCAPE OR PARKING AREAS.
12. SEE SHEET C1.0 FOR ADDITIONAL NOTES.

HYDRONICS, GAS, POWER, & TELEPHONE SPECIAL NOTE

THE HYDRONICS, GAS, POWER, AND TELEPHONE LINES SHOWN ON THIS PLAN ARE FOR GENERAL ROUTING PURPOSES ONLY. SEE MECHANICAL, PLUMBING, AND ELECTRICAL PLANS FOR ALL SPECIFICS RELATED TO THESE SYSTEMS (INCLUDING ANY VALVES NOT SHOWN), THEIR EXACT POC'S INTO THE BUILDINGS, AND ANY RECONSTRUCTION NEEDED (EXISTING PAVEMENT, CONCRETE, WALLS, ETC).

WET UTILITY CONSTRUCTION NOTE

LAYOUT OF WET UTILITIES IN THE CORRIDOR BETWEEN MOHR AND LILLARD HALLS IS INTENDED TO ALLOW CONSTRUCTION/DEMO OF EACH SYSTEM TO BEGIN FROM THE SOUTH AND WORK NORTH. NEW DRAIN IS INTENDED TO BE CONSTRUCTED FIRST, THEN ONCE IN PLACE THE EXISTING DRAIN LINE SHALL BE REMOVED AND NEW SEWER CONSTRUCTED IN ITS PLACE. ONCE THE NEW SEWER IS IN PLACE, THE EXISTING SEWER IS THEN TO BE REMOVED, WITH THE NEW WATER MAIN CONSTRUCTED IN ITS PLACE.

CONSTRUCTION NOTES

GENERAL

(1) TRENCH HATCH SHOWN IS SCHEMATIC ONLY. TRENCH, BACKFILL, AND REPAVE PER DETAIL ON SHEET C7.0. AT CONCRETE, SAWCUT AND REMOVE CONCRETE TO NEAREST CRACK CONTROL JOINT AT 90° ANGLES, DO NOT OVERCUT. REPLACE EXISTING HARDSCAPE (SECTION, COLOR, CRACK CONTROL PATTERN, ETC.) IN KIND.

(2) BEFORE BEGINNING ANY UNDERGROUND WORK, CONTRACTOR TO CONFIRM INVERT AT CONNECTION TO EXISTING PIPE AND VERIFY CONNECTIONS CAN BE MADE AS SHOWN. CONTRACTOR TO NOTIFY ENGINEER OF ANY ISSUES PRIOR TO PROCEEDING WITH CONSTRUCTION.

(3) THE IMPROVEMENTS SHOWN HERE (CONCRETE WALK & GATHERING AREA, BENCHES, AND DOOR ACCESS) ARE AN ADD ALTERNATE. THE BASE BID IS NOT TO INCLUDE THESE ITEMS, BUT RATHER ONLY INCLUDES THIS AREA AS LANDSCAPING.

STORM DRAIN

(D1) EXTEND NEW SERVICE TO EXISTING LILLARD HALL DRAINAGE SERVICE, CONNECTING AS NEEDED. INLETS (WHERE SHOWN) SHALL REMAIN AND CONNECTION MADE DOWNSTREAM OF INLET.

(D2) PROVIDE NEW 12" LSCB (LARGER THAN NOTED IN LEGEND) WITH 22 LF ~ 8" PIPE AT S=0.005, MIN.

(D3) CONNECTING TO EXISTING INLET, INSTALL NEW 4" PIPE AT 2% MIN BETWEEN EXISTING INLET AND DRAIN LINE CROSSING. FROM CROSSING TO NEW MAIN, PROVIDE FITTINGS AND ROTATED WYE AT MAIN TO CROSS OVER TOP OF SEWER LINE AND DOWN TO THE NEW DRAIN LINE.

(D4) INSTALL NEW CLEANOUT AT OLD INLET LOCATION. FROM NEW CLEANOUT, INSTALL 6" PIPE AT 2% MIN BETWEEN CLEANOUT AND DRAIN LINE CROSSING. FROM CROSSING TO NEW MAIN, PROVIDE FITTINGS AND ROTATED WYE AT MAIN TO CROSS OVER TOP OF SEWER LINE AND DOWN TO THE NEW DRAIN LINE. ALSO INSTALL LSCB IN LINE WHERE SHOWN.

(D5) INSTALL NEW 34 LF ~ 4" PIPE AT 2% MIN BETWEEN RWL POC AND DRAIN LINE CROSSING. FROM CROSSING TO NEW MAIN, PROVIDE FITTINGS AND ROTATED WYE TO CROSS OVER TOP OF SEWER LINE AND DOWN TO THE NEW DRAIN LINE.

(D6) PROVIDE 8"x4" REDUCER TO CONNECT TO 4" PIPE SHOWN ON PLUMBING PLAN.

SANITARY SEWER

(S1) EXTEND NEW SERVICE TO EXISTING LILLARD HALL SEWER SERVICE, CONNECTING AS NEEDED.

(S2) PROVIDE NEW 6" SEWER SERVICE TO SERVE FUTURE BUILDING. 18 LF ~ 6" PIPE INV @ MH=17.76, INV @ STUB=18.12

(S3) ROTATE WYE AND PROVIDE FITTINGS TO CROSS OVER TOP OF DRAIN LINE. INSTALL NEW 6" PIPE AT 1% MIN FROM SEWER LINE CROSSING.

WATER

(W1) EXTEND NEW SERVICE TO EXISTING LILLARD HALL DOMESTIC WATER SERVICE, CONNECTING AS NEEDED.

(W2) MAKE CONNECTION BETWEEN NEW ONSITE MAIN, EXISTING STREET SERVICE, AND EXISTING IRRIGATION SERVICE AS SHOWN USING 45° 4" FITTINGS WITH 4"x3" TEE AND 3" ELBOW.

(W3) PROVIDE NEW 4" DOMESTIC WATER SERVICE TO SERVE FUTURE BUILDING.

(W4) TRENCH UNDER EXISTING RETAINING WALL, WALL TO REMAIN UNDISTURBED. (SEE 4/S1.02.)

(W5) NOT USED.

(W6) 3" DOMESTIC WATER SERVICE INSTALL 40 LF WITH RP WHERE SHOWN.

(W7) 6" FIRE WATER SERVICE INSTALL 61 LF WITH DCV FROM TEE TO BUILDING POC. PROVIDE ADDITIONAL BRANCH WITH FDC WHERE SHOWN.

(W8) REPLACE CURB IN KIND.

(W9) REMOVE EXISTING BLOW-OFF AND CONNECT TO NEWLY CONSTRUCTED CAMPUS MAIN WHERE SHOWN.

FIRE ACCESS NOTE

ALL FIRE ACCESS IS PROVIDED FROM THE FREEPORT BLVD. AND SUTTERVILLE ROAD STREET FRONTAGES.

20' 10' 0 20'
SCALE: 1" = 20'

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3301 C ST, BLDG. 100-B TEL 916.341.7760
SACRAMENTO, CA 95816 FAX 916.341.7767

REGISTERED PROFESSIONAL ENGINEER
PETER J. TOBIA
No. 49799
Exp. 9-30-18
CIVIL
STATE OF CALIFORNIA
3/20/2018

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AC JM FLS [illegible] SS [illegible]
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Rev 3

PLAN CHECK SET

REVISION	BY	DATE
~~1 BACKCHECK 1~~		
~~2 BACKCHECK CHANGES~~		
3 REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

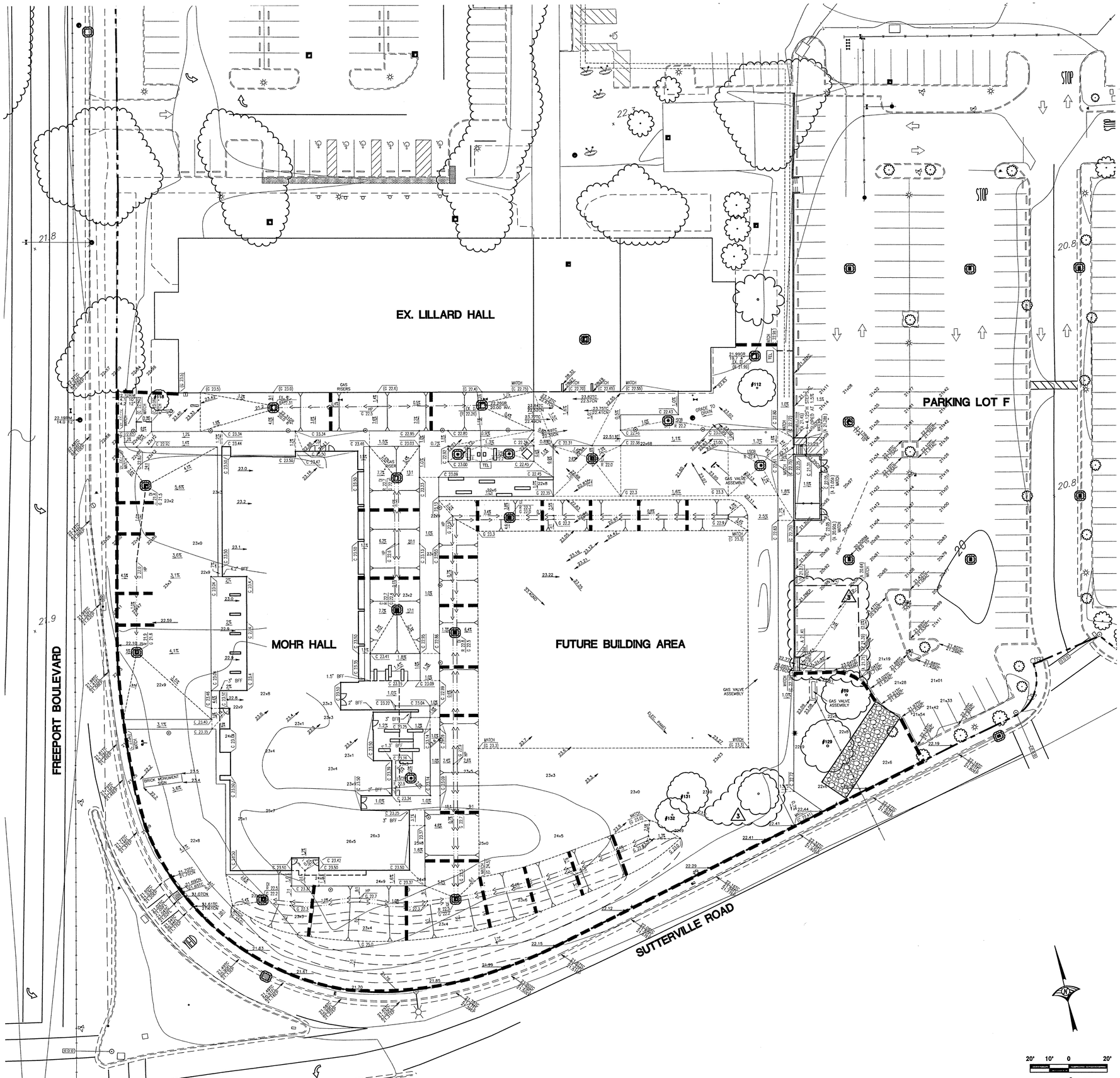
LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE

MOHR HALL REPLACEMENT

WET UTILITY PLAN

B5017.00
AS SHOWN
May 22, 2018

C6.0



LEGEND

- FIBER ROLL (SEE DETAIL ON SHEET C8.0)
- INLET PROTECTION GRAVEL BAG INLET PROTECTION WITH INLET FILTER BAG (SEE DETAILS ON SHEET C8.0)
- STABILIZED CONSTRUCTION ENTRANCE (SEE DETAIL ON SHEET C8.0)

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REGISTERED PROFESSIONAL ENGINEER — PETER J. YORK — No. 49799 — Exp 9-30-18 — CIVIL — STATE OF CALIFORNIA

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LOS RIOS COMM COLLEGE DISTRICT

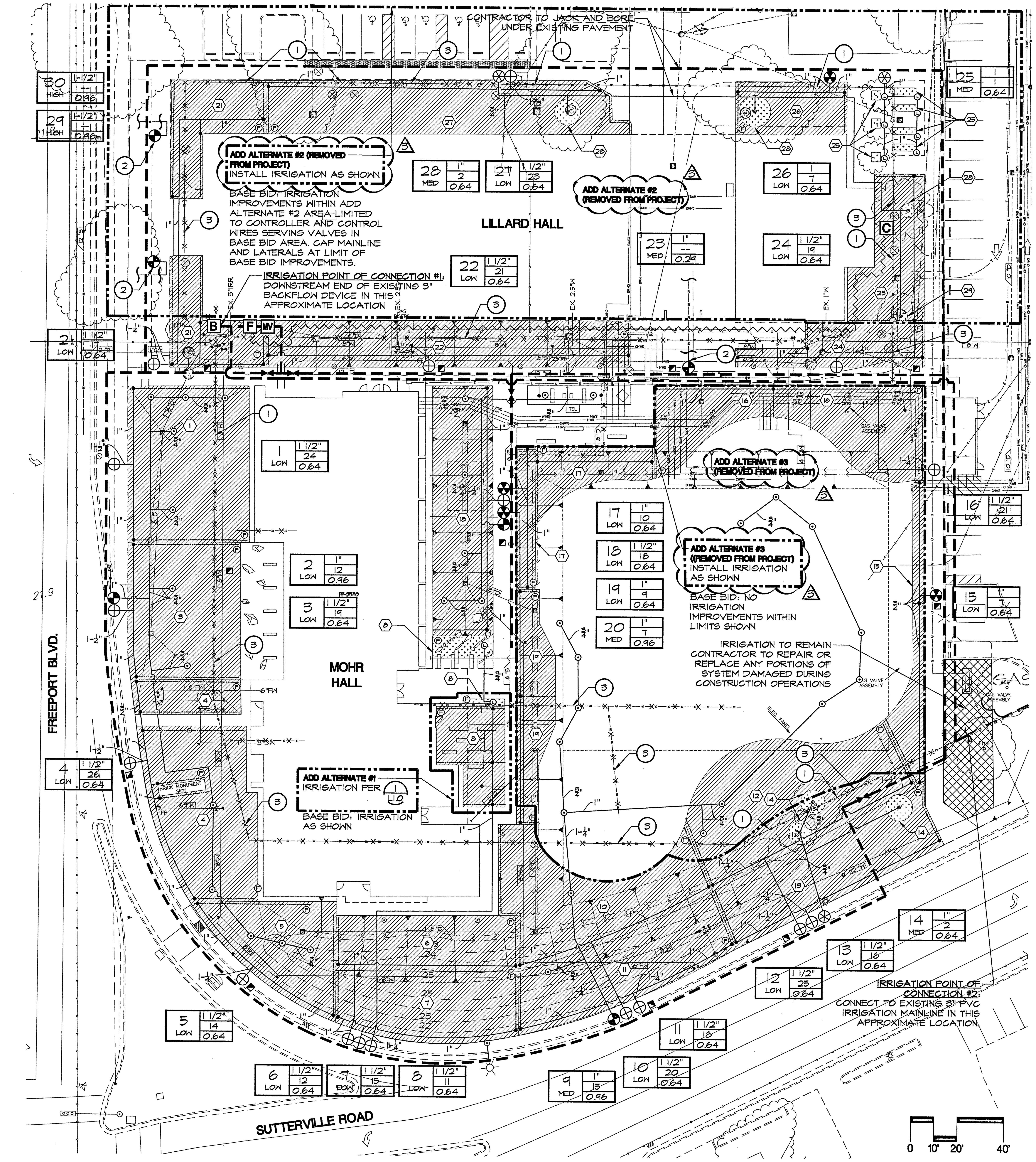
LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

EROSION & SEDIMENT CONTROL PLAN

B5017.00

May 22, 2018

C9.0



IRRIGATION KEYNOTES

1. SECTION OF EXISTING MAINLINE SHOWN TO BE ABANDONED IN PLACE WITHIN DRIPLINE OF EXISTING TREES TO REMAIN. NO EXISTING HYDRAULIC VALVES TO REMAIN.
2. CONNECT NEW VALVE TO EXISTING LATERAL IRRIGATION LINE AS SHOWN
3. PORTIONS OF THE EXISTING IRRIGATION TRANSITE MAINLINE TO BE REMOVED IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL CODES

DRIP IRRIGATION NOTES

1. ACTUAL LAYOUT OF DRIP IRRIGATION SYSTEM SHALL BE DETERMINED IN THE FIELD USING THE IRRIGATION PLAN AND THE DRIP IRRIGATION DETAILS AS A GUIDE, WHILE USING THE PLANTING PLAN FOR THE LOCATION.

2. SNAKE BLANK TUBING THROUGHOUT PLANTER AREAS TO ALLOW FOR HEAT EXPANSIONS/CONTRACTION.

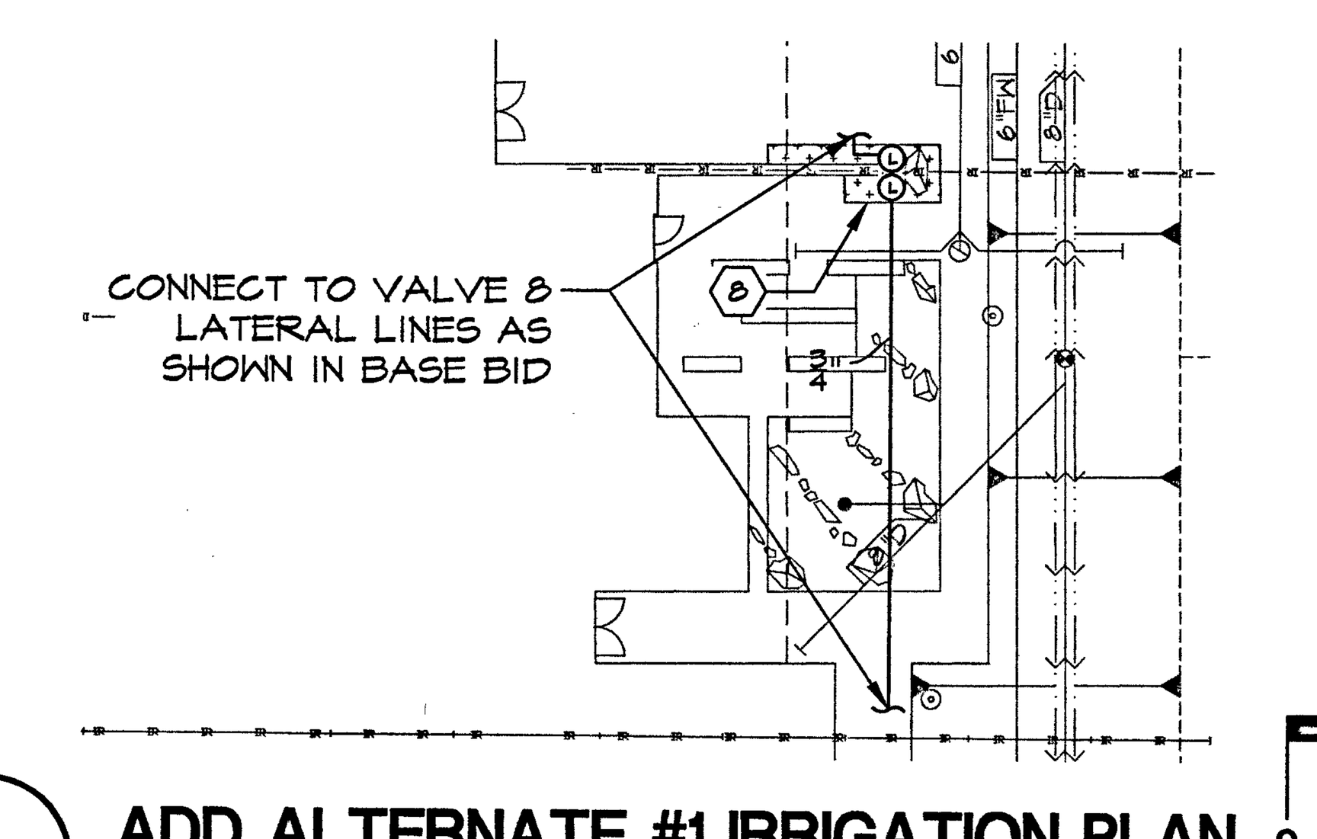
IRRIGATION LEGEND

- IN-LINE DRIP STANDARD LAYOUT, NETAFIM **TECHLINE CV 17MM DRIPLINE** WITH A 0.9 GALLON PER HOUR EMITTER FLOW AND 1'-6" EMITTER. SPACE LATERAL ROWS AT 1'-6" O.C., TYPICAL ALL ZONES UNLESS OTHERWISE INDICATED. 45 PSI. SECURE WITH 6" SOIL STAPLE EVERY 3'-0" OF TUBING. INSTALL 2 ON EACH ELBOW, TEE AND CROSS PER MANUFACTURER'S SPECIFICATIONS. INSTALL ALL LINES AT GRADE AND COVER WITH MULCH PER PLANTING PLAN. (3/L3.0, 4/L3.0, 5/L3.0, 6/L3.0)
- DRIP ZONE SUPPLY HEADER LINE/EXHAUST HEADER LINE: SCH 40, SIZE TO BE 1".
- DRIP TUBING LATERAL CONNECTION (8/L3.0)
- IN-LINE DRIP "LIGHT" LAYOUT, MODEL AND SPACING TO BE SAME AS STANDARD LAYOUT. (7/L3.0)
- TREE DRIPLINE RING, PER DETAIL (11/L3.0)
- VALVE NUMBER FOR DRIP IRRIGATION AREA
- TREE BUBBLERS, RAINBIRD XERI-BUBBLERS-UXB SERIES, EACH SYMBOL REPRESENTS TWO BUBBLERS PER TREE, 30 PSI (2/3.1)
- REMOTE CONTROL VALVE, RAINBIRD PEB SERIES (1/L3.1)
- DRIP CONTROL ZONE KIT, NETAFIM MODEL LVCZ-150HP HIGH VOLUME CONTROL ZONE KIT, 1 1/2" SIZE. INSTALL IN STANDARD 12" VALVE BOX.
- DRIP CONTROL ZONE KIT, NETAFIM MODEL LVCZ-10075-HFHP HIGH VOLUME CONTROL ZONE KIT, 1" SIZE. INSTALL IN STANDARD 12" VALVE BOX. (2/L3.0)
- DRIP CONTROL ZONE KIT, NETAFIM MODEL LVCZS8010075-LF LOW VOLUME CONTROL ZONE KIT, 1" SIZE. INSTALL IN STANDARD 12" VALVE BOX.
- LATERAL LINE, SCH 40 PVC, SIZE PER PLAN, 12" MIN. BURIAL (4/L3.1)
- MAINLINE, CLASS 315 PVC, 3" (4/L3.1)
- EXISTING 3" PVC MAINLINE
- EXISTING 3" CLASS 150 TRANSITE PIPE,
- EXISTING 3" CLASS 150 TRANSITE PIPE, TO BE REMOVED
- GATE VALVE, GATE VALVE, NIBCO, CLASS 125, T-113, LINE SIZE, INSTALL IN VALVE BOX (12/L3.0)
- QUICK COUPLER, RAINBIRD 44-LRC INSTALL IN ROUND BOX (5/L3.1)
- SLEEVING, SCH 40 PVC, SIZE TO BE TWICE OF MAIN LINE SIZE. (EXAMPLE: 3" MAIN LINE, 6" SLEEVING)
- COMMUNICATION WIRES: CONNECT FROM NEW CONTROLLER TO NEW MASTER VALVE AND FLOW SENSOR PER MANUFACTURER SPECIFICATIONS.
- B — EXISTING IRRIGATION BACKFLOW PREVENTER, APPROXIMATE LOCATION
- C — CONTROLLER, CALSENSE 40 STATION MODEL CS3-40-SI, AND SPREAD SPECTRUM RADIO CS3-SR, AND SPREAD SPECTRUM RADIO ANTENNA SR-STUBBY IN STANDARD STEEL ENCLOSURE (1/L3.0)
- F — FLOW SENSOR, CALSENSE MODEL FM-1B (6/L3.1)
- MV — MASTER VALVE, SUPERIOR 3200, NORMALLY CLOSED (6-7/L3.1)

A1 LOW		
A1	VALVE # AND HYDROZONE	
1"	VALVE SIZE	
7	APPROXIMATE GPM THROUGH VALVE	
.06	PRECIP RATE (IN/HR)	

IRRIGATION NOTES

1. SPECIFICATIONS: SEE IRRIGATION SPECIFICATIONS FOR ADDITIONAL INFORMATION.
2. VERIFICATION: SYSTEM DESIGN IS BASED ON 45 P.S.I. AND 100 G.P.M. AVAILABLE AT DISCHARGE OF BACKFLOW PREVENTER. CONTRACTOR SHALL VERIFY SAME AND NOTIFY LANDSCAPE ARCHITECT IF SUCH DATA ADVERSELY AFFECTS THE OPERATION OF THE SYSTEM. SUCH NOTICE SHALL BE MADE IN WRITING AND PRIOR TO COMMENCING ANY IRRIGATION WORK.
3. UTILITIES: CONTRACTOR SHALL VERIFY LOCATION OF ALL ON-SITE UTILITIES. RESTORATION OF DAMAGED UTILITIES SHALL BE MADE AT THE CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.
4. SCHEMATIC: SYSTEM FEATURES ARE SHOWN SCHEMATICALLY FOR GRAPHIC CLARITY. INSTALL ALL PIPING AND VALVES IN COMMON TRENCHES WHERE FEASIBLE AND INSIDE PLANTING AREAS WHENEVER POSSIBLE. ALL VALVES SHALL BE LOCATED IN GROUNDCOVER OR SHRUB AREAS WHENEVER POSSIBLE.
5. CODES: IRRIGATION SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH ALL LOCAL CODES AND MANUFACTURER'S SPECIFICATIONS. NOTIFY LANDSCAPE ARCHITECT BY TELEPHONE AND IN WRITING OF ANY CONFLICTS PRIOR TO INSTALLATION.
6. SLEEVING: CONTRACTOR SHALL ADEQUATELY SIZE ALL SLEEVES SHOWN ON PLAN. SLEEVES SHALL BE INSTALLED AT THE NECESSARY DEPTHS PRIOR TO PAVEMENT CONSTRUCTION. SLEEVING SHALL EXTEND 1'-0" FROM EDGE OF PAVEMENT INTO LAWN OR PLANTING AREA, AND SHALL HAVE ENDS CLEARLY MARKED ABOVE GRADE.
7. BACKFLOW DEVICES: LOCATE EXISITING BACKFLOW DEVICES AS SHOWN ON PLAN.
8. QUICK COUPLING VALVES: INSTALL ON TRIPLE SWING JOINT. LOCATE 12" AWAY FROM EDGE OF WALKS, WALLS, CURBS, AND HEADERBOARDS WITHIN PLANTING AREAS. PROVIDE OWNER WITH ONE OPERATING KEY, TWO SETS OF LOCKING COVER KEYS, AND ONE SWIVEL HOSE ELL.
9. EXISTING PARKING LOT IRRIGATION: THE PARKING LOT IRRIGATION SYSTEM EAST OF THE PROJECT AREA IS SUPPLIED BY POINT OF CONNECTION #2 AND MAINLINE REPLACED AS PART OF THE PROJECT, AND VALVES ARE CONNECTED TO SEPARATE CONTROLLER. THE CONTRACTOR SHALL HAND WATER ALL TREES, SHRUBS, TURF, AND GROUNDCOVER THAT THE EXISTING IRRIGATION SYSTEM WATERS. THE CONTRACTOR SHALL CONTINUE TO DO SO UNTIL THE IRRIGATION SYSTEM IS OPERABLE.
10. EXISTING IRRIGATION: UNLESS OTHERWISE INDICATED ALL COMPONENTS OF THE EXISTING IRRIGATION SYSTEM WITHIN THE PROJECT LIMITS SHALL BE REMOVED



1 L1.0 ADD ALTERNATE #1 IRRIGATION PLAN
PLAN

0 10' 20' 40'

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CALA Project No. 15068

LICENSED LANDSCAPE ARCHITECT — BENJAMIN W. WOODSIDE, NO. 4[illegible] — Signature — May 31, 2018 Renewal Date — Date — STATE OF CALIFORNIA

DEMOLITION SCOPE

FOR COMPLETE SCOPE OF DEMOLITION SEE ADDITONAL SHEETS

C3.0
L1.0
AD2.01
M1.0
E1.01
P1.1
SPECIFICATION SECTION 02 41 16

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LOS RIOS COMM COLLEGE DISTRICT

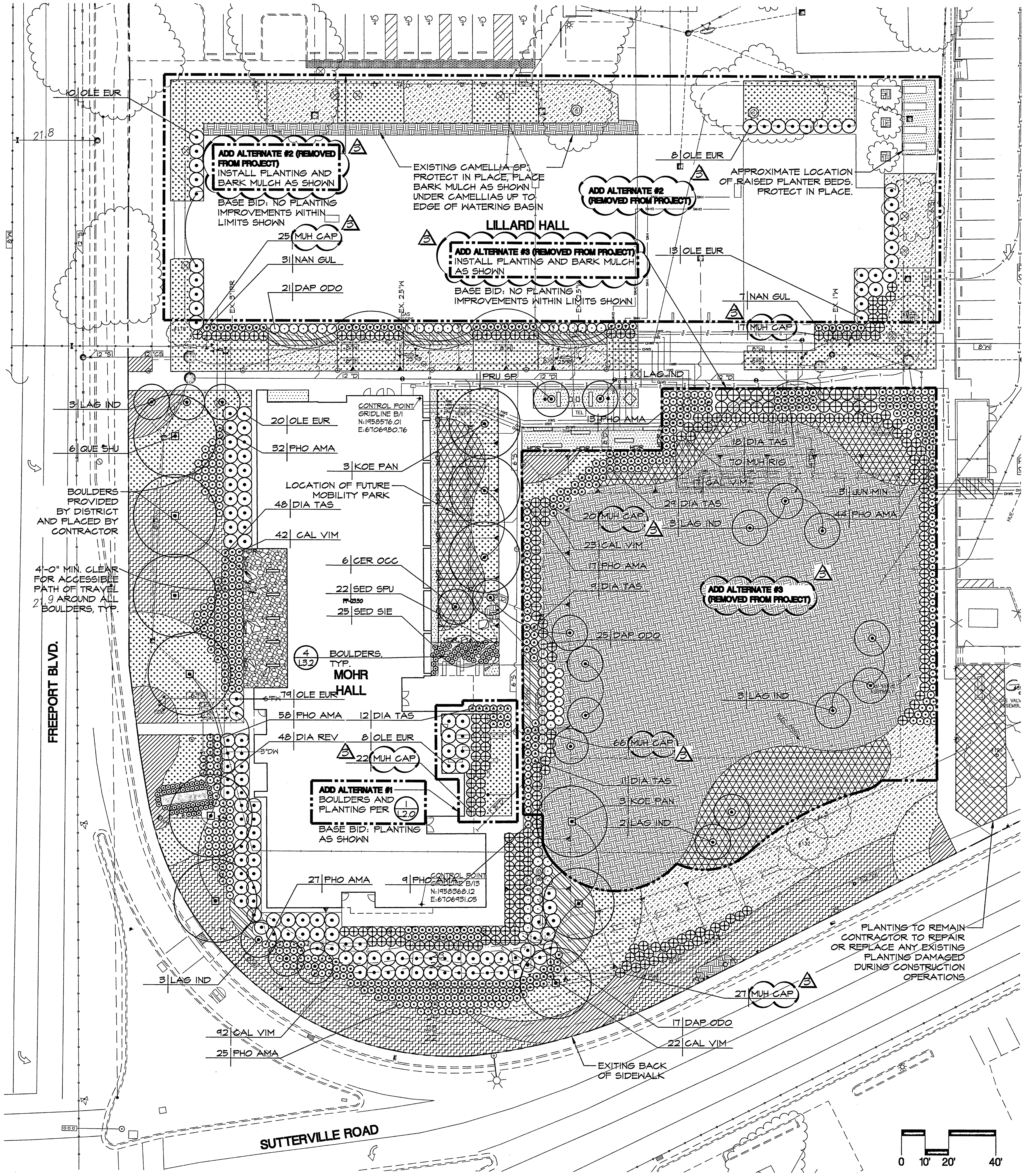
LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

IRRIGATION PLAN

B5017.00

May 22, 2018

L1.0



PLANTING NOTES

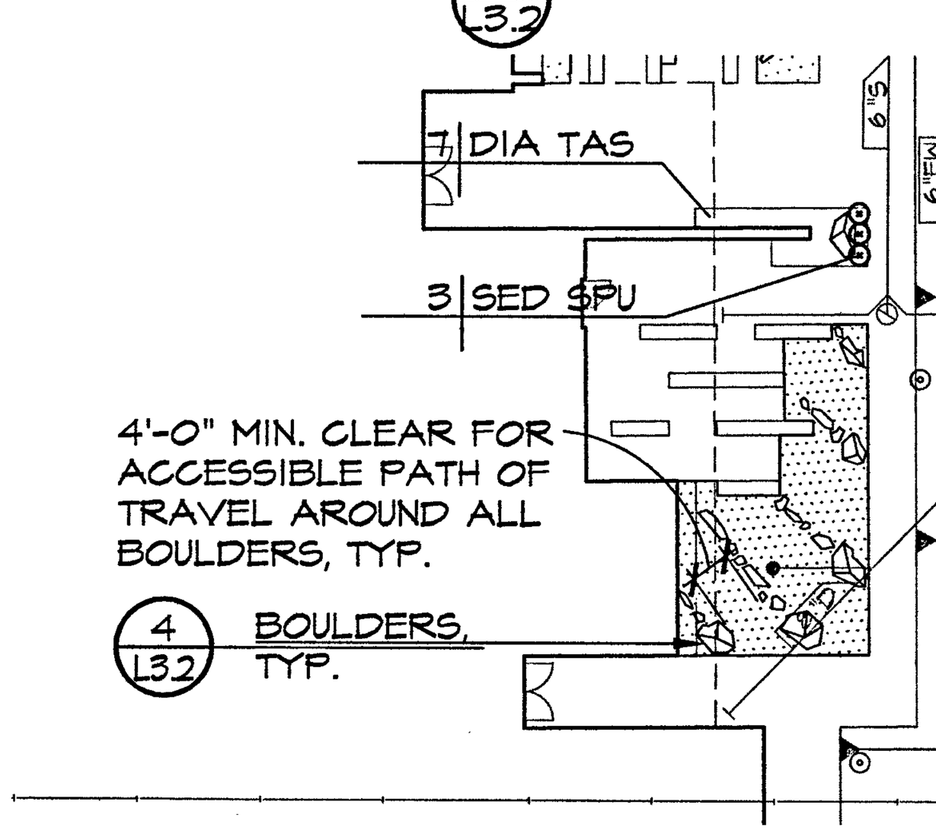
1. MULCH: INSTALL A UNIFORM 3 INCH COVERING, OF SMALL DECORATIVE BARK, 1/4 INCH TO 3/4 INCH PARTICLE SIZE, IN ALL PLANTING AREAS. MATERIAL AVAILABLE FROM REDI-GRO CORP., (916)381-6063.
2. GROUNDCOVER: PROVIDE GROUNDCOVER AT INDICATED ON-CENTER SPACING THROUGHOUT ALL PLANTING AREAS. GROUNDCOVER SHALL BE PROVIDED UP TO THE WATERING BASIN OF ALL TREES AND SHRUBS.
3. TOPSOIL: ALL PLANTING AREAS TO RECEIVE A SIX INCH LAYER OF AMENDED NATIVE TOPSOIL PER SPECIFICATIONS.
4. SOILS TESTING: SEE SPECIFICATIONS FOR TESTING OF TOPSOIL AND AMENDMENTS.

PLANT LIST

ABBREV/SYMB.	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	WATER USE
SHRUBS					
CAL VIM	CALLISTEMON VIMINALIS 'LITTLE JOHN'	LITTLE JOHN DWARF BOTTLEBRUSH	1 GAL	3'-0"	L
DAP ODO	DAPHNE ODORA MARGINATA	VARIEGATED WINTER DAPHNE	1 GAL	4'-0"	L
DIA TAS	DIANELLA TASMANICA SILVER STREAK	SILVER STREAK FLAX LILY	1 GAL	2'-0'	L
DIA REV	DIANELLA REVOLUTA	LITTLE REV FLAX LILLY	1 GAL	2'-0"	L
JUN MIN	JUNIPERUS CHINENSIS 'MONLEP'	MINT JULEP JUNIPER	1 GAL	5'-0"	L
MUH CAP	MUHLENBERGIA CAPILLARIS	PINK MUHLY GRASS	1 GAL	3'-0"	L
NAN GUL	NANDINA DOMESTICA 'GULF STREAM'	GULF STREAM HEAVENLY BAMBOO	1 GAL	3'-0"	L
OLE EUR	OLEA EUROPAEA 'MONTRA'	'LITTLE OLLIE' DWARF OLIVE	1 GAL	6'-0"	L
PHO AMA	PHORMIUM 'AMAZING RED'	AMAZING RED NEW ZEALAND FLAX	1 GAL	3'-0"	L
GROUNDCOVER					
	COPROSMA P. 'VISTA VERDE'	MIRROR PLANT	1 GAL	4'-0"	L
	COTONEASTER DAMMERI 'LOWFAST	LOWFAST BEARBERRY COTONEASTER	1 GAL	8'-0"	L
	JUNIPERUS HORIZONTALIS 'BLUE CHIP'	BLUE CHIP JUNIPER	1 GAL	6'-0"	L
	JUNIPERUS HORIZONTALIS 'WILTONII'	BLUE CARPET JUNIPER	1 GAL	6'-0"	L
SED SIE	SEDUM SIEBOLDII	OCTOBER DAPHNE STONECROP	FLATS	1'-0"	L
SED SPU	SEDUM SPURIUM 'DRAGON'S BLOOD'	DRAGON'S BLOOD STONECROP	1 GAL	2'-0"	L
GRASSES					
	CAREX DIVULSA	BERKELEY SEDGE	1 GAL	1'-6"	L
	ELYMUS CONDENSATUS 'CANYON PRINCE'	CANYON PRINCE WILDRYE	1 GAL	3'-0"	L
TREES					
CER OCC	CERCIS OCCIDENTALIS, MULTI	WESTERN REDBUD, MULTI TRUNK	15 GAL	AS SHOWN	L
LAG IND	LAGERSTROEMIA INDICA X FAURIEI 'NATCHEZ'	NATCHEZ CRAPE MYRTLE	15 GAL	AS SHOWN	L
KOE PAN	KOELREUTERIA PANICULATA	GOLDEN RAIN TREE	15 GAL	AS SHOWN	M
QUE SHU	QUERCUS KELLOGGII	BLACK OAK	15 GAL	AS SHOWN	M
PRU SP	PRUNUS SP. (MATCH EXISTING TBR)	ORNAMENTAL CHERRY	15 GAL	AS SHOWN	M
	BARK MULCH ONLY, SEE PLANTING NOTE #1				

PLANT LEGEND

- EXISTING TREE TO REMAIN
- TREE, 15 GALLON SIZE (3/L3.2)
- TREE, 24" BOX SIZE
- DECOMPOSED GRANITE PAVEMENT (5/L3.2)
- GROUTED COBBLE (7/L3.2)
- METAL HEADER (6/L3.2)
- BOULDERS: TO BE PROVIDED BY DISTRICT, INSTALLED BY CONTRACTOR PER (4/L3.2)



1 / L2.0 **ADD ALTERNATE #1 PLANT LAYOUT**
PLAN

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LOS RIOS COMM COLLEGE DISTRICT

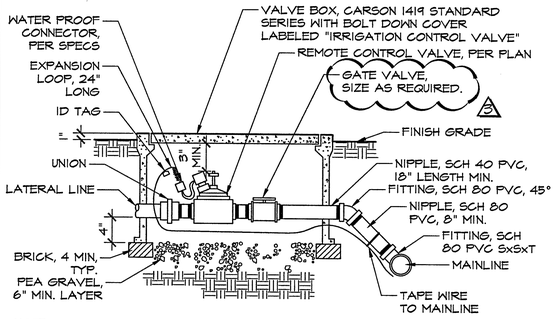
LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

PLANTING PLAN

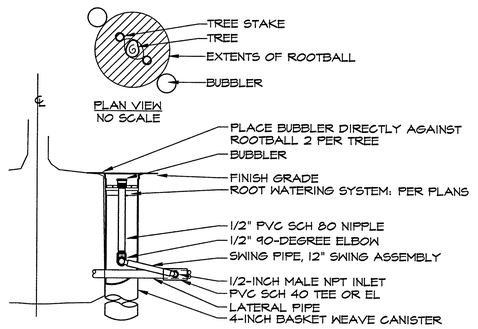
B5017.00

May 22, 2018

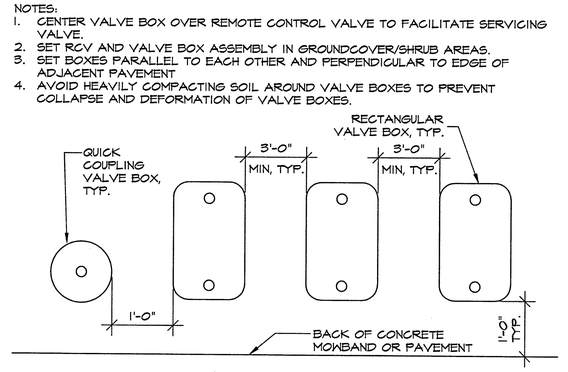
L2.0



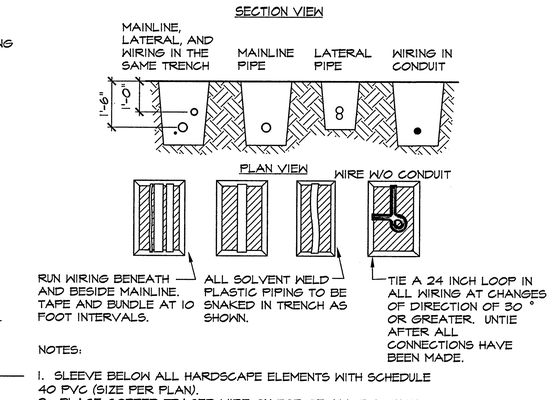
1 L3.1 **REMOTE CONTROL VALVE** SECTION



2 L3.1 **TREE BUBBLER** SECTION/PLAN



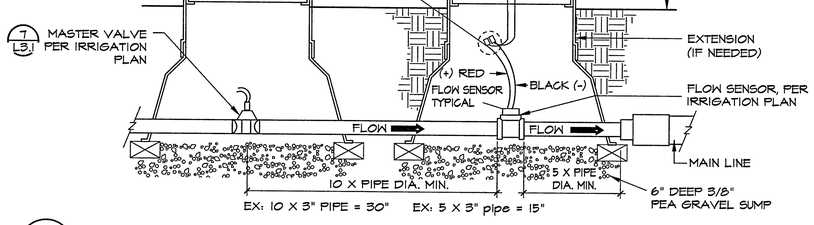
3 L3.1 **VALVE BOX LAYOUT** PLAN



4 L3.1 **TRENCHING** SECTION

02819trench2.dwg

5 L3.1 **QUICK COUPLING VALVE** SECTION



6 L3.1 **FLOW SENSOR/MASTERVALVE** SECTION

15068_02816_Flow Sensor.dwg

7 L3.1 **MASTER VALVE** PLAN

N.T.S.

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LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

CONSTRUCTION DETAILS

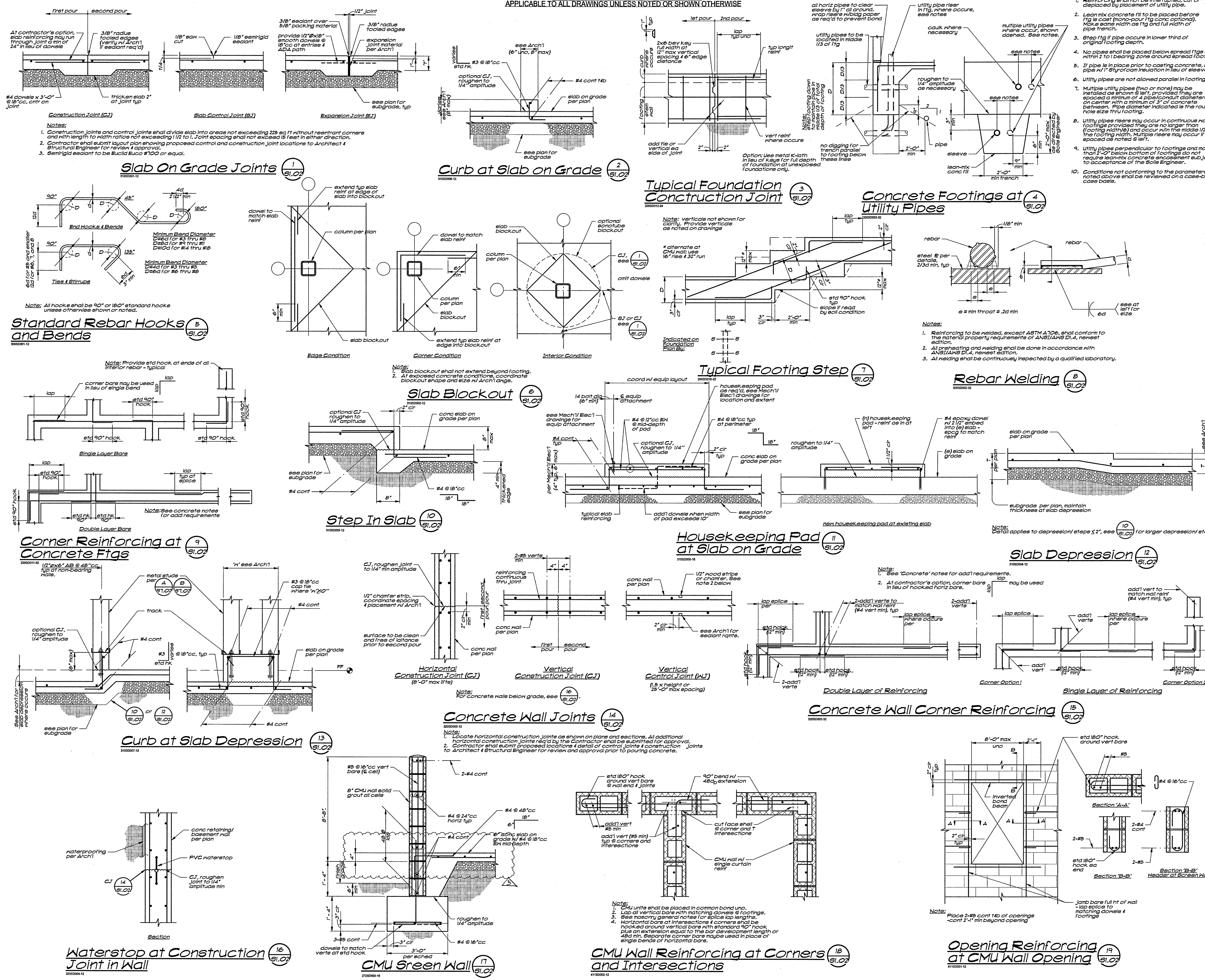
B5017.00

May 22, 2018

L3.1

TYPICAL DETAILS

APPLICABLE TO ALL DRAWINGS UNLESS NOTED OR SHOWN OTHERWISE



Construction Joint (CJ)
Slab Control Joint (SJ)
Expansion Joint (EJ)
Notes:
1. Construction joints and control joints shall divide slab into areas not exceeding 225 sq ft without reentrant corners and with length to width ratios not exceeding 1 1/2 to 1. Joint spacing shall not exceed 15 feet in either direction.
2. Contractor shall submit layout plan showing proposed control and construction joint locations to Architect & Structural Engineer for review & approval.
3. Semirigid sealant to be Euclid Euco #700 or equal.
Slab On Grade Joints 1 S1.02
Curb at Slab on Grade 2 S1.02
Typical Foundation Conctruction Joint 3 S1.02
Concrete Footings at Utility Pipes 4 S1.02
Notes:
1. Reinforcing shall not be interrupted, cut or displaced by placement of utility pipe.
2. Lean mix concrete fill to be placed before ftg is cast (mono-pour ftg conc optional). Make same width as ftg and full width of pipe trench.
3. Step ftg if pipe occurs in lower third of original footing depth.
4. No pipes shall be placed below spread ftgs or within 2 to 1 bearing zone around spread footing.
5. If pipe is in place prior to casting concrete, wrap pipe w/ 1" Styrofoam insulation in lieu of sleeve.
6. Utility pipes are not allowed parallel in footing.
7. Multiple utility pipes (two or more) may be installed as shown @ left, provided they are spaced a minimum of 4 pipe/conduit diameters on center with a minimum of 3" of concrete between. Pipe diameter indicated is the rough hole size thru footing.
8. Utility pipes risers may occur in continuous wall footings provided they are no larger than (footing width/6) and occur w/in the middle 1/3 of the footing width. Multiple risers may occur if spaced as noted @ left.
9. Utility pipes perpendicular to footings and more than 2'-0" below bottom of footings do not require lean-mix concrete encasement subject to acceptance of the Soils Engineer.
10. Conditions not conforming to the parameters noted above shall be reviewed on a case-by-case basis.
Standard Rebar Hooks and Bends 5 S1.02
Note: All hooks shall be 90° or 180° standard hooks unless otherwise shown or noted.
Edge Condition
Corner Condition
Interior Condition
Note:
1. Slab blockout shall not extend beyond footing.
2. At exposed concrete conditions, coordinate blockout shape and size w/ Arch'l dwgs.
Slab Blockout 6 S1.02
Typical Footing Step 7 S1.02
Notes:
1. Reinforcing to be welded, except ASTM A706, shall conform to the material property requirements of ANSI/AWS D1.4, newest edition.
2. All preheating and welding shall be done in accordance with ANSI/AWS D1.4, newest edition.
3. All welding shall be continuously inspected by a qualified laboratory.
Rebar Welding 8 S1.02
Note: Provide std hook at ends of all interior rebar - typical
Single Layer Bars
Double Layer Bars
Note: See concrete notes for add'l requirements
Corner Reinforcing at Concrete Ftgs 9 S1.02
Step In Slab 10 S1.02
new housekeeping pad at existing slab
Housekeeping Pad at Slab on Grade 11 S1.02
Note: Detail applies to depression/ steps ≤ 2", see 10 S1.02 for larger depression/ steps.
Slab Depression 12 S1.02
Curb at Slab Depression 13 S1.02
Horizontal Construction Joint (CJ)
Vertical Construction Joint (CJ)
Vertical Control Joint (WJ)
Note: For concrete walls below grade, see 16 S1.02.
Concrete Wall Joints 14 S1.02
Note:
1. Locate horizontal construction joints as shown on plans and sections. All additional horizontal construction joints req'd by the Contractor shall be submitted for approval.
2. Contractor shall submit proposed locations & detail of control joints & construction joints to Architect & Structural Engineer for review and approval prior to pouring concrete.
Note:
1. See 'Concrete' notes for add'l requirements.
2. At contractor's option, corner bars may be used in lieu of hooked horiz bars.
Double Layer of Reinforcing
Corner Option 1
Single Layer of Reinforcing
Corner Option 2
Concrete Wall Corner Reinforcing 15 S1.02
Section
Waterstop at Construction Joint in Wall 16 S1.02
CMU Screen Wall 17 S1.02
Note:
1. CMU units shall be placed in common bond uno.
2. Lap all vertical bars with matching dowels @ footings.
3. See masonry general notes for splice lap lengths.
4. Horizontal bars at intersections & corners shall be hooked around vertical bars with standard 90° hook plus an extension equal to the bar development length or 48db min. Separate corner bars maybe used in place of single bends of horizontal bars.
CMU Wall Reinforcing at Corners and Intersections 18 S1.02
Section 'A-A'
Section 'B-B'
Section 'B-B' Header at Screen Wall
Note: Place 2-#5 cont ftb of openings - cont 2'-1" min beyond opening
Opening Reinforcing at CMU Wall Opening 19 S1.02

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Buehler & Buehler Structural Engineers, Inc.

FILE NO. 34-C3
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02-116163

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PLAN CHECK SET

REVISION		BY	DATE
1	BACKCHECK 1		
2	BACKCHECK 3		
3	Revised Plans		

LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT SACRAMENTO CITY COLLEGE

MOHR HALL REPLACEMENT

TYPICAL DETAILS

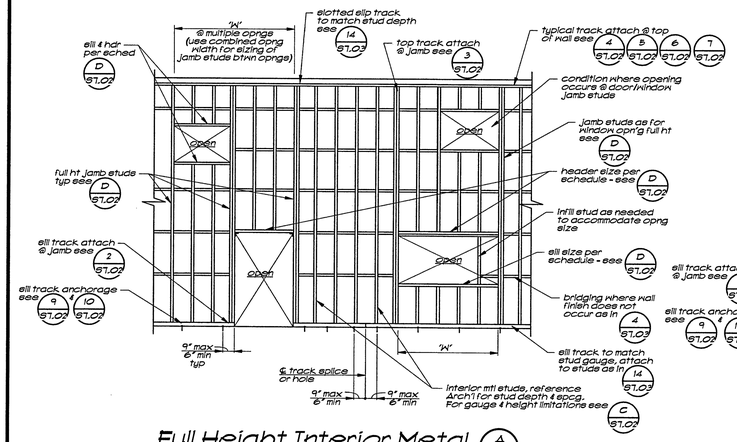
B5017.00

May 22, 2018

S1.02

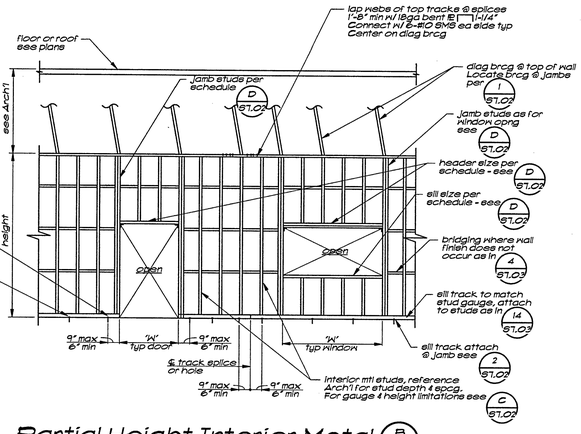
TYPICAL DETAILS

APPLICABLE TO ALL DRAWINGS UNLESS NOTED OR SHOWN OTHERWISE



Full Height Interior Metal Stud Wall Elevation A S1.02

54250011-46



Partial Height Interior Metal Stud Wall Elevation B S1.02

54250012-46

Interior Metal Stud Partitions C S1.02

Maximum Height for Metal Studs with
Sds = 0.15, Ip = 1.0
Deflection Limit L/120 - Non Bearing with Cabinet or Equipment

54250033-1

16"cc spacing

Depth	Gage	Designation [3]	Height
3 5/8"	20	362S162-33	17'-1"
3 5/8"	18	362S162-43	18'-6"
3 5/8"	16	362S162-54	20'-10"
3 5/8"	14	362S162-68	22'-7"
4"	20	400S162-33	18'-10"
4"	18	400S162-43	20'-11"
4"	16	400S162-54	22'-7"
4"	14	400S162-68	24'-7"
6"	20	600S162-33	25'-7"
6"	18	600S162-43	28'-8"
6"	16	600S162-54	32'-8"
6"	14	600S162-68	35'-10"
8"	20	800S162-33	29'-2"
8"	18	800S162-43	36'-11"
8"	16	800S162-54	42'-1"
8"	14	800S162-68	46'-10"

1. Stude shall be depth as indicated on Arch drawings and gauge as determined by height of wall and the schedule above.
2. See elevations A S1.02 & B S1.02 for typical wall framing conditions.
3. Designation conforms to Steel Stud Manufacturers Association standards.
4. For wall supported cabinet installation see 16 S1.03
5. The max. hts noted in this table are based upon the use of seismic component load Fp or a live load of 8psf, whichever governs.

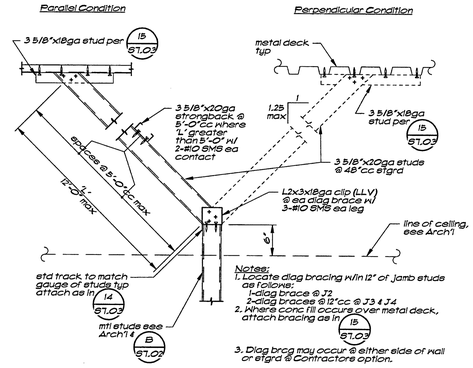
Interior Wall Opening Framing Schedule D S1.02

Deflection Limit = L/120

54250014-1

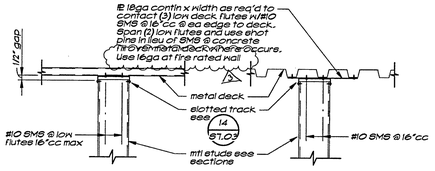
'W' width max 15	Jambs	Header	Sill	HC4-B Screw Spcg	
				3-5/8" & 4" walls	6" & 8" walls
4'-0"	J1 [1,2,3]	H2	S1		
8'-0"	J2	H4	S1 [9]		
12'-0"	J3	HC4-B [4,5,12]	S2	8"cc	4"cc
16'-0"	J4	HC4-B [6,7,8,12]	S4 [10]	8"cc	4"cc

1. Use J2 minimum at door openings
2. Use J2 at 4'-0" max opngs in 20ga walls
3. Use J2 at 4'-0" max opngs in 8"x18ga walls
4. H4-6 may be used at 12'-0" max opngs in 16ga and 14ga walls w/ the exception of 8" walls
5. Use 18ga min. headers at 12'-0" max opngs in 8" walls
6. Use 16ga min. headers at 16'-0" max opngs in 3-5/8" & 4" walls
7. Use 14ga min. headers at 16'-0" max opngs in 6" & 8" walls uno
8. Use HC4-10 headers at 16'-0" max opngs in 8"x14ga walls
9. Use S2 ells at 8'-0" max opngs in 3-5/8x20ga, 4"x20ga, and 6"x20ga walls.
10. S2 may be used at 16'-0" max opngs in 16ga and 14ga walls w/ the exception of 3-5/8" walls
11. See sheet S1.5 for jamb, header, and sill details
12. "H4-8" indicates header type and depth of vertical stud elements inside header. "HC4-8" indicates composite header w/ addl screw requirements - see schedule 4 S1.03
13. For connection @ base of wall at jambs see 2 S1.02
14. For connection @ top of wall at jambs see 3 S1.02
15. 'W' width is the max width of a single opening or the combined width of side by side openings that share a single jamb stud configuration.



Typical Partial Height Partition Wall Bracing 1 S1.02

54250001-12

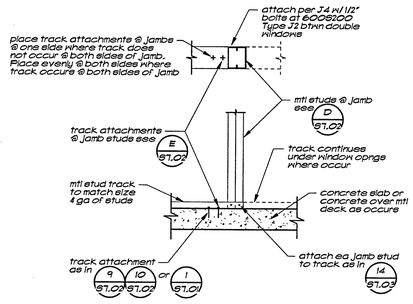


Notes:

1. Where concrete over metal deck occure:
   a. Where wall is perpendicular to deck, attach track to deck w/ (1) shot pin w/ steel washer @ 24"cc max in lieu of SMS.
   b. Where wall is parallel to deck, 4 mall @ le w/in 1-1/2" of @ of lon deck flute, top track may be attached directly to deck as in perpendicular cond 4 contin fill may be omitted.
2. See shot pin notes for spacing, edge distance & placement requirements. At SMS maintain 1.5 x diameter min spacing & edge distance.
3. For cond @ jamb studs see 3 S1.02

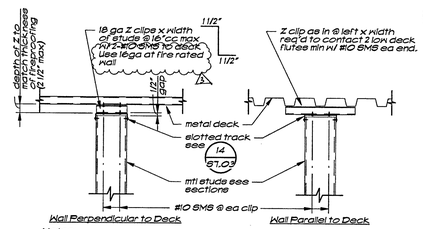
Slip Track to Metal Deck w/o Fireproofing 4 S1.02

54250004-12



Jamb Studs @ Sill Track 2 S1.02

54250002-12

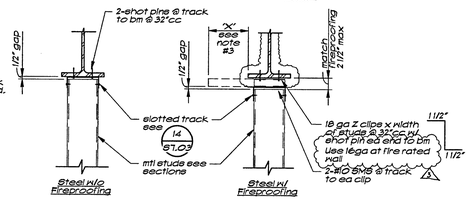


Notes:

1. Where conc fill occure over metal deck, use shot pins in lieu of SMS.
2. Provide Z clips as req'd for fasteners @ jamb studs, see E S1.02

Slip Track to Metal Deck w/ Fireproofing 5 S1.02

54250005-12

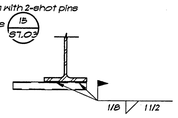


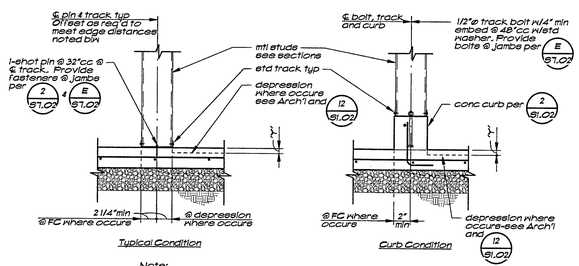
Notes:

1. Provide Z clips as req'd for fasteners @ jamb studs see E S1.02
2. At soffit hangers, studs may be attached as shown above with the following modifications:
   A. Use std 18 ga deep leg track in lieu of clip track. Provide 2-#10 SMS ea side of hanger.
   B. Where fireproofing occurs, use 14 ga Z clips @ ea hgr. Attach track to clips w/ 3-#10 SMS located within 1/2" of ea edge and at middle of track. Align Z clips w/ hangers (±1/2").
   C. Where no fireproofing occurs, attach track to bm with 2-shot pins @ 16"cc located within 1/2" of ea edge of track. For additional information @ suspended soffits see 15 S1.03
3. Stude & hgrs may be offset from bm flange up to 9" @ studs 6" @ hgrs with the following modifications:
   A. At stude, provide 16ga Z clip & 3 shot pins evenly spaced where "X"≤3".
   B. At hangers, weld clip to beam as shown, where "X"≤3".

Slip Track to Steel Beam 6 S1.02

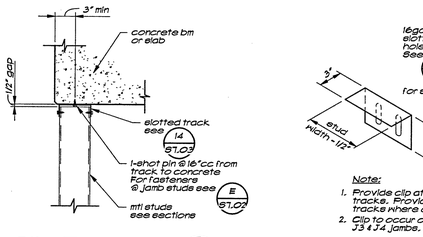
54250032-12





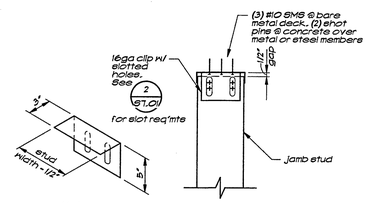
Jamb Studs @ Top Track 3 S1.02

54250003-12



Slip Track to Concrete 7 S1.02

54250007-12



Note:

1. Provide clip at all exterior wall jamb studs at slotted tracks. Provide clip at all interior wall deflection tracks where opening width is greater than 8'-0" wide.
2. Clip to occur one side of J2 jambs, both sides of J3 & J4 jambs.

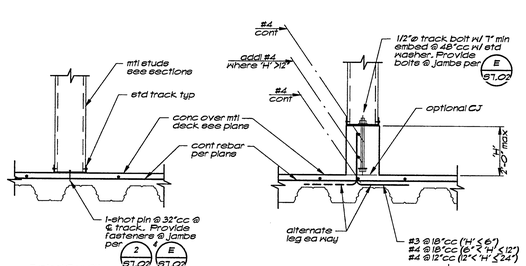
Jamb Stud Clip Attachment at Slip Track 8 S1.02

54250046-8

Note:
Where slab depression occure, verify depth "Y", location & extent w/ Arch't. Where "Y" exceeds 2" use provisions of curb cond.

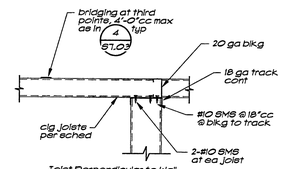
Sill Track to Slab 9 S1.02

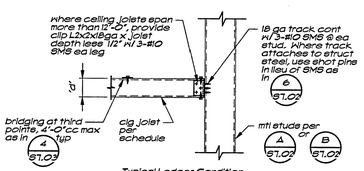
54250008-12



Sill Track to Concrete Over Metal Deck 10 S1.02

54250009-12

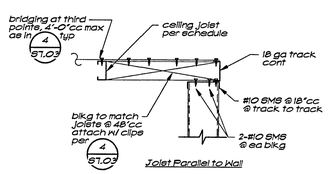




Ceiling Joist Schedule

Non-accessible Span	Accessible Span	ceiling joist
10'-0" max	5'-0" max	2 1/2" x 18 ga @ 16"cc
14'-0" max	8'-0" max	3 5/8" x 18 ga @ 16"cc
19'-0" max	10'-0" max	6" x 20 ga @ 16"cc
20'-0" max	12'-0" max	6" x 18 ga @ 16"cc
22'-0" max	16'-0" max	6" x 16 ga @ 16"cc

1. All studs & joiste are "S" type.
2. Where clg joists are supported from soffit hgrs as in 15 S1.03 & clg joists occur @ both sides of hgrs, joist spans shall not exceed 8'-0". Provide addl lines of hgrs as req'd.



Typical Framed Ceiling Details 11 S1.02

54250015-12

Track Attachment @ Jamb Studs E S1.02

54250017-1

Jamb Type	Track Attachment Method 1,2		
	Shot Pin	SMS	1/2"ø bolts
J1	1	1	1
J2	2	2	1
J3	3	3	1
J4	4	4	2

Notes:

1. Schedule indicates track attachments required where jamb stude occur. See typical ell and top track attachment details for basic attachment methods (i.e. shot pins, SMS, bolts etc....) & conditions beyond jamb studs.
2. Locate all required attachments as close to jamb stude as possible. Maintain all fastener spacing and edge distance requirements. At shot pins, see typical notes, @ SMS maintain 1.5xdiameter min edge distance & spcg. At bolts space no closer than 12 diameters and no more than 9" from end of track.

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Sacramento . Phoenix . San Francisco . Los Angeles

JASON D. OLSEN No. 5 STRUCTURAL ASSOCIATED PROFESSIONAL ENGINEERS STATE OF CALIFORNIA

FILE NO.34-C3

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PLAN CHECK SET

REVISION	BY	DATE
~~1 BACKCHECK 1~~		
~~4 BACKCHECK 4~~		
5 Revised Plans		

LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

METAL STUD INTERIOR DETAILS

B5017.00

May 22, 2018

S7.02

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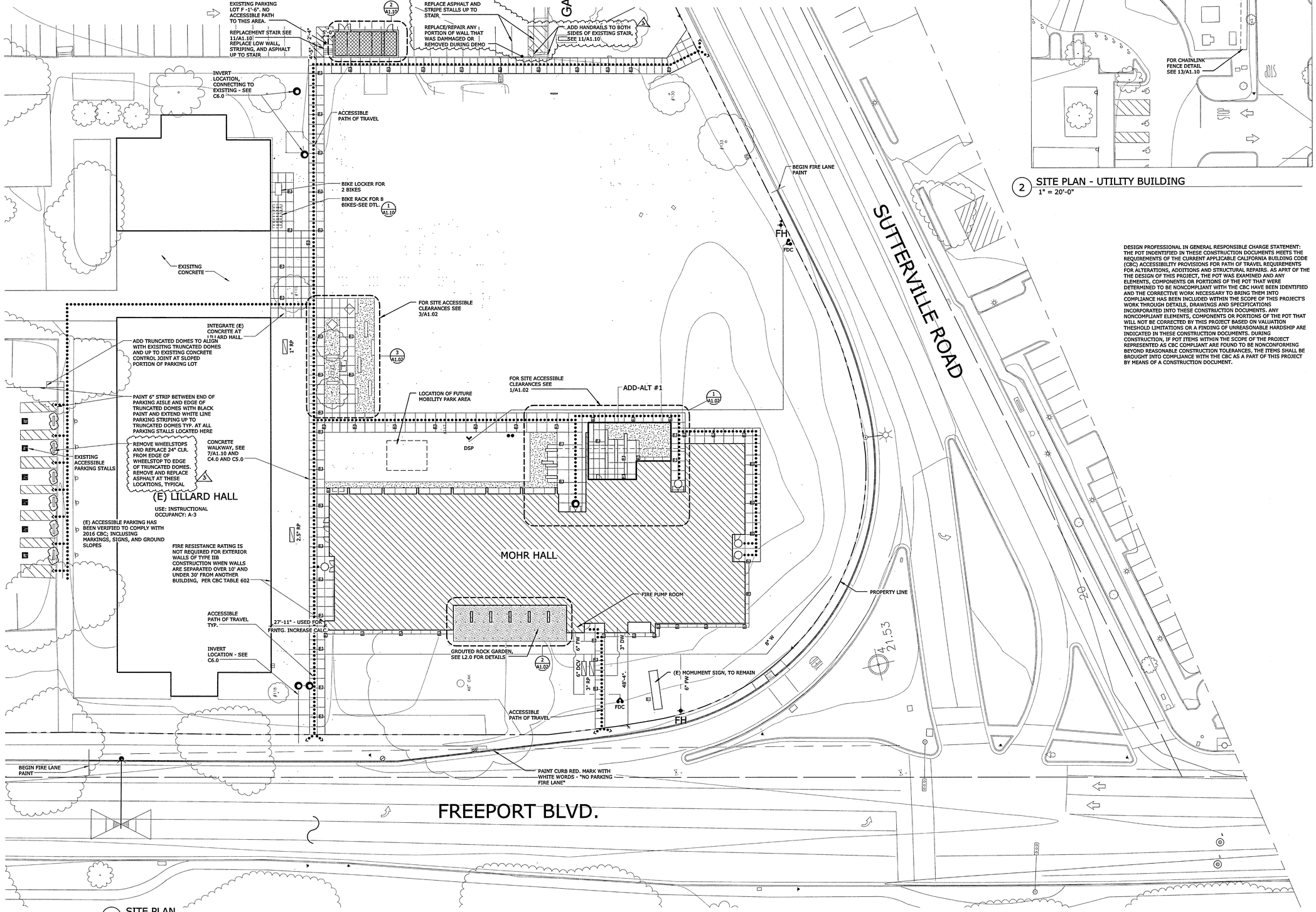
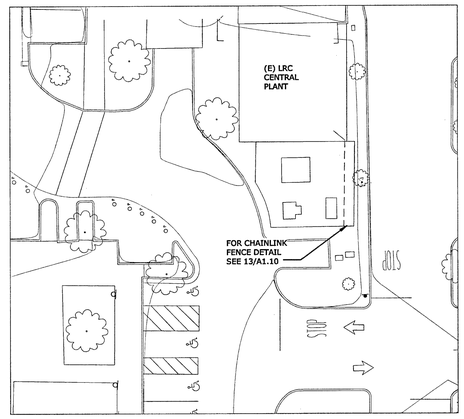


1 SITE PLAN
1" = 20'-0"



2 SITE PLAN - UTILITY BUILDING
1" = 20'-0"

DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE STATEMENT: THE POT INDENTIFIED IN THESE CONSTRUCTION DOCUMENTS MEETS THE REQUIREMENTS OF THE CURRENT APPLICABLE CALIFORNIA BUILDING CODE (CBC) ACCESSIBILITY PROVISIONS FOR PATH OF TRAVEL REQUIREMENTS FOR ALTERATIONS, ADDITIONS AND STRUCTURAL REPAIRS. AS APRT OF THE THE DESIGN OF THIS PROJECT, THE POT WAS EXAMINED AND ANY ELEMENTS, COMPONENTS OR PORTIONS OF THE POT THAT WERE DETERMINED TO BE NONCOMPLIANT WITH THE CBC HAVE BEEN IDENTIFIED AND THE CORRECTIVE WORK NECESSARY TO BRING THEM INTO COMPLIANCE HAS BEEN INCLUDED WITHIN THE SCOPE OF THIS PROJECT'S WORK THROUGH DETAILS, DRAWINGS AND SPECIFICATIONS INCORPORATED INTO THESE CONSTRUCTION DOCUMENTS. ANY NONCOMPLIANT ELEMENTS, COMPONENTS OR PORTIONS OF THE POT THAT WILL NOT BE CORRECTED BY THIS PROJECT BASED ON VALUATION THESHOLD LIMITATIONS OR A FINDING OF UNREASONABLE HARDSHIP ARE INDICATED IN THESE CONSTRUCTION DOCUMENTS. DURING CONSTRUCTION, IF POT ITEMS WITHIN THE SCOPE OF THE PROJECT REPRESENTED AS CBC COMPLIANT ARE FOUND TO BE NONCONFORMING BEYOND REASONABLE CONSTRUCTION TOLERANCES, THE ITEMS SHALL BE BROUGHT INTO COMPLIANCE WITH THE CBC AS A PART OF THIS PROJECT BY MEANS OF A CONSTRUCTION DOCUMENT.

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GENERAL NOTES

1. THE ACCESSIBLE ROUTE OF TRAVEL (OR PATH OF TRAVEL) IS A CONTINUOUS UNOBSTRUCTED WALKWAY (OR PATH) CONNECTING ALL ACCESSIBLE ELEMENTS AND SPACES AS INDICATED ON THIS SHEET. THE CONTRACTOR SHALL VERIFY THAT A PERSON CAN NEGOTIATE THE ACCESSIBLE ROUTE WITH A DISABILITY USING A WHEELCHAIR AND THAT THE ROUTE IS ALSO SAFE AND USABLE BY PERSONS WITH OTHER DISABILITIES.
2. ALL WALKS, SIDEWALKS AND LANDINGS THAT ARE PART OF THE ACCESSIBLE ROUTE OF TRAVEL SHALL HAVE A CONTINUOUS COMMON SURFACE, NOT INTERRUPTED BY STEPS OR BY ABRUPT CHANGES IN LEVEL EXCEEDING 1/2 INCH, AND SHALL HAVE A MINIMUM WIDTH OF 48 INCHES, UNLESS NOTED OTHERWISE. THE SLOPE IN THE DIRECTION OF TRAVEL SHALL BE LESS THAN 1:20 (5%) WITH A MAXIMUM CROSS SLOPE OF 1/4 INCH PER FOOT (2%), UNLESS OTHERWISE NOTED.
3. ALL DESIGNATED ACCESSIBLE RAMPS SHALL HAVE A MAXIMUM SLOPE OF 1:12 (8.33%) IN THE DIRECTION OF TRAVEL WITH A MAXIMUM CROSS SLOPE OF 1/4 INCH PER FOOT (2%), UNLESS OTHERWISE NOTED.
4. AT FLATWORK, PROVIDE CONTROL JOINTS AS INDICATED ON PLANS AND EXPANSION JOINTS (EJ) AT 20'-0" O.C. MAXIMUM, SEE SHEET A1.02 FOR ENLARGED PLANS AND A1.10 FOR DETAILS
5. SEE CIVIL DRAWINGS FOR FULL EXTENT OF SITE WORK IN THIS CONTRACT.

ADD-ALTERNATES

LEGEND #2

ADD-ALT #1:
SITE FEATURES FOR ROCK DISPLAY AREA OUTSIDE GEOLOGY LAB INCLUDING:
- PRECAST BENCHES
- DECOMPOSED GRANITE
- ROCK GARDEN

REFERENCED SHEETS:
A1.01, A1.02, L1.0, L2.0

SITE PLAN AND ACCESSIBLE ROUTE LEGEND

- MAIN BUILDING ENTRY
- SECONDARY BUILDING ENTRY
- ACCESSIBLE PATH OF TRAVEL TO PUBLIC WAY

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AC TH FLS MC SS
DATE 5-10-18

LICENSED ARCHITECT
C32210
Christopher Agbod GOLDEN
Exp. 02/31/19
STATE OF CALIFORNIA

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~~2 BACKCHECK CHANGES~~		
3 REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

SITE PLAN AND ACCESSIBLE ROUTE

B5017.00

May 22, 2018

NORTH

A1.01

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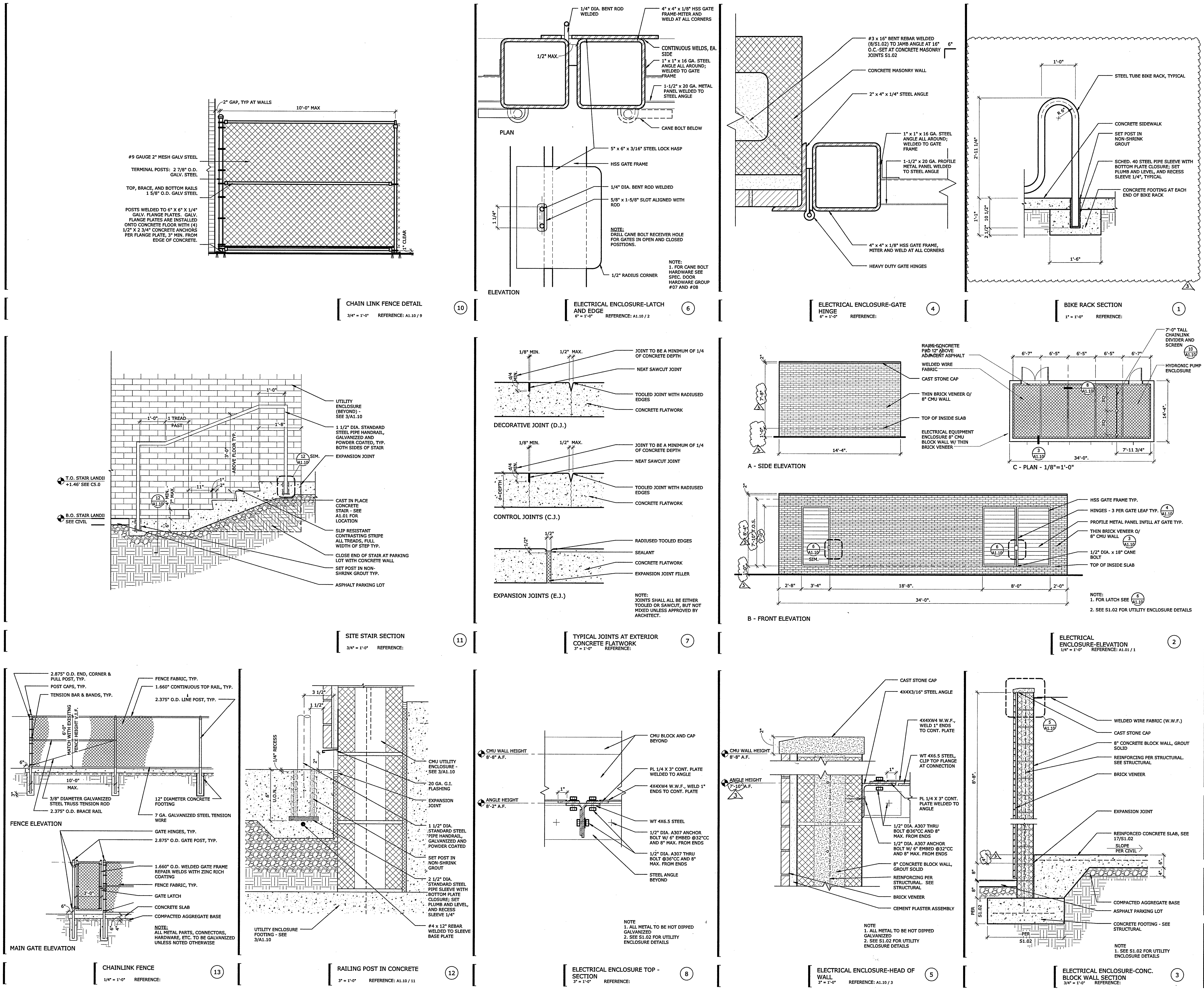
CHAIN LINK FENCE DETAIL
3/4" = 1'-0" REFERENCE: A1.10 / 9
10
ELECTRICAL ENCLOSURE-LATCH AND EDGE
6" = 1'-0" REFERENCE: A1.10 / 2
6
ELECTRICAL ENCLOSURE-GATE HINGE
6" = 1'-0" REFERENCE:
4
BIKE RACK SECTION
1" = 1'-0" REFERENCE:
1
SITE STAIR SECTION
3/4" = 1'-0" REFERENCE:
11
TYPICAL JOINTS AT EXTERIOR CONCRETE FLATWORK
3" = 1'-0" REFERENCE:
7
ELECTRICAL ENCLOSURE-ELEVATION
1/4" = 1'-0" REFERENCE: A1.01 / 1
2
CHAINLINK FENCE
1/4" = 1'-0" REFERENCE:
13
RAILING POST IN CONCRETE
3" = 1'-0" REFERENCE: A1.10 / 11
12
ELECTRICAL ENCLOSURE TOP - SECTION
3" = 1'-0" REFERENCE:
8
ELECTRICAL ENCLOSURE-HEAD OF WALL
3" = 1'-0" REFERENCE: A1.10 / 3
5
ELECTRICAL ENCLOSURE-CONC. BLOCK WALL SECTION
3/4" = 1'-0" REFERENCE:
3
DECORATIVE JOINT (D.J.)
CONTROL JOINTS (C.J.)
EXPANSION JOINTS (E.J.)
A - SIDE ELEVATION
B - FRONT ELEVATION
C - PLAN - 1/8"=1'-0"
FENCE ELEVATION
MAIN GATE ELEVATION
PLAN
ELEVATION
NOTE: JOINTS SHALL ALL BE EITHER TOOLED OR SAWCUT, BUT NOT MIXED UNLESS APPROVED BY ARCHITECT.
NOTE: 1. FOR LATCH SEE 6/A1.10 2. SEE S1.02 FOR UTILITY ENCLOSURE DETAILS
NOTE: ALL METAL PARTS, CONNECTORS, HARDWARE, ETC. TO BE GALVANIZED UNLESS NOTED OTHERWISE
NOTE 1. ALL METAL TO BE HOT DIPPED GALVANIZED 2. SEE S1.02 FOR UTILITY ENCLOSURE DETAILS

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REVISION	BY	DATE
1 ~~BACKCHECK 1~~		
2 ~~BACKCHECK CHANGES~~		
3 REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

SITE DETAILS

B5017.00

May 22, 2018

A1.10

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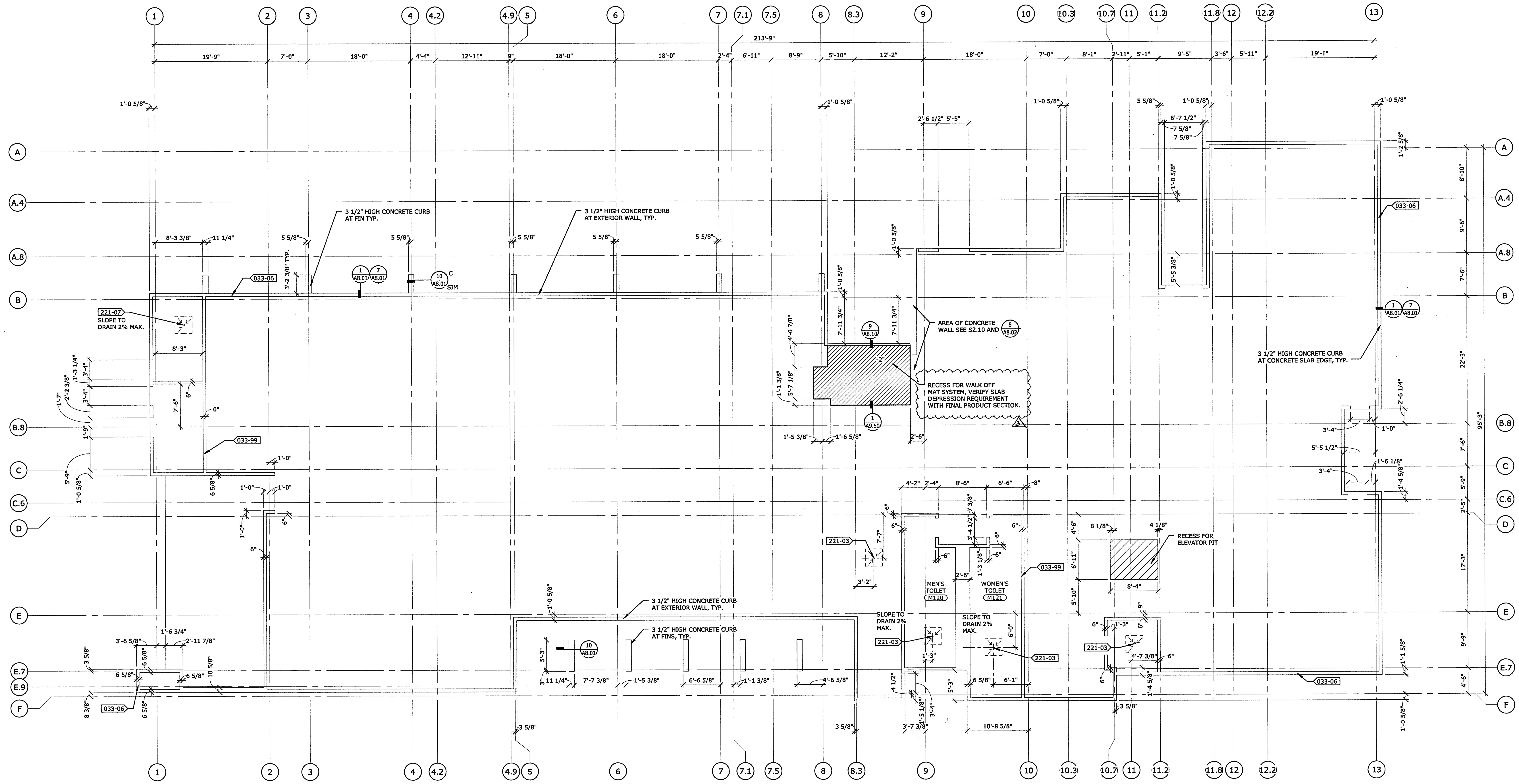
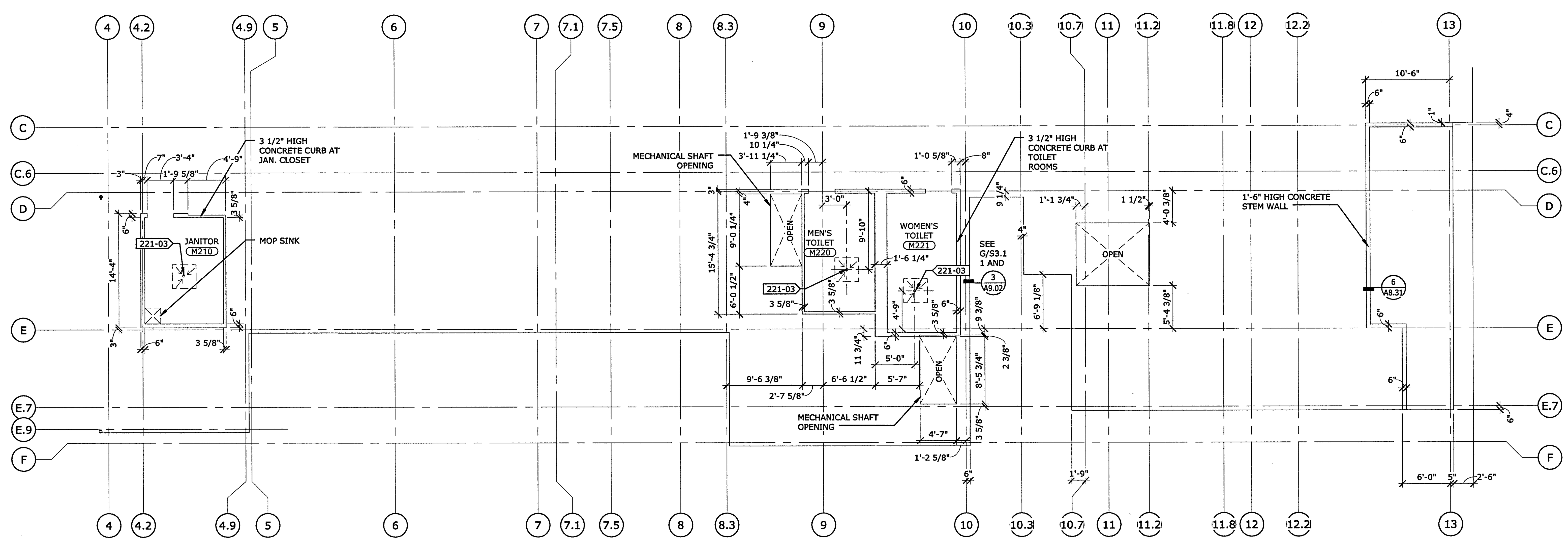


1 SLAB PLAN - FIRST FLOOR
1/8" = 1'-0"



2 SLAB PLAN - SECOND FLOOR
1/8" = 1'-0"

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GENERAL NOTES

1. ALL EXTERIOR SLAB AND CURB EDGE DIMENSIONS ARE TO FACE OF GYP. BD., NOT TO FRAMING. SEE DETAILS 1,7/A8.01

KEYNOTES:

000-00	KEYNOTE DESCRIPTION
033-06	6 5/8" WIDE CONCRETE CURB TYP. AT EXTERIOR
033-99	3 1/2" HIGH CURB TYP.
221-03	AREA FLOOR DRAIN - SEE SLAB PLANS AND PLUMBING FOR DETAILS, SEE SLAB PLANS FOR SLOPED CONCRETE LOCATIONS AND BATHROOM PLANS FOR SLOPED TILE LOCATIONS
221-07	FLOOR SINK - SEE SLAB PLANS AND PLUMBING FOR DETAILS, SEE SLAB PLANS FOR SLOPED CONCRETE LOCATIONS

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LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

SLAB PLAN

NORTH

B5017.00
1/8" = 1'-0"
May 22, 2018

A2.00

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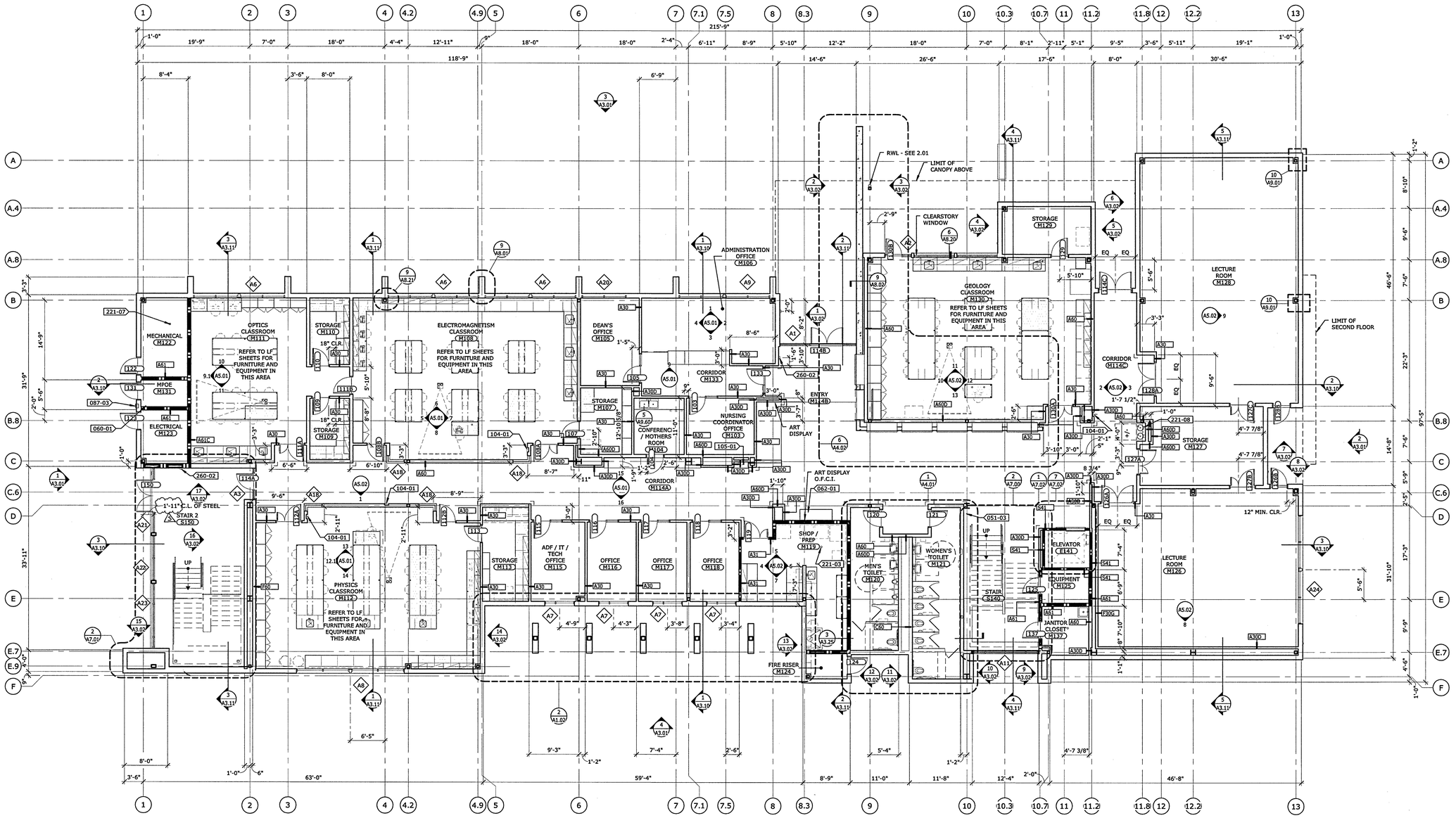

1 FLOOR PLAN - FIRST FLOOR
1/8" = 1'-0"

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GENERAL NOTES

1. ALL DIMENSIONS ARE TO CENTER LINE OF COLUMN OR FACE OF STUD, UNLESS OTHERWISE NOTED. ALL PLUMBING FIXTURES, TOILET ROOM SPECIALTIES, MISC. WALL MOUNTED ITEMS ARE DIMENSIONED FROM FINISH FACE.
2. PROVIDE BLOCKING AND SUPPORT AS REQUIRED FOR ALL CASEWORK, HARDWARE AND MISCELLANEOUS EQUIPMENT ATTACHED TO WALLS, SEE DETAIL 13/S7.03
3. PROVIDE INTERIOR SIGNAGE PER SPECIFICATIONS AND SCHEDULE, SEE SHEET A2.73 AND A2.74
4. ALL DOORS ADJACENT TO A PERPENDICULAR WALL SHALL BE 4" FROM SUCH WALL TO BUTT FACE OF DOOR FRAME UNLESS NOTED OTHERWISE.
5. SEE SHEET A2.53 FOR FINISH SCHEDULE AND LEGEND.
6. SEE SHEET A2.51 FOR DOOR SCHEDULE AND FRAME TYPES.
7. SEE SHEETS A6.01-A6.02 FOR REFLECTED CEILING PLANS.
8. FOR ALL LAB FURNITURE & EQUIPMENT SEE SHEETS LF100-LF202.1
9. SEE SHEETS A2.54 AND A2.55 FOR FINISH INFORMATION
10. SEE SHEET GA0.05 FOR ACCESSIBILITY DETAILS
11. SEE 1/A9.03 FOR STANDARD TOILET ROOM WALL TILE ASSEMBLY.
12. SEE SHEET A9.03 FOR METAL TRIM DETAILS AT TILE.
13. ALL INTERIOR PARTITIONS TO BE A60 U.O.N.
14. SEE DETAIL 10/A9.01 FOR TYPICAL FURRING AT INTERIOR COLUMNS.
15. FOR TYPICAL OUTLET BOX LOCATED IN A PARTITION, SEE 2/A9.02
16. RECESSED FIRE EXTINGUISHER CABINET - SEE DTL. 1/A9.02 - 2-A 10:B:C F.E. TYPE
17. PROVIDE COAT HOOKS AT ALL BATHROOM STALL LOCATIONS TYP.

WALL LEGEND

- NON RATED CONSTRUCTION
- 1 HOUR RATED FIRE PARTITION — PROTECTED OPENINGS - U.O.N. (20 MIN OPENING PROTECTION AT DOORS. 45 MIN. AT WINDOWS) 1-HOUR FIRE BARRIER AT ELECT., IDF, MECHANICAL ROOMS (45 MIN. OPENING PROTECTION AT DOORS AND WINDOWS)
- CAST IN PLACE CONCRETE — SEE STRUCTURAL FOR MORE INFORMATION
- A30D — WALL TAG, SEE SHEET A9.00

KEYNOTES:

000-00	KEYNOTE DESCRIPTION
051-03	ALL EXPOSED STEEL TO BE AESS, ALL EXPOSED STEEL IN THE AREA OF STAIR 1 TO BE AESS, SEE STRUCTURAL SPECIFICATION 05 12 13
060-01	SEE ELECTRICAL FOR PLYWOOD BACKING AT UTILITY ROOMS
062-01	WOOD AND GLASS DISPLAY CASE TYP.
087-03	RECESSED KNOX BOX - SEE DTL. 1/A9.02
101-01	MARKER BOARD TYP., O.F.C.I.
101-03	VERTICAL SLIDING WHITEBOARD, O.F.C.I.
104-01	RECESSED FIRE EXTINGUISHER CABINET - SEE GENERAL NOTE 16 ON CODE SHEETS GA0.03 AND 0.04 AND DTL. 1/A9.02
105-01	CARD KEY OPERATED KEY BOX
221-03	AREA FLOOR DRAIN - SEE SLAB PLANS AND PLUMBING FOR DETAILS, SEE SLAB PLANS FOR SLOPED CONCRETE LOCATIONS AND BATHROOM PLANS FOR SLOPED TILE LOCATIONS
221-07	FLOOR SINK - SEE SLAB PLANS AND PLUMBING FOR DETAILS, SEE SLAB PLANS FOR SLOPED CONCRETE LOCATIONS
221-08	LOCATE LOW SIDE OF D.F. 15" FROM FACE OF FINISH MIN.
260-02	ACCESSIBLE AUTO OPENER PAD

ADD-ALTERNATES

LEGEND #2

ADD-ALT #1:
SITE FEATURES FOR ROCK DISPLAY AREA OUTSIDE GEOLOGY LAB
INCLUDING:
- PRECAST BENCHES
- DECOMPOSED GRANITE
- ROCK GARDEN

REFERENCED SHEETS:
A1.01, A1.02, L1.0, L2.0

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LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

FIRST LEVEL PLAN

NORTH

B5017.00
1/8" = 1'-0"
May 22, 2018

A2.01

FINISH LEGEND

REV.	SPEC.	ITEM	MATERIAL	MANUFACTURER	SIZE	COLOR	STYLE	SERIES	NOTES
	09 51 13	AC1**	ACOUSTIC CEILING TILE	ARMSTRONG	2' X 4'	WHITE	1945 9/16" BEVELED TEGULAR	ULTIMA	SUPRAFINE XL 9/16" EXPOSED TEE GRID SYSTEM
	09 30 00	CB1	COVE BASE	SCHLUTER	2" x 2"	ANODIZED ALUMINIM	DILEX-AHK		INSTALL RELATED INSIDE CORNERS, SQUARE OUTSIDE CORNERS, AND END CAPS WHERE NEEDED
	03 05 00	CO1	CONCRETE				SEALED		SEE SPECIFICATIONS FOR MORE INFORMATION
	03 05 00	CO2	CONCRETE				BROOM FINISH & SEALED		
	09 68 13	CT1	CARPET TILE	TANDUS	24" X 24"	TRANSLUNAR 51506	MODULAR	NOVA 04707	ANTRON LUMENA NYLON
	03 35 00	EP1	EPOXY COUNTER						SEE LF SHEETS FOR MORE INFORMATION
	09 96 00	HP1	HIGH PERFORMANCE COATING	DUNN EDWARDS		MATCH TO PI1	LOW SHEEN	ULTRASHIELD	
	05 50 00	MS1	METAL - STAINLESS				FABRICATED CASEWORK		SEE LF SHEETS FOR MORE INFORMATION
	09 91 00	PI1	PAINT	DUNN EDWARDS		DE6225 FOSSIL	EGGSHELL		
	09 91 00	PI2	PAINT	DUNN EDWARDS		DE6225 FOSSIL	SEMI GLOSS		
	09 91 00	PI3	PAINT	DUNN EDWARDS		DE6225 FOSSIL	FLAT		
	09 91 00	PI4	PAINT	DUNN EDWARDS		DE6227 MUSLIN	EGGSHELL		DOOR AND FRAME PAINT WHERE OCCURS - SEE DOOR SCHEDULE
	09 91 00	PI5	PAINT	DUNN EDWARDS		DE5937 NIGHT NIGHT	EGGSHELL		
	09 91 00	PI6	PAINT	DUNN EDWARDS		DE5921 YOUR SHADOW	EGGSHELL		
	09 91 00	PI7	PAINT	DUNN EDWARDS		DE5410 GOLDEN GLITTER	EGGSHELL		
	09 91 00	PI8	PAINT	DUNN EDWARDS		DE5412 LEMON ZEST	EGGSHELL		
	09 91 00	PI9	PAINT	DUNN EDWARDS		DE5957 PRINCELY VIOLET	EGGSHELL		
	09 91 00	PI10	PAINT	DUNN EDWARDS		DE5755 CARNIVAL NIGHT	EGGSHELL		
	09 91 00	PI11	PAINT	DUNN EDWARDS		DE5146 CAMPFIRE	EGGSHELL		
	09 91 00	PI12	PAINT	DUNN EDWARDS		DE5811 SUMMER NIGHT	EGGSHELL		
	09 91 00	PI13	PAINT	DUNN EDWARDS		DE5920 LONDON FOG	EGGSHELL		
	09 91 00	PI15	PAINT	DUNN EDWARDS		DE5922 PENCIL LEAD	EGGSHELL		
	09 91 00	PI16	PAINT	DUNN EDWARDS		DE6365 COLD MORNING	POWDER COAT TO MATCH		
	09 91 00	PI17	PAINT	DUNN EDWARDS		DE6368 WALRUS	SEMI GLOSS		
	09 91 00	PI18	PAINT	DUNN EDWARDS		DE6227 MUSLIN	SEMI GLOSS		DOOR AND FRAME PAINT WHERE OCCURS - SEE DOOR SCHEDULE
	06 41 00	PL1	PLASTIC LAMINATE	WILSONART	SHEET	SKYLINE WALNUT 7964K-38	FINE VELVET	PREMIUM LAMINATE	STANDARD COUNTERTOP
	06 41 00	PL2	PLASTIC LAMINATE	WILSONART	SHEET	PINBALL 4937-38	FINE VELVET	STANDARD LAMINATE	STANDARD CASEWORK
	06 41 00	PL3	PLASTIC LAMINATE	WILSONART		TBD	TBD	STANDARD LAMINATE	LAB COUNTERTOP
	06 41 00	PL4	PLASTIC LAMINATE	WILSONART		TBD	TBD	STANDARD LAMINATE	LAB CASEWORK
	09 65 13	RB1	RESILIENT BASE	JOHNSONITE	4"	TBD	STANDARD COVE		
	09 65 13	RB2	RESILIENT BASE	JOHNSONITE	4"	TBD	TOELESS		
	09 65 16	RS1	RESILIENT SHEET FLOORING	GERFLOR	SHEET	TAUPE 1719	CUBIST	TARALAY IMPRESSION COMPACT	
	05 55 00	RS2	RESILIENT - STAIR TREAD	JOHNSONITE	CUSTOM	TBD	HAMMERED	STANDARD RUBBER STAIR TREAD - VISUALLY IMPAIRED	
	09 30 00	TI1	TILE - PORCELAIN	DAL TILE	12" x 24"	VOYAGER BLACK AM33	UNPOLISHED	AMBASSADOR	CUT TILE TO 12"X12", ASHLAR PATTERN WITH 1/8" GROUT JOINT
	09 30 00	TI2	TILE - CERAMIC	BEDROSIANS	8" X 9"	ADRIATIC	COSTA ALLEGRA 8" HEZAGON		
	09 30 00	TI3	TILE	DAL TILE	6" X 3"	MATTE PEARL WHITE 0799		MATTE	
	09 30 00	TI4	TILE	DAL TILE		MOONLIGHT BLEND	2 X 1 MOSAIC	KEYSTONES	
	10 21 13	TP-1	SOLID TOILET PARTITION	SCRANTON PRODUCTS		SHALE	HINEY HIDERS		ORANGE PEEL TEXTURE
	09 66 00	TZ1	TERRAZZO - PRECAST TREAD AND RISER	WAUSAU		TZ41 SWISS ALPS			
	09 66 00	TZ2	TERRAZZO - PRECAST 1/2" TILE	WAUSAU		TZ41 SWISS ALPS			
	GENERAL POLYMER S	TZ3	ADD ALTERNATE: EPOXY TERRAZZO	SHERWIN WILLIAMS	THINSET EPOXY	TO MATCH WAUSAU TZ03 FOGGY DAY			
	09 65 19	VC1	VINYL COMPOSITION TILE	MANNINGTON	12" X 12"	DARK BARK 9179	TOUCHSTONE	PREMIUM VCT	
	09 65 19	VC2	VINYL COMPOSITION TILE	MANNINGTON	12" X 12"	BED ROCK 9189	TOUCHSTONE	PREMIUM VCT	
	09 65 19	VC6	STATIC DISSAPATIVE TILE	ARMSTRONG	12" X 12"	FOSSIL GRAY 51956	EXCELON SDT	ESD	
	06 40 23	WD1	WOOD - TRIM	CUSTOM		CLEAR MAPLE			
	06 40 23	WD2	WOOD - CASEWORK	CUSTOM		CLEAR SEALER	PLAIN SLICED WHITE MAPLE		SEE LF SHEETS FOR MORE INFORMATION
	06 40 23	WD3	WOOD - COUNTERTOP	CUSTOM		CLEAR SEALER	BUTCHER BLOCK		SEE LF SHEETS FOR MORE INFORMATION
	10 11 73	WF1	TACKBOARD	EGAN VISUAL		(T) ECOTACK DTB	DIMENSION TACK BOXCORE		
	12 48 13	WM1	WALKOFF MAT	CONSTRUCTION SPECIALTIES	PEDIGRID ENTRANCE SYSTEM	RECYCLED RUBBER INSERTS		ALUMINUM LEVEL BASE FRAME	
	06 64 00	WP1	WALL PROTECTION - FRP	MARLITE	4' X 8' SHEET	WHITE	PEBBLED	STANDARD FRP	

FINISH TYPE SCHEDULE

KEY	ROOM	FLOOR FINISH	WALL BASE	WALLS	CEILINGS	MILLWORK	COUNTERTOPS	OTHER	NOTES
F-01A*	CORRIDOR FLOOR 1	WM1, VC2 OR TZ3	RB1	PI1	AC1, PI3, PI5, PI6, PI7, PI8, PI9, PI10	--	--	WF1	SEE REFLECTED CEILING PLANS AND ELEVATIONS FOR ACCENT PAINT LOCATIONS. TZ3 FLOOR FINISH PART OF ADD ALTERNATE
F-01B	CORRIDOR FLOOR 2	VC2	RB1	PI1	AC1, PI11, PI12, PI13, PI14, PI15	--	--	WF1	SEE REFLECTED CEILING PLANS AND ELEVATIONS FOR ACCENT PAINT LOCATIONS
F-02	PHYSICAL SCIENCE LAB	VC1	RB1	HP1	AC1, PI3	WD2	EP1	--	
F-03	SHOP / PREP	CO1	RB1	HP1	AC1	MS-1	MS-1	--	(EP1 COUNTERTOPS AT SINKS)
F-04	LECTURE ROOM	VC1	RB1	PI1	AC1	PL4	PL3	--	
F-05	ALLIED HEALTH LAB	VC1	RB1	PI1	AC1	PL4	PL3	--	
F-06	OFFICE	CT1	RB2	PI1	AC1	--	--	--	
F-07	TOILET ROOM	TI1	CB1	TI2,TI3	PI2	--	--	TP1	SEE SPECIFICATION FOR MORE INFORMATION
F-08	STORAGE	CO1	RB1	PI1	OPEN TO ABOVE	PL4	PL3	--	
F-09	FACULTY LOUNGE	VC1	RB1	PI2, GL2	PI3	PL1	PL2	WF1	BACKSPLASH TI4-SEE INTERIOR ELEVATIONS
F-10	JANITOR	CO1	CURB	WP1,PI2	OPEN TO ABOVE	--	--	--	
F-11	STAIR 1	TZ1, TZ2	RB1	PI1	PI3	--	--	--	
F-12	ELEVATOR	RS1	RB1	--	--	--	--	--	SEE ELEVATOR SPECIFICATION FOR COMPLETE FINISH INFORMATION
F-13	COLLABORATION	CT1	RB2	PI1, PI11	AC1, PI3	PL1	PL2	--	
F-14	MECHANICAL	CO1	RB1	PI1	OPEN TO ABOVE	--	--	--	
F-15	ELECTRICAL / MPOE	CO1	RB1	PI1	OPEN TO ABOVE	--	--	--	UNFINISHED
F-16	IDF	VC6	RB1	PI1	OPEN TO ABOVE	--	--	--	
F-17	STAIR 2	CO1	RB1	PT1	PI3	--	--	RS2	SEE 6,11/A9.03 FOR WALL BASE DETAILS

* ADD-ALT #4
** ADD-ALT #6

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GENERAL NOTES

1. ALL WALLS TO RECIEVE PAINT PI1 U.O.N.
2. ALL WALLS TO RECIEVE RUBBER BASE RB1 U.O.N.
3. ALL PAINTED GYP. CEILINGS TO RECIEVE PAINT PI3 U.O.N.
4. ALL AESS STEEL TO RECEIVE PAINT PI17 U.O.N.
5. ALL PERFORATED METAL PANEL STAIR RAILINGS TO RECEIVE PI16 U.O.N.
6. SEE A9.03 & A9.50 FOR FINISH DETAILS
7. SEE FINISH FLOOR PLANS AND INTERIOR ELEVATIONS FOR EXTENT AND LOCATION OF FLOOR AND WALL FINISHES.
8. SEE REFLECTED CEILING PLANS FOR EXTENT AND LOCATION OF CEILING MATERIAL TYPES
9. SEE DOOR SCHEDULE FOR DOOR AND FRAME FINISH INFORMATION
10. SEE WINDOW TYPE SCHEDULE FOR WINDOW FRAME INFORMATION
11. WALLS SHALL BE SMOOTH AND WASHABLE IN: WAREWASHING AREAS, FOOD PREP AREAS, JANITORIAL AREAS, EMPLOYEE RESTROOMS, AND OPEN FOOD STORAGE AREAS; SEE SPECS.
12. SEE DETAIL 1/A9.03 FOR STANDARD WALL TILE ASSEMBLY AT TOILET ROOMS AND 4,7/A9.50 FOR TILE BASES
13. SEE DETAIL 6/A9.03 FOR TYPICAL RUBBER WALL BASE INSTALLATION
15. SEE DOOR SCHEDULE ON SHEET A2.51 FOR FLOOR TRANSITION DETAILS AT DOORWAYS.
16. ALL FINISHES SHAL COMPLY WITH CBC, CFC AND TITLE 19 CCR REQUIREMENTS

ADD-ALTERNATES

LEGEND #2

ADD-ALT #4:
SUBSTITUTE POURED TERRAZZO FLOOR SYSTEM FOR VC2 AT FIRST FLOOR CORRIDOR AND ENTRY ROOMS: M114A, M114B, M114C, S140

REFERENCED SHEETS: A2.51, A2.53

ADD-ALT #6:
INCREASE NRC OF ACOUSTIC CEILING TILES FROM .75 TO 1.0

REFERENCED SHEETS: A2.53

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LOS RIOS COMM COLLEGE DISTRICT

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FINISH LEGEND AND FINISH TYPE KEY

B5017.00

May 22, 2018

A2.53

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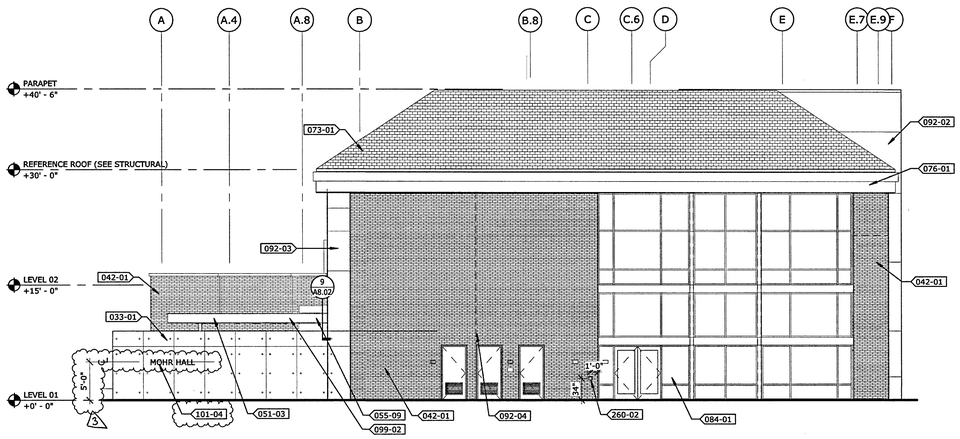
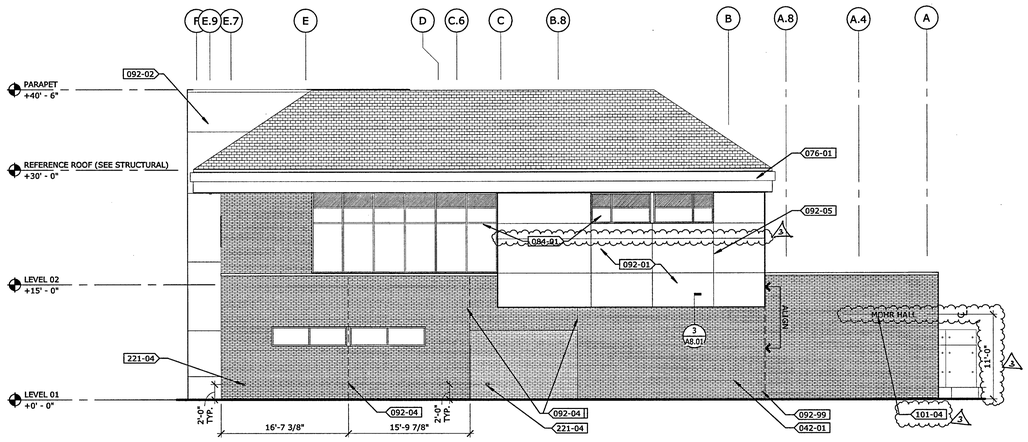
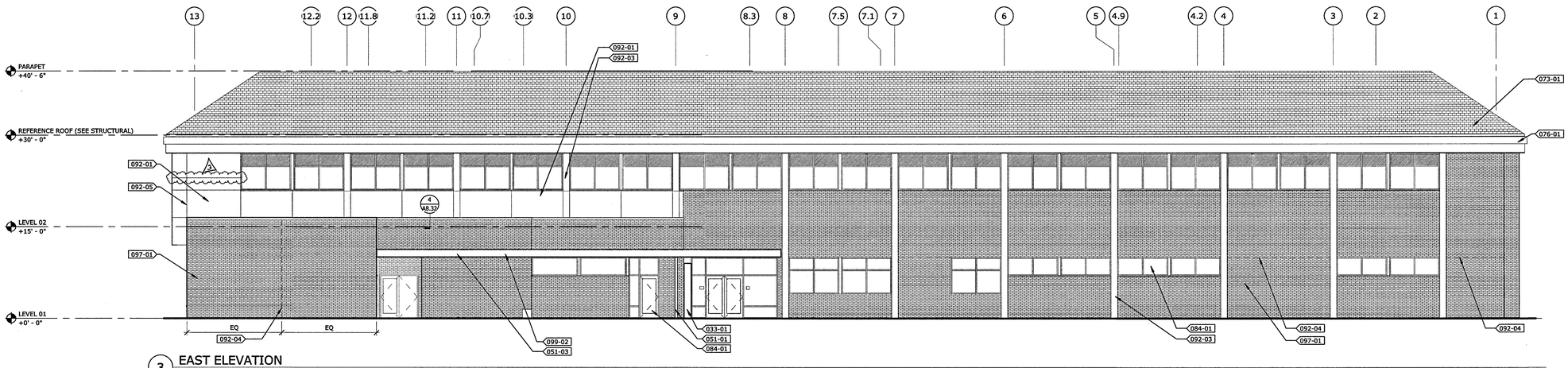


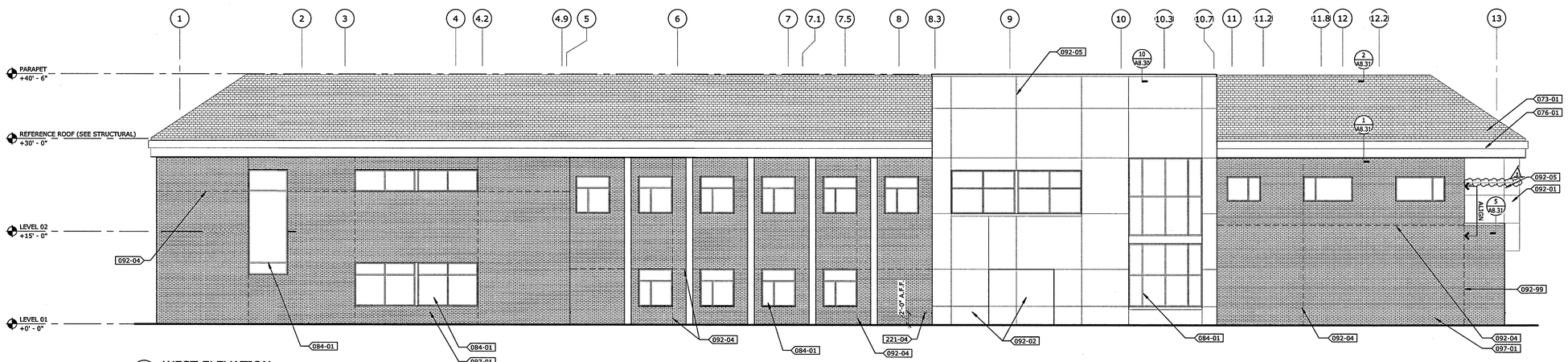
1 NORTH ELEVATION
1/8" = 1'-0"



2 SOUTH ELEVATION
1/8" = 1'-0"



3 EAST ELEVATION
1/8" = 1'-0"



4 WEST ELEVATION
1/8" = 1'-0"

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GENERAL NOTES

1. SPANDREL GLAZING PANELS SHOWN HATCHED, REFER TO A2.50 FOR MORE INFORMATION

KEYNOTES:

000-00	KEYNOTE DESCRIPTION
033-01	CAST-IN-PLACE CONCRETE WALL
042-01	THIN BRICK VENEER - CUSTOM MIX SEE SPECIFICATIONS
051-01	STEEL POST - SEE STRUCTURAL
051-03	ALL EXPOSED STEEL TO BE AESS, ALL EXPOSED STEEL IN THE AREA OF STAIR 1 TO BE AESS, SEE STRUCTURAL SPECIFICATION 05 12 13
055-09	C CHANNEL FASCIA EXTERIOR - SEE A8.31 AND S2.04
073-01	GLADDING MCBEAN CLAY ROOF TILE, CORDOVA #8, CLASS A RATING,SEE SPECIFICATIONS FOR MORE INFORMATION
076-01	ALUMINUM COMPOSITE DRY JOINT PANEL FASCIA AND GSM GUTTER ASSEMBLY - SEE SHEET A8.31
084-01	ALUMINUM STOREFRONT WINDOW SYSTEM
092-01	CEMENT PLASTER (P1) COLOR TO MATCH SHERWIN WILLIAMS SW 7045 INTELECTUAL GRAY
092-02	CEMENT PLASTER (P2) COLOR TO MATCH SHERWIN WILLIAMS SW 7047 PORPOISE
092-03	CEMENT PLASTER (P3) COLOR TO MATCH SHERWIN WILLIAMS SW 7043 WORDLY GRAY
092-04	CEMENT PLASTER CONTROL JOINT AT THIN BRICK
092-05	CEMENT PLASTER CONTROL JOINT
092-99	STRUCTURAL EXPANSION JOINT - SEE 5/S7.01
097-01	THIN BRICK WALL ASSEMBLY
099-02	TNEMIC COATING, TO MATCH SHERWIN WILLIAMS SW 7048 URBANE BRONZE
101-04	RELOCATE EXISTING MOHR HALL LETTERS. REPLACE LETTERS IN KIND IF REQUIRED, AT ARCHITECTS APPROVAL – DEPTH NOT EXCEED 6" OFF WALL
221-04	OVERFLOW DRAIN SCUPPER/DOWNSPOUT NOZZLE WITH PERFORATED COVER - SEE PLUMBING PLANS, SPECIFICATIONS, AND A8.01 FOR DETAILS
260-02	ACCESSIBLE AUTO OPENER PAD

ADD-ALTERNATES

LEGEND #2

ADD-ALT #1:
SITE FEATURES FOR ROCK DISPLAY AREA OUTSIDE GEOLOGY LAB INCLUDING:
- PRECAST BENCHES
- DECOMPOSED GRANITE
- ROCK GARDEN

REFERENCED SHEETS:
A1.01, A1.02, L1.0, L2.0

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LOS RIOS COMM COLLEGE DISTRICT

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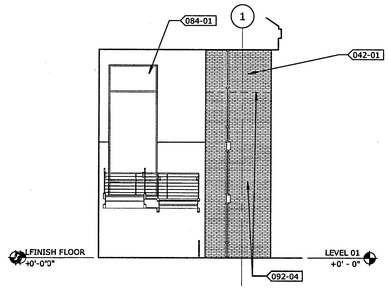
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

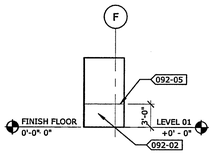
EXTERIOR ELEVATIONS

B5017.00
1/8" = 1'-0"
May 22, 2018

A3.01



15 STAIR 2 - ELEVATION 1
1/8" = 1'-0"



11 FIRE RISER ROOM - ELEVATION 1
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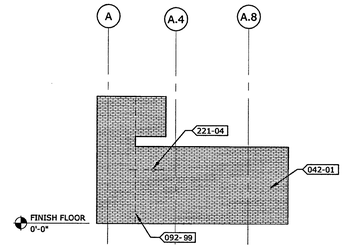

6 ENTRY 2 - ELEVATION 2
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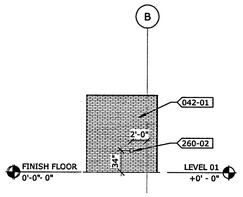
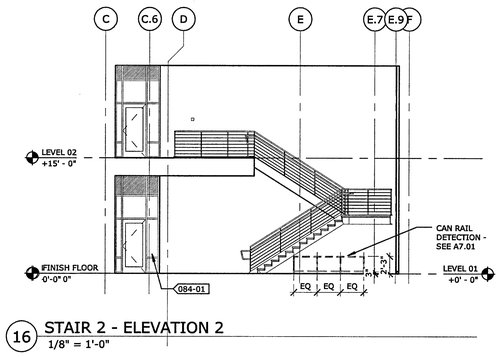
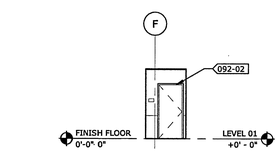


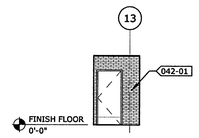
1 MAIN ENTRY - ELEVATION 1
1/8" = 1'-0"



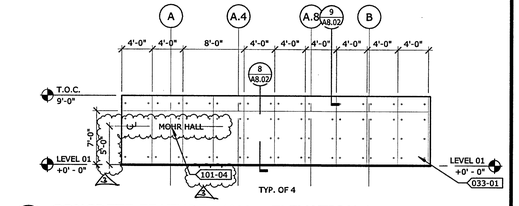
16 STAIR 2 - ELEVATION 2
1/8" = 1'-0"



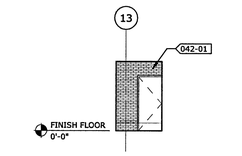
12 SHOP / PREP - ELEVATION 1
1/8" = 1'-0"



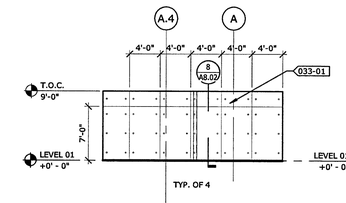
7 LECTURE ROOM EXIT - ELEVATION 1
1/8" = 1'-0"



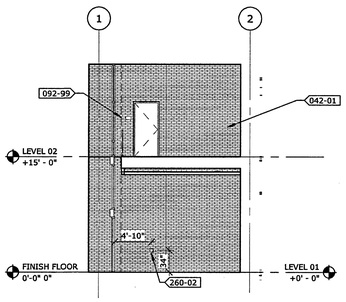
2 CONCRETE FEATURE WALL - ELEVATION 1
1/8" = 1'-0"



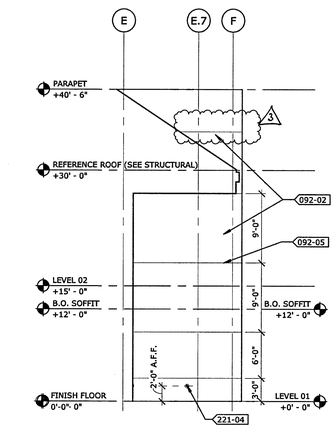
8 LECTURE ROOM EXIT - ELEVATION 2
1/8" = 1'-0"



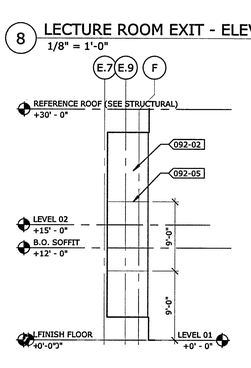
3 CONCRETE FEATURE WALL - ELEVATION 2
1/8" = 1'-0"



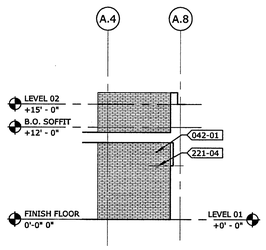
17 STAIR 2 - ELEVATION 3
1/8" = 1'-0"



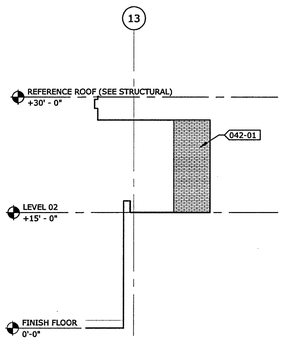
13 SHOP / PREP - ELEVATION 2
1/8" = 1'-0"



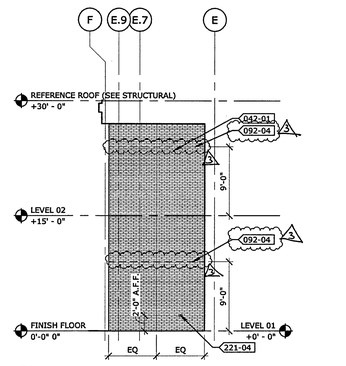
9 INTERIOR STAIR ALCOVE - ELEVATION 1
1/8" = 1'-0"



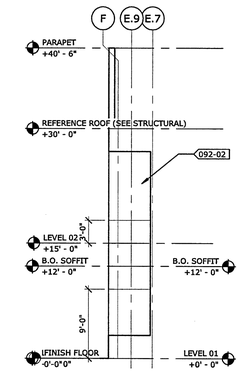
4 STORAGE - ELEVATION 1
1/8" = 1'-0"



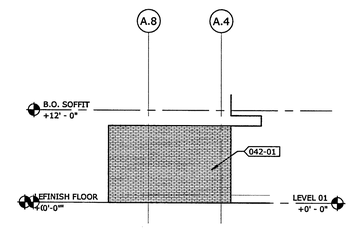
18 PTA COORD. OFF. - 2ND FLOOR ELEVATION 1
1/8" = 1'-0"



14 PHYSICS LABORATORY - ELEVATION 1
1/8" = 1'-0"



10 INTERIOR STAIR ALCOVE - ELEVATION 2
1/8" = 1'-0"



5 ENTRY 2 - ELEVATION 1
1/8" = 1'-0"

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5/22/2018 10:07:36 AM

Dreyfuss+ Blackford
architecture
3540 Folsom Blvd
Sacramento, CA
95816-6699
T 916.453.1234
dreyfussblackford.com

GENERAL NOTES

1. SPANDREL GLAZING PANELS SHOWN HATCHED, REFER TO A2.50 FOR MORE INFORMATION

KEYNOTES:

000-00	KEYNOTE DESCRIPTION
033-01	CAST-IN-PLACE CONCRETE WALL
042-01	THIN BRICK VENEER - CUSTOM MIX SEE SPECIFICATIONS
084-01	ALUMINUM STOREFRONT WINDOW SYSTEM
092-02	CEMENT PLASTER (P2) COLOR TO MATCH SHERWIN WILLIAMS SW 7047 PORPOISE
092-04	CEMENT PLASTER CONTROL JOINT AT THIN BRICK
092-05	CEMENT PLASTER CONTROL JOINT
092-09	STRUCTURAL EXPANSION JOINT - SEE S/S7.01
101-04	RELOCATE EXISTING MOHR HALL LETTERS. REPLACE LETTERS IN KIND IF REQUIRED, AT ARCHITECTS APPROVAL - CENTER 10'-0" TO EXTEND 4'-0" OFF WALL
221-04	OVERFLOW DRAIN DOWNSPOUT NOZZLE WITH PERFORATED COVER - SEE PLUMBING PLANS, SPECIFICATIONS, AND A8.01 FOR DETAILS
260-02	ACCESSIBLE AUTO OPENER PAD

FILE NO.34-C3
IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
02-116163
AC TM FS SS
DATE 5-10-18

LICENSED ARCHITECT
C32210
COUNTY OF SACRAMENTO
EXPIRATION DATE: 08/31/19
STATE OF CALIFORNIA

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PLAN CHECK SET

REVISION	BY	DATE
~~1 BACKCHECK 1~~		
~~2 BACKCHECK CHANGES~~		
3 REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

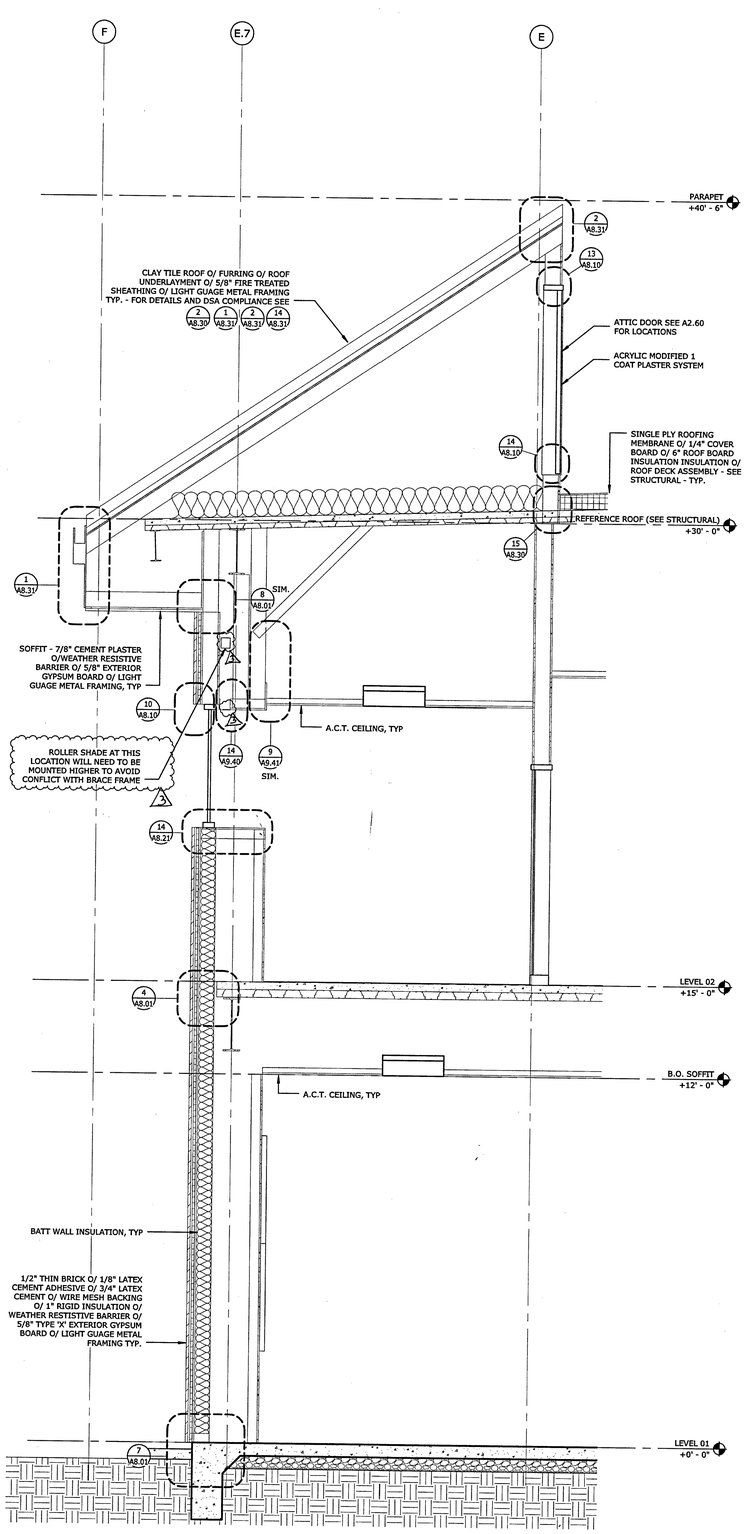
LOS RIOS COMMUNITY
COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

EXTERIOR ELEVATIONS

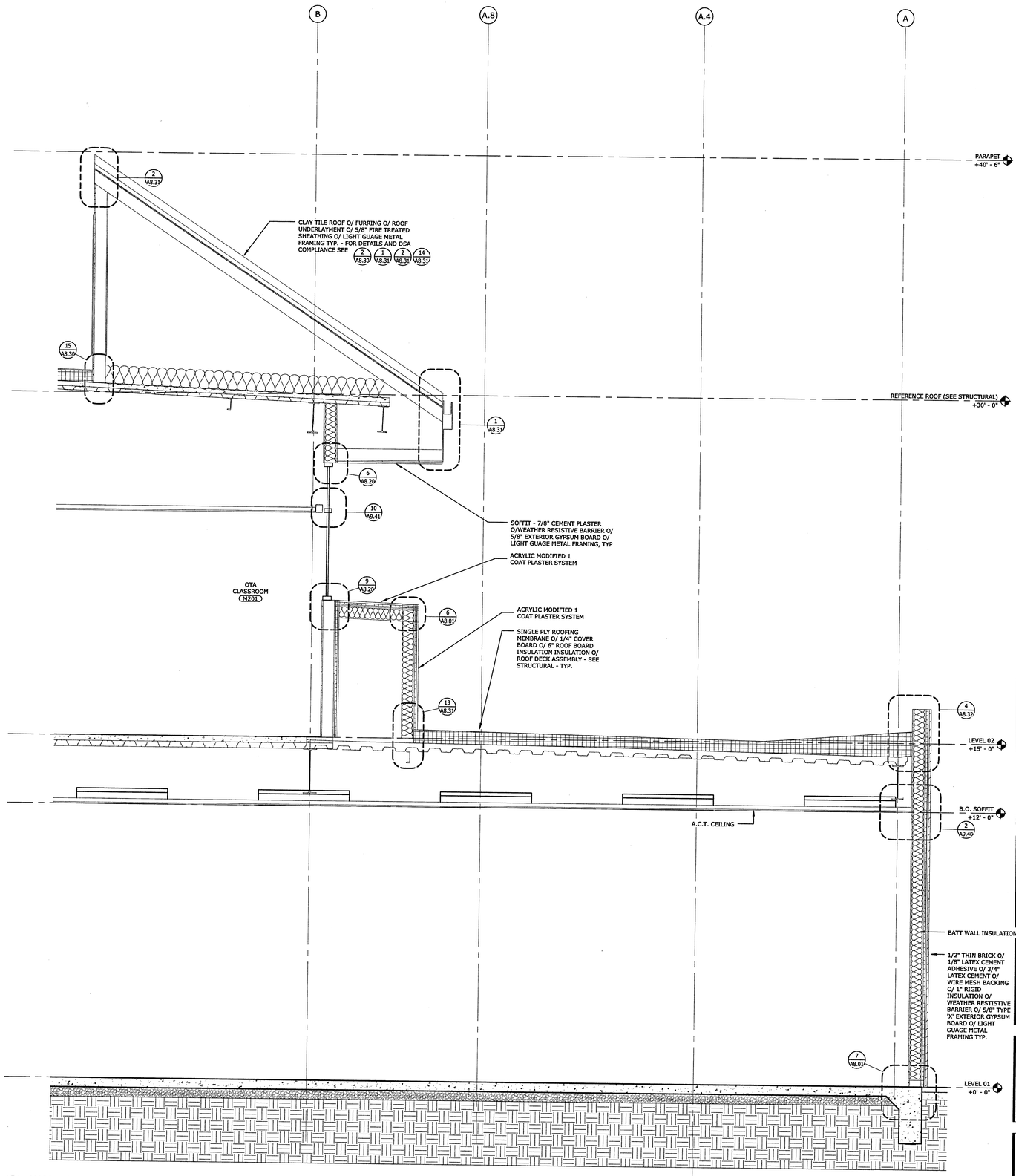
B5017.00

May 22, 2018

A3.02



2 WALL SECTION
1/2" = 1'-0"



1 WALL SECTION
1/2" = 1'-0"

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dreyfussblackford.com

GENERAL NOTES

1. ALL EXTERIOR WALLS AND SOFFITS TO HAVE 5/8" EXTERIOR GYP. TYPE 'X' TYP. U.O.N. - EXTERIOR AND INTERIOR
2. ALL EXTERIOR WALLS ARE 6" MSF U.O.N. - SEE S7.01

FILE NO.34-C3

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
02-116163
AC TM FLS MC SB
DATE 5-10-18
Rev3

LICENSED ARCHITECT
C32310
COURTNEY ALLROD COLVIN
REN. 08/31/19
STATE OF CALIFORNIA

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PLAN CHECK SET

	REVISION	BY	DATE
2	~~BACKCHECK CHANGES~~		
3	REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

WALL SECTIONS

B5017.00

May 22, 2018

A3.27

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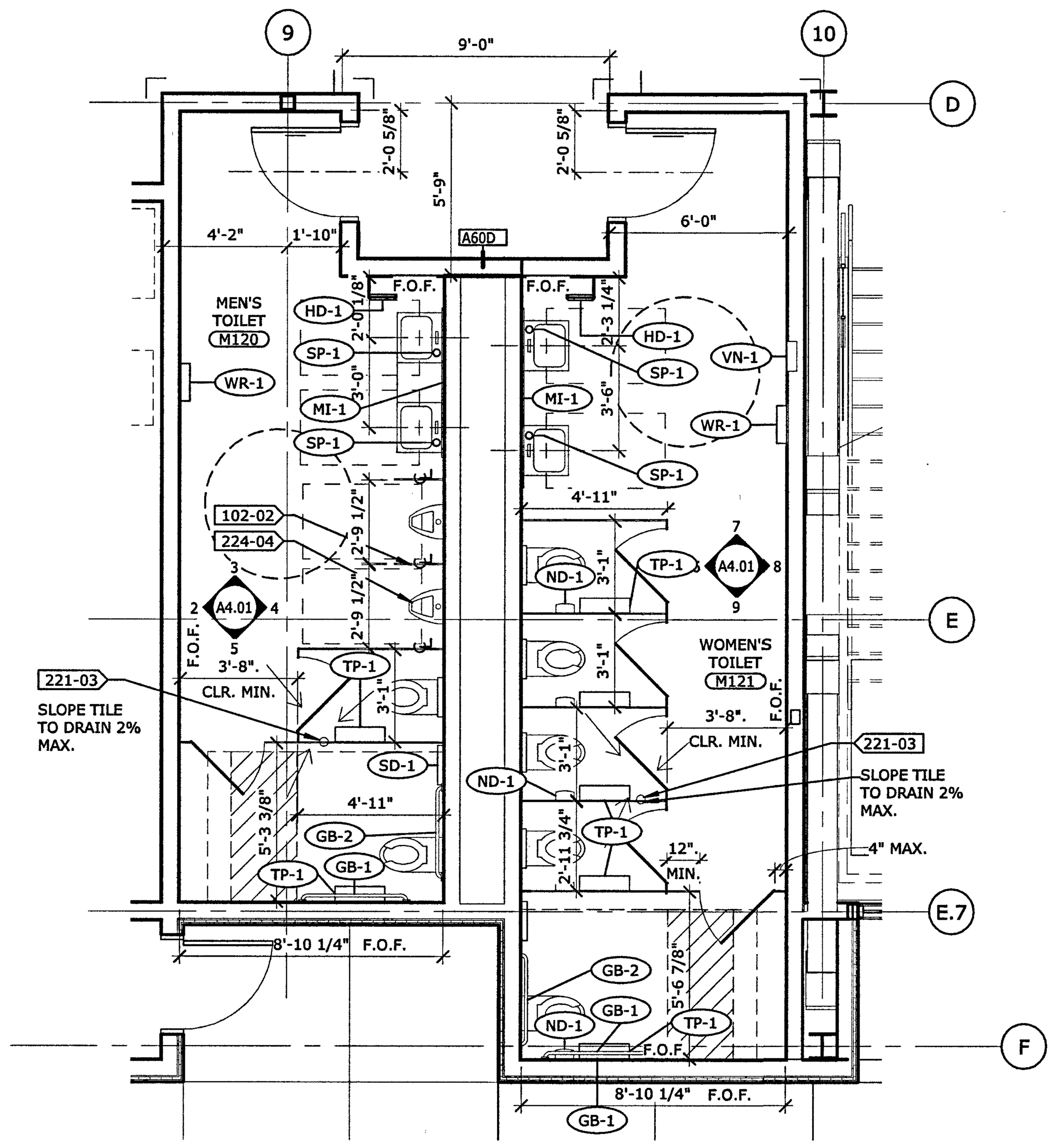
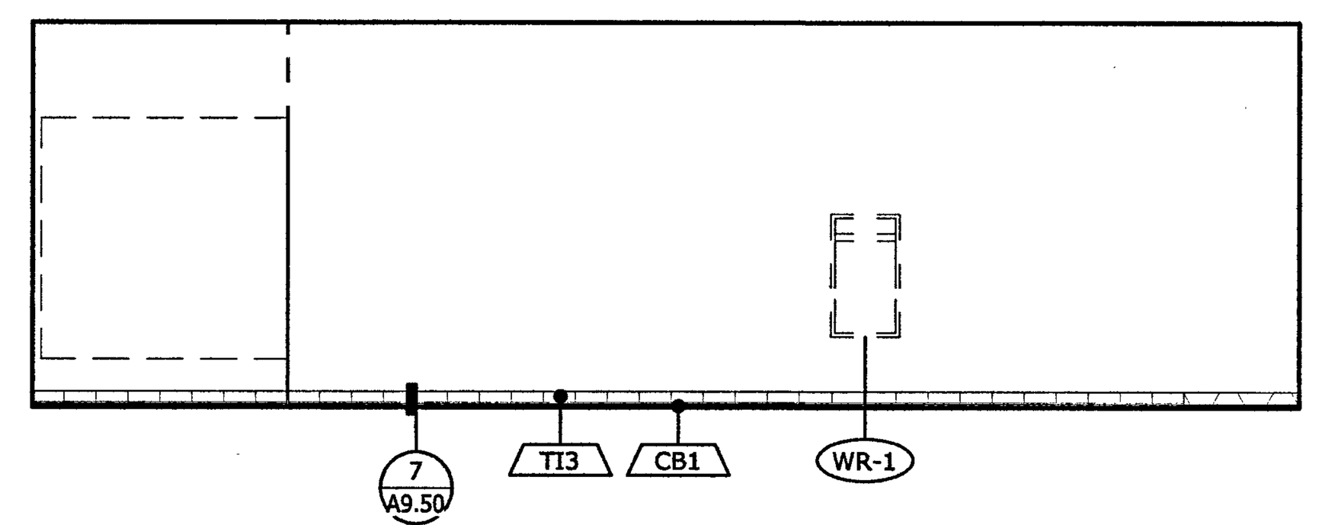
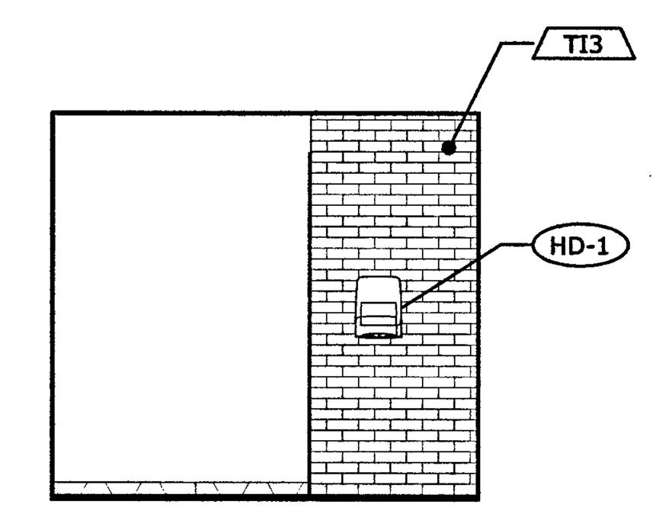


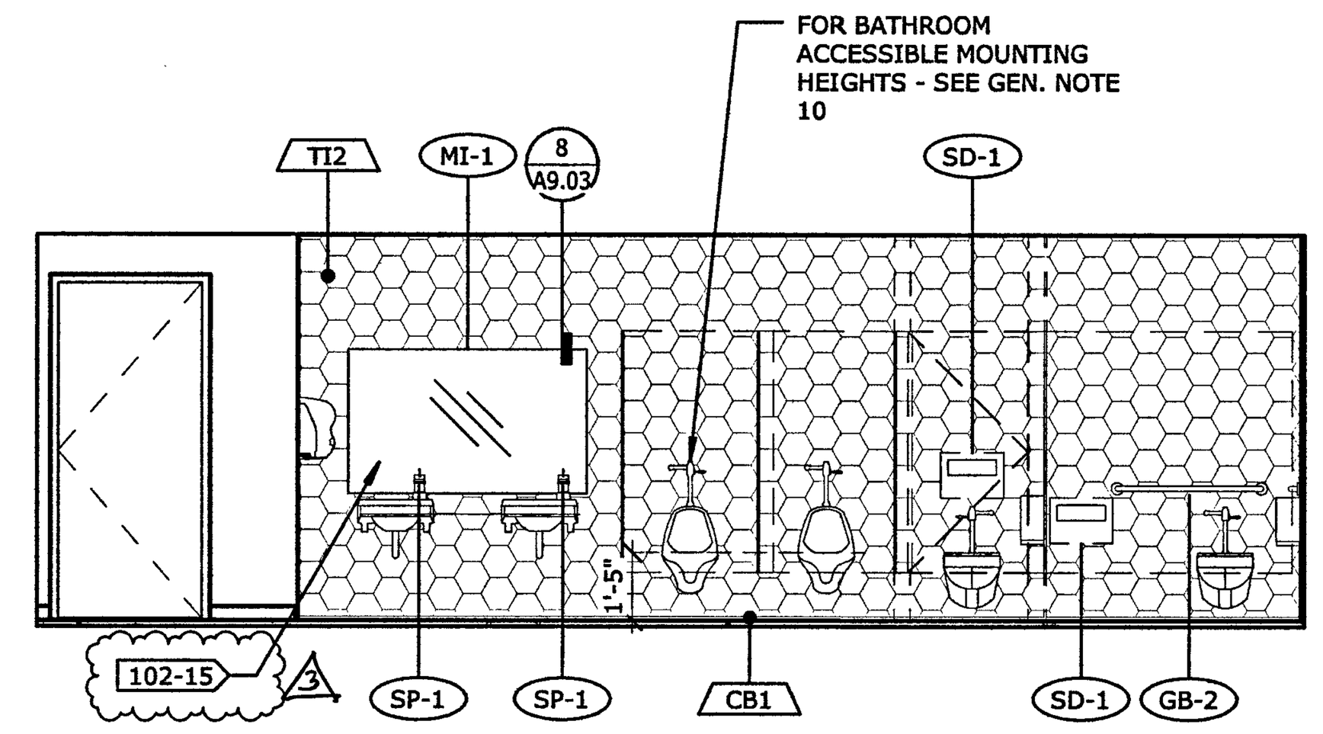
1 M120 M121 ENLARGED TOILET ROOM PLANS
1/4" = 1'-0"



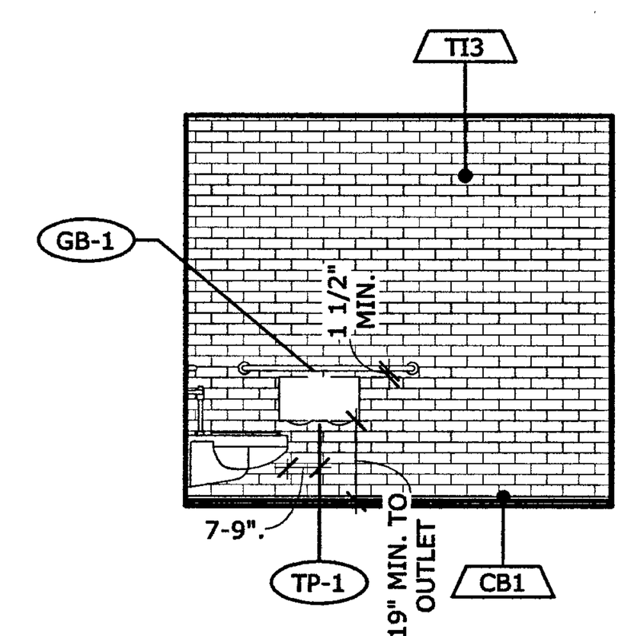
2 M120 MENS TOILET - NORTH
1/4" = 1'-0"



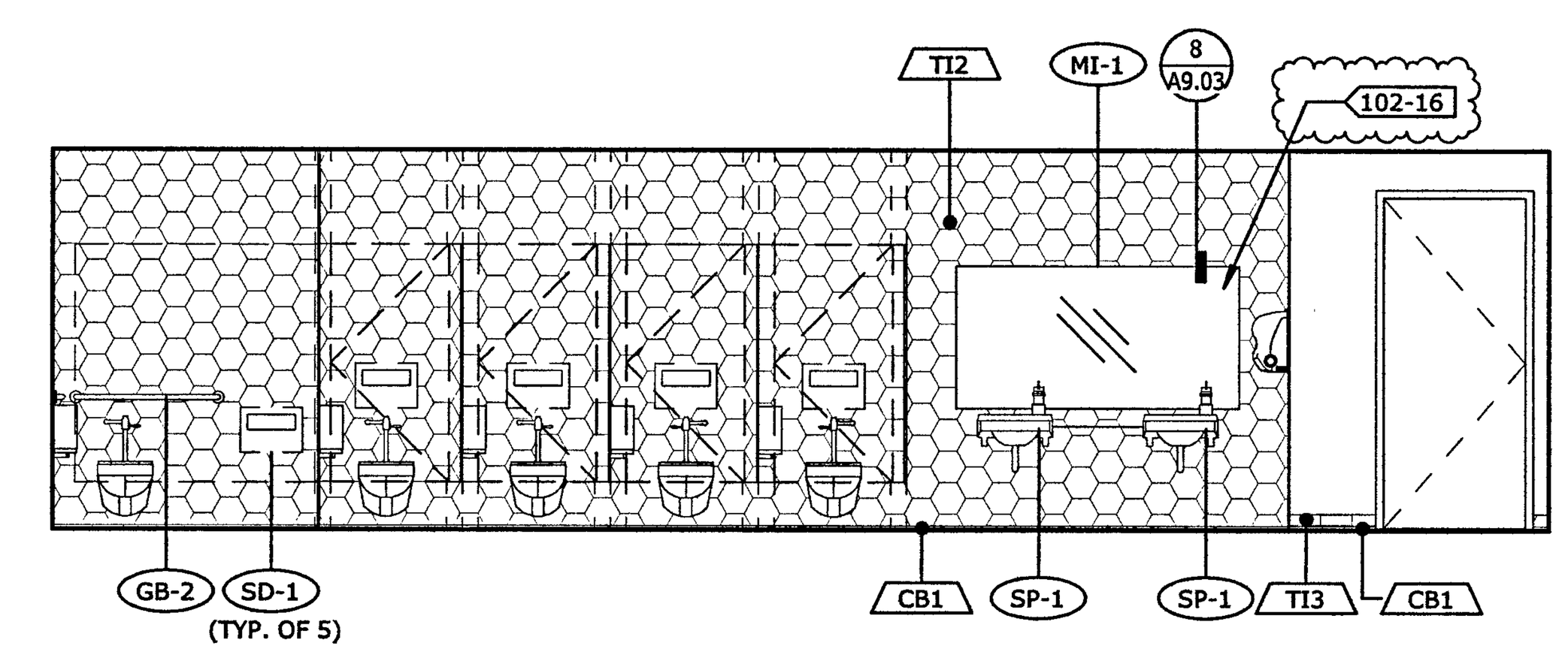
3 M120 MENS TOILET - EAST
1/4" = 1'-0"



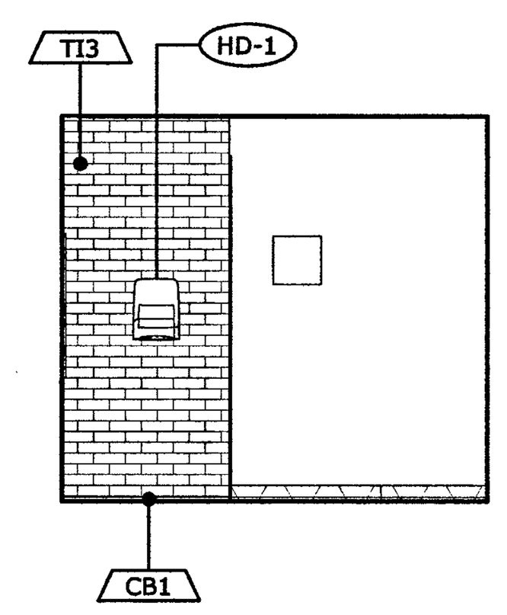
4 M120 MENS TOILET - SOUTH
1/4" = 1'-0"



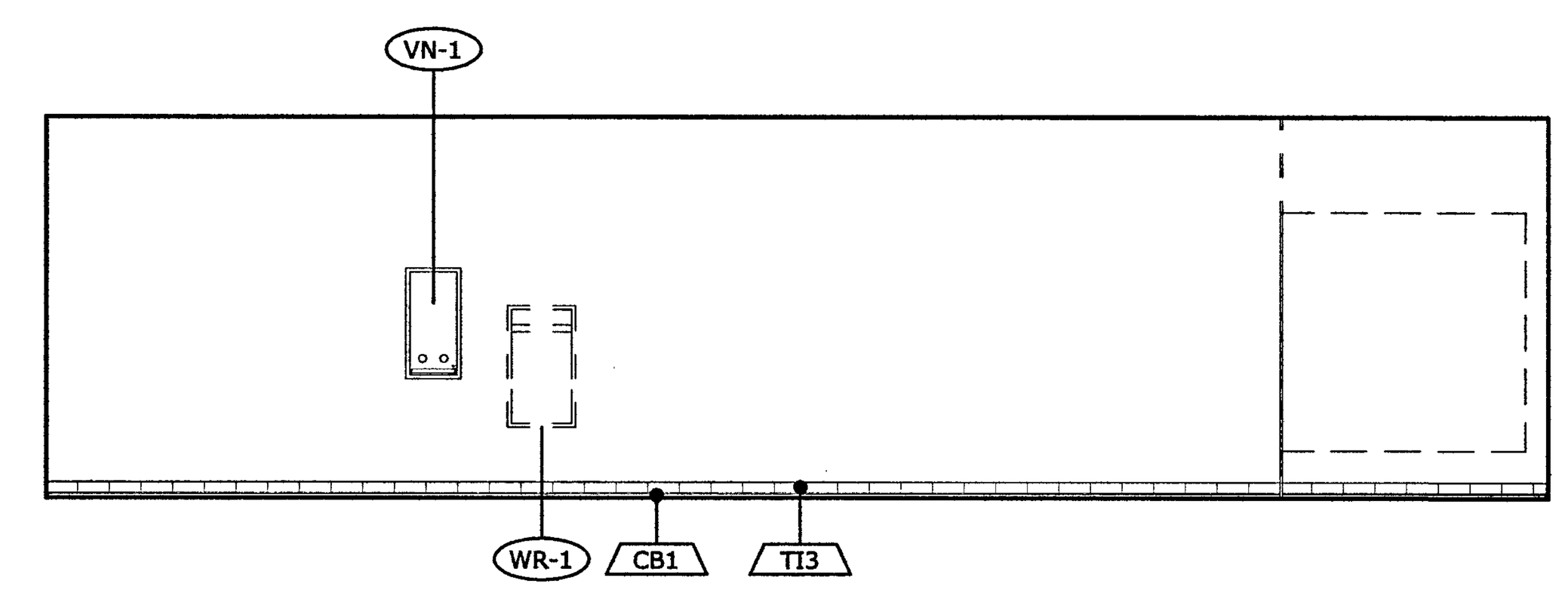
5 M120 MENS TOILET - WEST
1/4" = 1'-0"



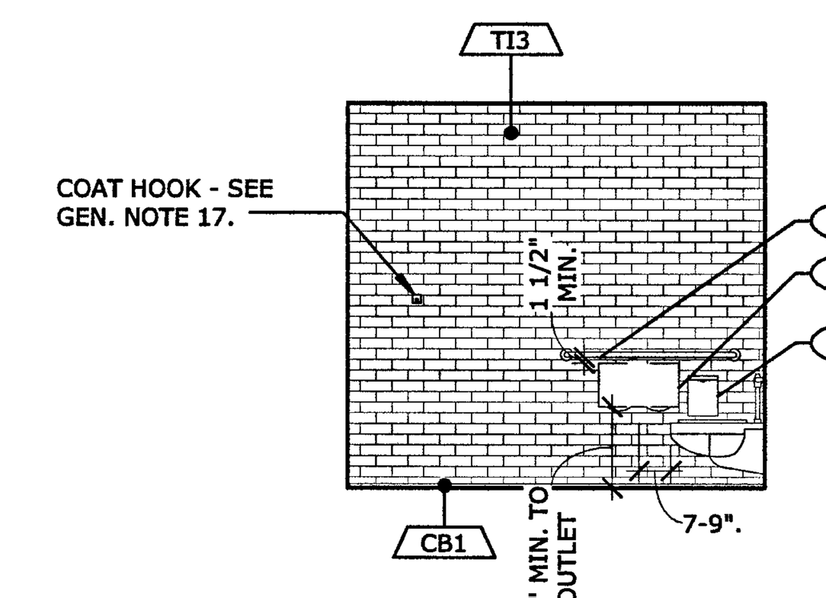
6 M121 WOMENS TOILET - NORTH
1/4" = 1'-0"



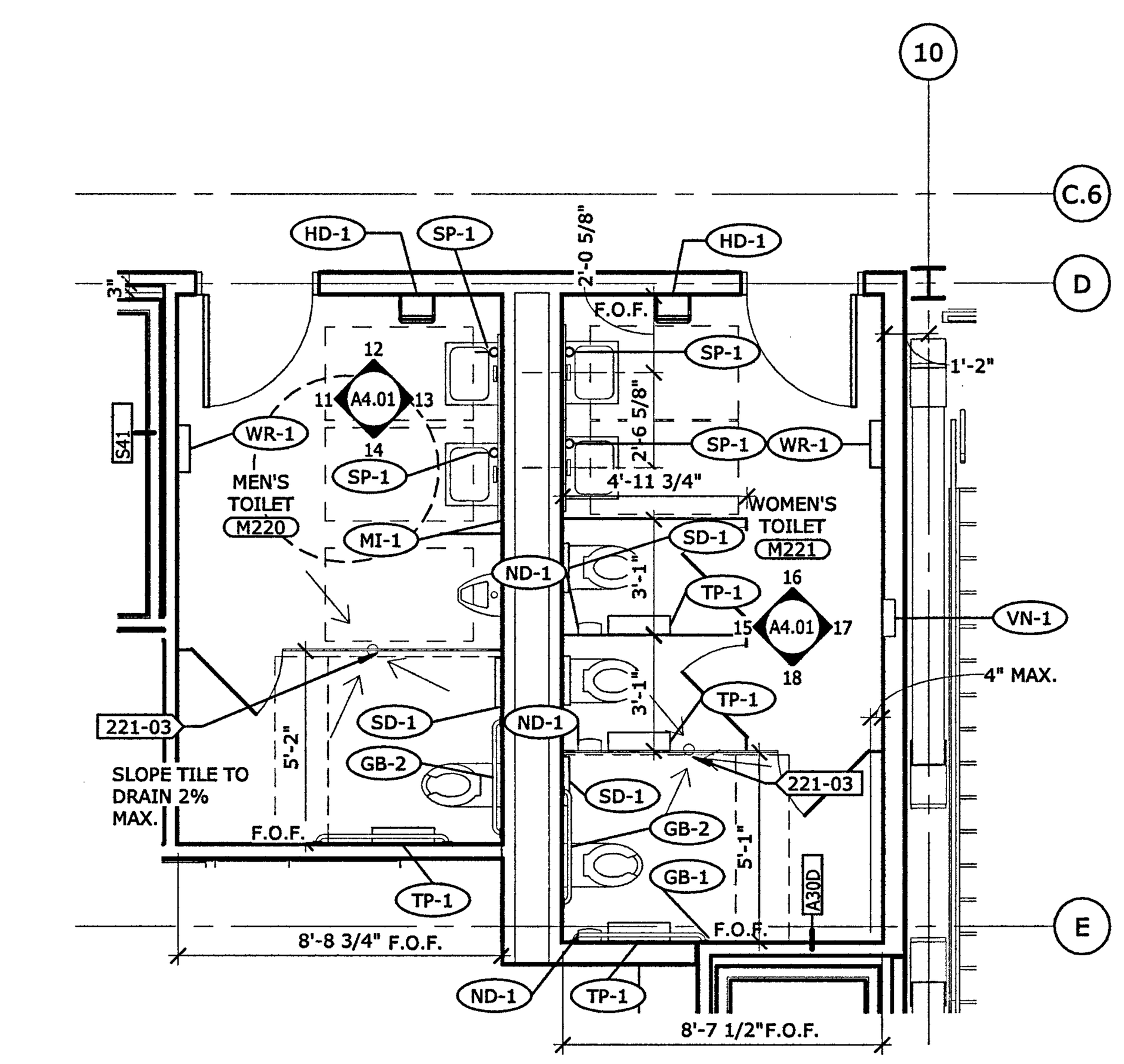
7 M121 WOMENS TOILET - EAST
1/4" = 1'-0"



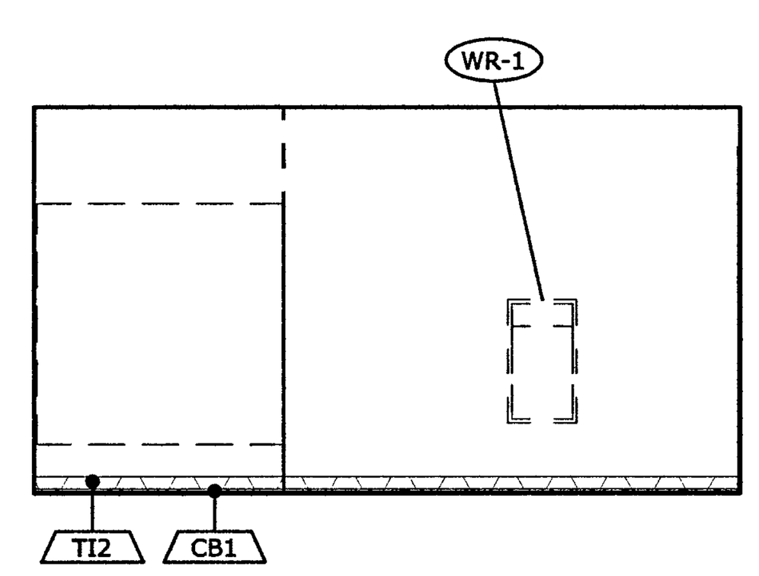
8 M121 WOMENS TOILET - SOUTH
1/4" = 1'-0"



9 M121 WOMENS TOILET - WEST
1/4" = 1'-0"



10 M220 M221 ENLARGED TOILET ROOM PLANS
1/4" = 1'-0"



11 M220 MENS TOILET - NORTH
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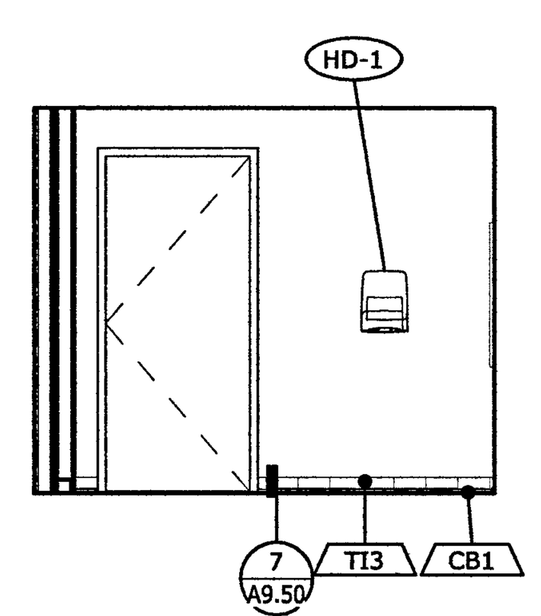
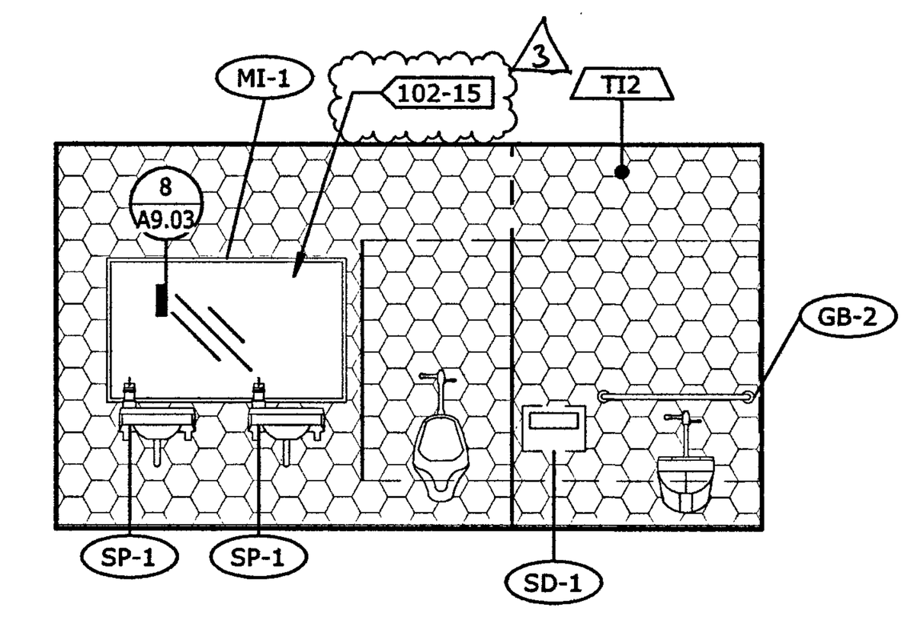
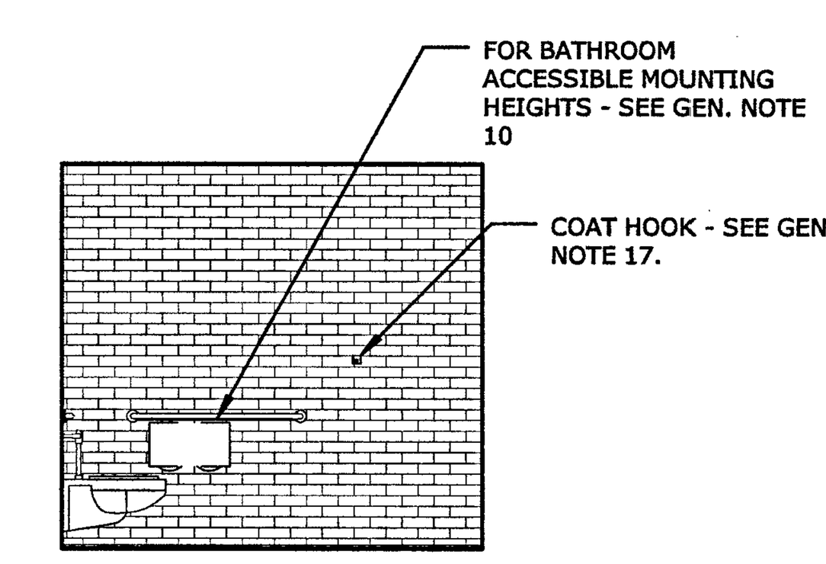


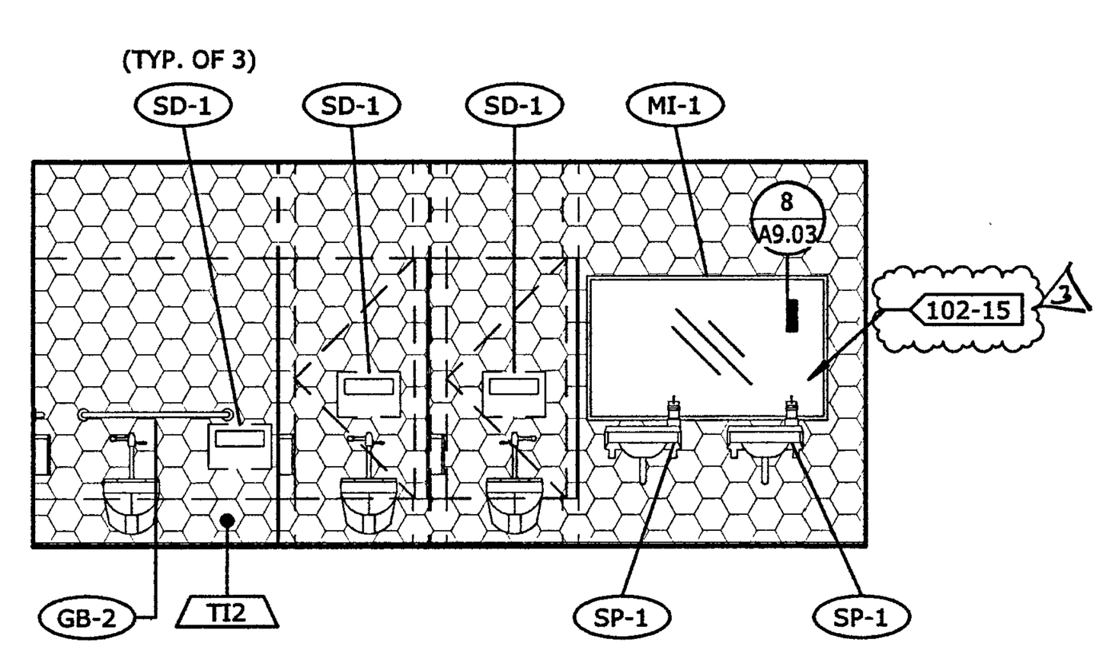
12 M220 MENS TOILET - EAST
1/4" = 1'-0"



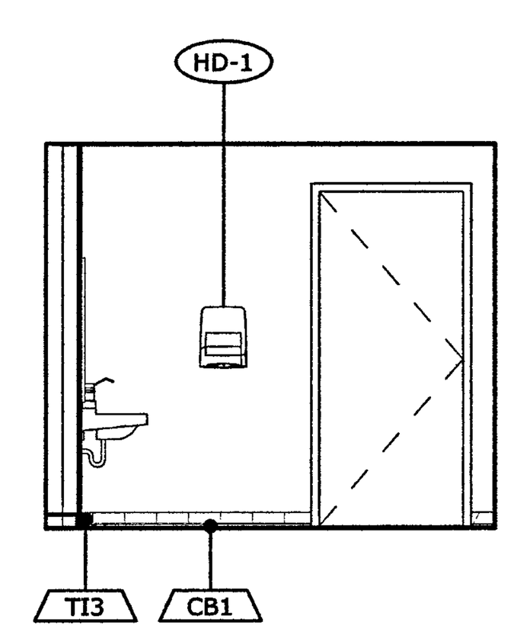
13 M220 MENS TOILET - SOUTH
1/4" = 1'-0"



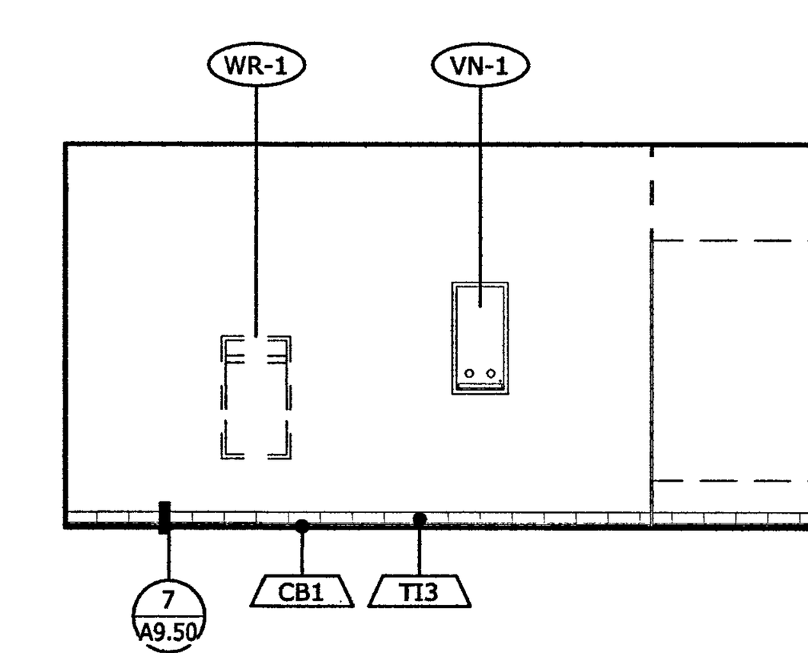
14 M220 MENS TOILET - WEST
1/4" = 1'-0"



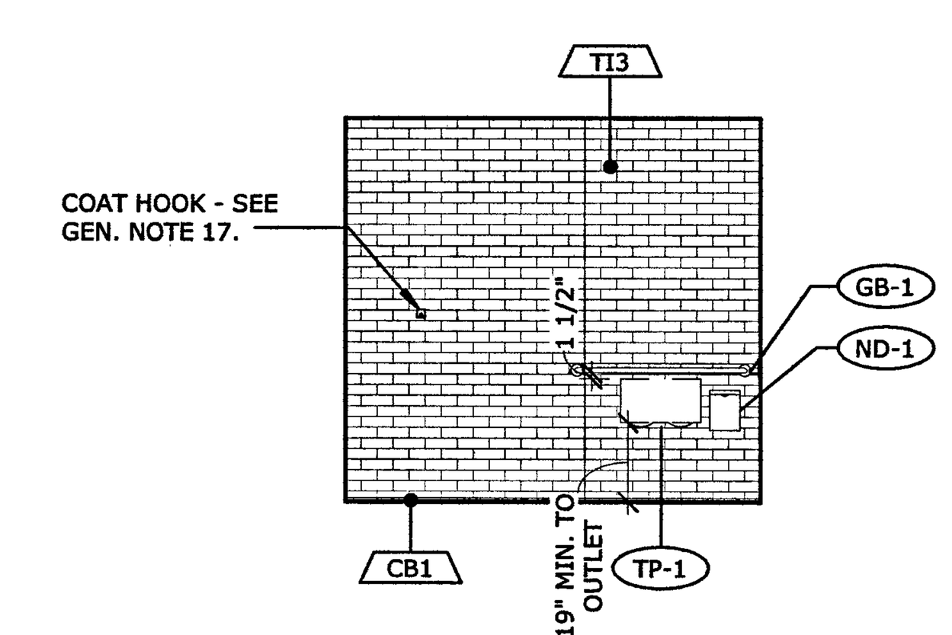
15 M221 WOMENS TOILET - NORTH
1/4" = 1'-0"



16 M221 WOMENS TOILET - EAST
1/4" = 1'-0"



17 M221 WOMENS TOILET - SOUTH
1/4" = 1'-0"



18 M221 WOMENS TOILET - WEST
1/4" = 1'-0"

TOILET ROOM ACCESSORIES

SEE SPECIFICATION SECTION 10 28 13 FOR COMPLETE DESCRIPTIONS OF ALL TOILET ROOM ACCESSORIES

MARK	DESCRIPTION
GB-1	GRAB BAR-42"
GB-2	GRAB BAR-36"
HD-1	HIGH CAPACITY PAPER TOWEL ROLL DISPENSER - MANUAL
MI-1	MIRROR - SEE KEYNOTES FOR SIZES 3
ND-1	SANITARY NAPKIN DISPOSAL
SD-1	TOILET SEAT COVER DISPENSER (SURFACE MOUNTED)
SP-1	SOAP DISPENSER
TP-1	DUAL HIGH CAPACITY SURFACE MOUNT TOILET PAPER DISPENSER
VN-1	NAPKIN VENDOR
WR-1	SEMI-RECESSED WASTE RECEPTACLE

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GENERAL NOTES

1. ALL DIMENSIONS ARE TO CENTER LINE OF COLUMN OR FACE OF STUD, UNLESS OTHERWISE NOTED. ALL PLUMBING FIXTURES, TOILET ROOM SPECIALTIES, MISC. WALL MOUNTED ITEMS ARE DIMENSIONED FROM FINISH FACE.
2. PROVIDE BLOCKING AND SUPPORT AS REQUIRED FOR ALL CASEWORK, HARDWARE AND MISCELLANEOUS EQUIPMENT ATTACHED TO WALLS, SEE DETAIL 13/S7.03
3. PROVIDE INTERIOR SIGNAGE PER SPECIFICATIONS AND SCHEDULE, SEE SHEET A2.73 AND A2.74
4. ALL DOORS ADJACENT TO A PERPENDICULAR WALL SHALL BE 4" FROM SUCH WALL TO BUTT FACE OF DOOR FRAME UNLESS NOTED OTHERWISE.
5. SEE SHEET A2.53 FOR FINISH SCHEDULE AND LEGEND.
6. SEE SHEET A2.51 FOR DOOR SCHEDULE AND FRAME TYPES.
7. SEE SHEETS A6.01-A6.02 FOR REFLECTED CEILING PLANS.
8. FOR ALL LAB FURNITURE & EQUIPMENT SEE SHEETS LF100-LF202.1
9. SEE SHEETS A2.54 AND A2.55 FOR FINISH INFORMATION
10. SEE SHEET GA0.05 FOR ACCESSIBILITY DETAILS
11. SEE 1/A9.03 FOR STANDARD TOILET ROOM WALL TILE ASSEMBLY.
12. SEE SHEET A9.03 FOR METAL TRIM DETAILS AT TILE.
13. ALL INTERIOR PARTITIONS TO BE A60 U.O.N.
14. SEE DETAIL 10/A9.01 FOR TYPICAL FURRING AT INTERIOR COLUMNS.
15. FOR TYPICAL OUTLET BOX LOCATED IN A PARTITION, SEE 2/A9.02
16. RECESSED FIRE EXTINGUISHER CABINET - SEE DTL. 1/A9.02 - 2-A 10:B:C F.E. TYPE
17. PROVIDE COAT HOOKS AT ALL BATHROOM STALL LOCATIONS TYP.

KEYNOTES:

000-00	KEYNOTE DESCRIPTION
~~102-02~~	~~URINAL PARTITION TYP.~~
102-15	BATHROOM MIRROR, 3'-0" X 5'-0"
102-16	BATHROOM MIRROR, 3'-0" X 6'-0"
221-03	AREA FLOOR DRAIN - SEE SLAB PLANS AND PLUMBING FOR DETAILS, SEE SLAB PLANS FOR SLOPED CONCRETE LOCATIONS AND BATHROOM PLANS FOR SLOPED TILE LOCATIONS
224-04	URINAL TYP.

FILE NO.34-C3

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
02-116163
AC TM FLS SS
DATE 5-30-18

LICENSED ARCHITECT
C32210
COURTNEY McLEOD GOLDEN
REN. 05/31/19
STATE OF CALIFORNIA

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PLAN CHECK SET

REVISION	BY	DATE
~~1 BACKCHECK 1~~		
3 REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

ENLARGED TOILET ROOM FLOOR PLANS

NORTH

B5017.00

May 22, 2018

A4.01

5/22/2018 10:08:09 AM

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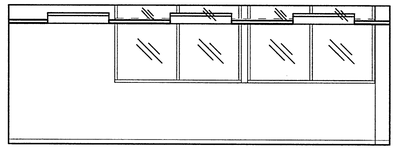
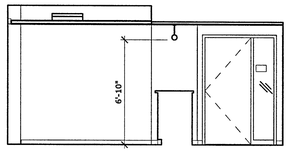
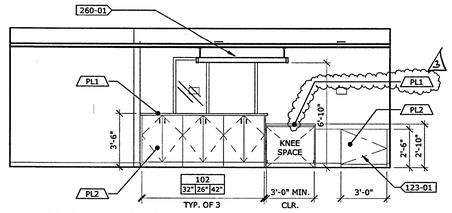


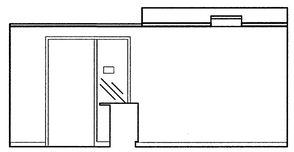
1 M106 ADMINISTRATION OFFICE - EAST
1/4" = 1'-0"



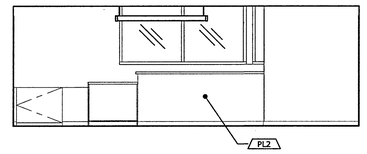
2 M106 ADMINISTRATION OFFICE - SOUTH
1/4" = 1'-0"



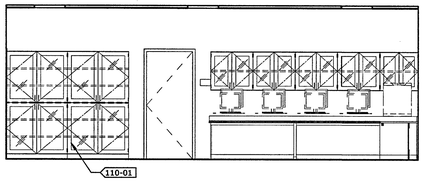
3 M106 ADMINISTRATION OFFICE - WEST
1/4" = 1'-0"



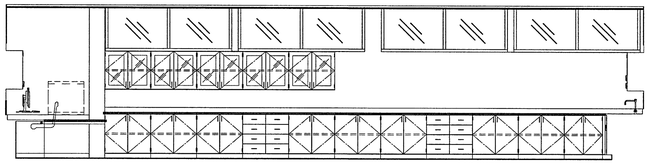
4 M106 ADMINISTRATION OFFICE - NORTH
1/4" = 1'-0"



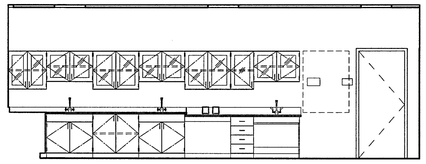
9 M106 ADMINISTRATION OFFICE - EAST 2
1/4" = 1'-0"



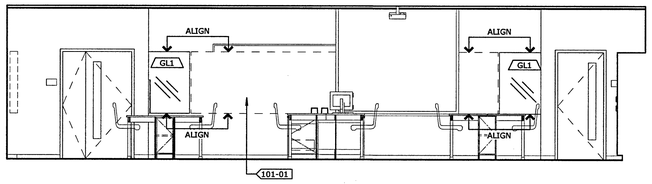
5 M108 ELECTROMAGNETISM LAB - NORTH
1/4" = 1'-0"



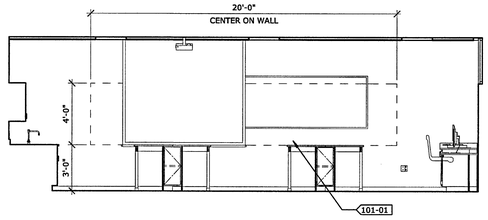
6 M108 ELECTROMAGNETISM LAB - EAST
1/4" = 1'-0"



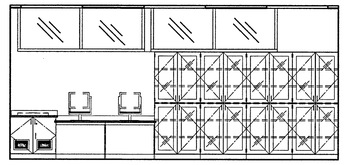
7 M108 ELECTROMAGNETISM LAB - SOUTH
1/4" = 1'-0"



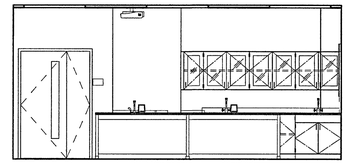
8 M108 ELECTROMAGNETISM LABORATORY - WEST
1/4" = 1'-0"



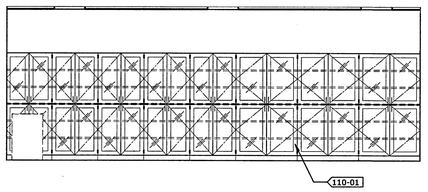
9.1 M111 OPTICS LABORATORY - NORTH
1/4" = 1'-0"



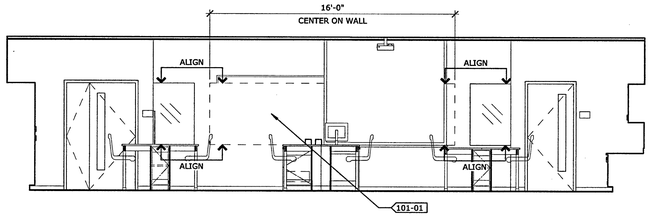
10 M111 OPTICS LABORATORY - EAST
1/4" = 1'-0"



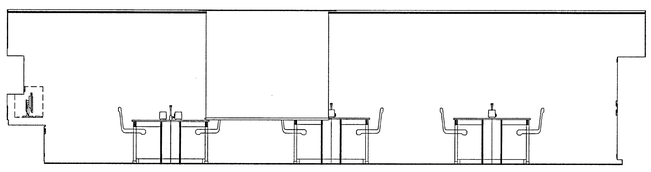
11 M111OPTICS LABORATORY - WEST
1/4" = 1'-0"



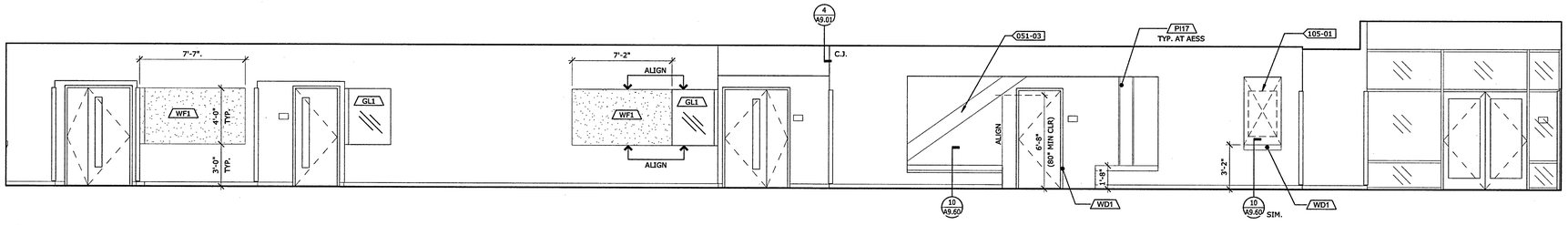
12.1 M112 PHYSICS LABORATORY - NORTH
1/4" = 1'-0"



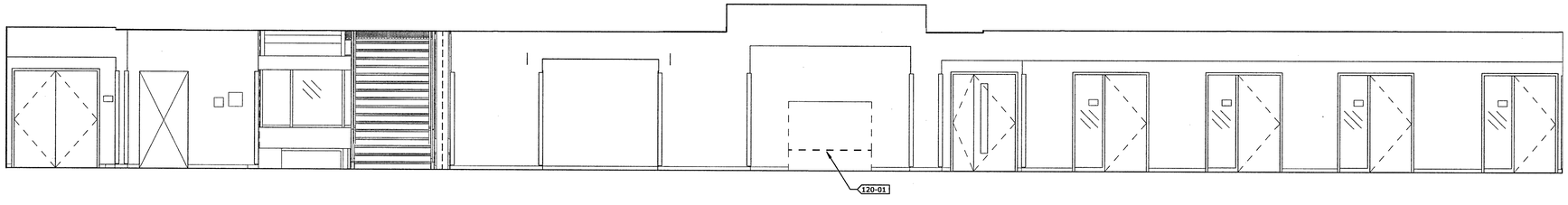
13 M112 PHYSICS LABORATORY - EAST
1/4" = 1'-0"



14 M112 PHYSICS LABORATORY - WEST
1/4" = 1'-0"



15 M114A CORRIDOR - EAST
1/4" = 1'-0"



16 M114A CORRIDOR - WEST
1/4" = 1'-0"

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95816-6699
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GENERAL NOTES

1. PROVIDE BLOCKING, BACKING AND SUPPORT AS REQUIRED FOR ALL CASEWORK, COUNTER TOPS, FIXTURES, HARDWARE, MISCELLANEOUS EQUIPMENT AND ACCESSORIES ATTACHED TO WALLS, SEE DETAIL 13/S7.03. COORDINATE BACKING OF WALL HUNG EQUIPMENT WITH EQUIPMENT WEIGHT AND LOCATION.
2. FOR INTERIOR SIGNAGE LOCATIONS SEE SHEETS A2.73 AND A2.74.
3. ALL INTERIOR PARTITIONS TO BE A60 U.O.N.

KEYNOTES:

000-00	KEYNOTE DESCRIPTION
051-03	ALL EXPOSED STEEL TO BE AESS, ALL EXPOSED STEEL IN THE AREA OF STAIR 1 TO BE AESS, SEE STRUCTURAL SPECIFICATION 05 12 13
101-01	MARKER BOARD TYP., O.F.C.I.
105-01	CARD KEY OPERATED KEY BOX
110-01	REFER TO LF SHEETS FOR FURNITURE AND EQUIPMENT IN THIS ROOM
120-01	DISPLAY CASE, OWNER FURNISHED
123-01	PLASTIC LAMINATE FACED SWING DOOR
260-01	SUSPENDED LIGHT FIXTURE, SEE ELECTRICAL FOR FIXTURE INFORMATION

FILE NO.34-C3

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
02-116163
AC FLS SS
DATE 5/10/18

LICENSED ARCHITECT
C32210
COURTNEY AgRICO COLVIN
REN. 08/31/19
STATE OF CALIFORNIA

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PLAN CHECK SET

	REVISION	BY	DATE
1	BACKCHECK 1		
2	BACKCHECK CHANGES		
3	REVISED PLANS		

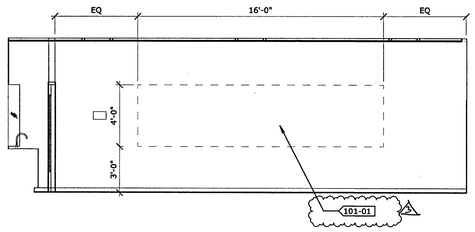
LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

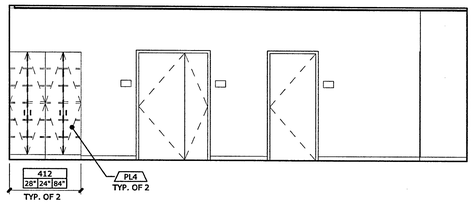
INTERIOR ELEVATIONS

B5017.00
As indicated
May 22, 2018

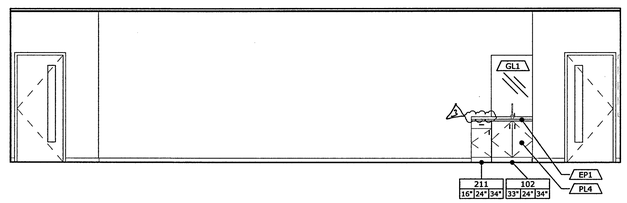
A5.01



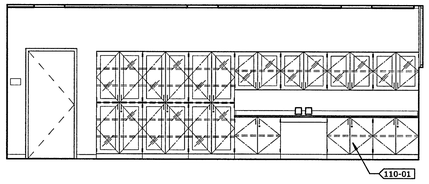
10 M204 PTA LECTURE ROOM - NORTH
1/4" = 1'-0"



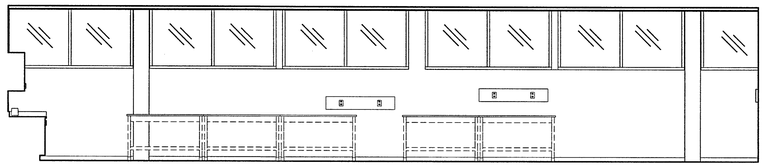
11 M204 PTA LECTURE ROOM - SOUTH
1/4" = 1'-0"



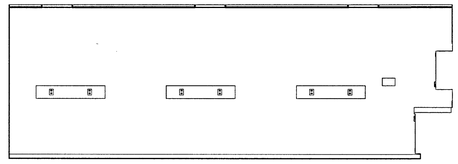
12 M204 PTA LECTURE ROOM - WEST
1/4" = 1'-0"



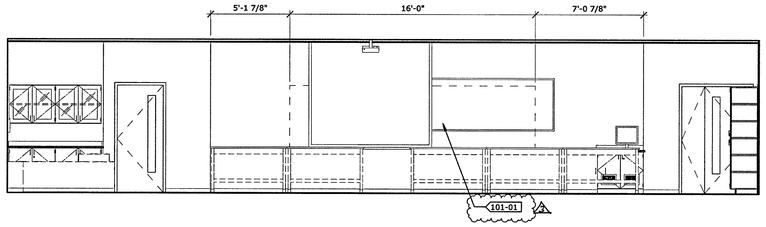
1 M205 NURSING LABORATORY - NORTH
1/4" = 1'-0"



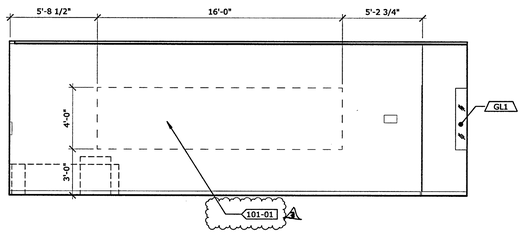
2 M205 NURSING LAB - EAST
1/4" = 1'-0"



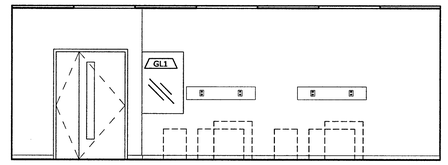
3 M205 NURSING LAB - SOUTH
1/4" = 1'-0"



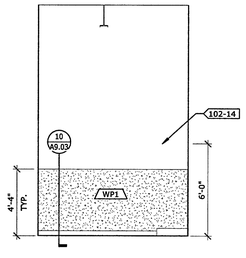
4 M205 NURSING LABORATORY - WEST
1/4" = 1'-0"



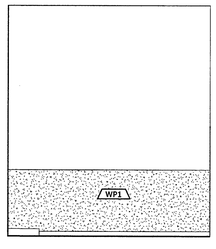
5 M208 SIMULATION ROOM - NORTH
1/4" = 1'-0"



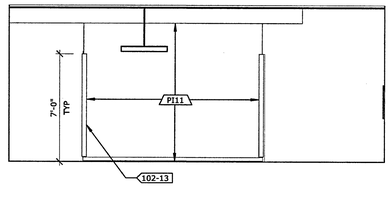
6 M208 SIMULATION ROOM - EAST
1/4" = 1'-0"



7 M210 JANITOR - WEST
1/4" = 1'-0"



8 M210 JANITOR - NORTH
1/4" = 1'-0"



9 CIRCULATION AREA - NORTH
1/4" = 1'-0"

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GENERAL NOTES

1. PROVIDE BLOCKING, BACKING AND SUPPORT AS REQUIRED FOR ALL CASEWORK, COUNTER TOPS, FIXTURES, HARDWARE, MISCELLANEOUS EQUIPMENT AND ACCESSORIES ATTACHED TO WALLS, SEE DETAIL 13/S7.03. COORDINATE BACKING OF WALL HUNG EQUIPMENT WITH EQUIPMENT WEIGHT AND LOCATION.
2. FOR INTERIOR SIGNAGE LOCATIONS SEE SHEETS A2.73 AND A2.74.
3. ALL INTERIOR PARTITIONS TO BE A60 U.O.N.

KEYNOTES:

000-00	KEYNOTE DESCRIPTION
101-01	MARKER BOARD TYP., O.F.C.I.
102-13	3 1/2" STAINLESS STEEL CORNERGUARD, TYP.
102-14	MOP SHELF, OFCI
110-01	REFER TO LF SHEETS FOR FURNITURE AND EQUIPMENT IN THIS ROOM

FILE NO.34-C3

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
02-116163 Rev 3
AC TM FLS SS
DATE 5-30-18

LICENSED ARCHITECT
C32210
COURTNEY ALROD EDLUND
REN. 08/31/19
STATE OF CALIFORNIA

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PLAN CHECK SET

	REVISION	BY	DATE
~~1~~	~~BACKCHECK 1~~		
2	REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

INTERIOR ELEVATIONS

B5017.00

May 22, 2018

A5.03

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architecture

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Sacramento, CA
95816-6699
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dreyfussblackford.com

KEYNOTES:

000-00	KEYNOTE DESCRIPTION
078-01	SPRAY FIREPROOFING - SPRAY TO EDGE OF DECK OR TO NEAREST SUPPORTED BAY AT GRIDLINES 2 AND D -
078-02	SPRAY FIREPROOFING - SPRAY TO EDGE OF DECK OR TO NEAREST SUPPORTED BAY AT GRIDLINES 7 to 10 AND C TO EDGE OF DECK
092-01	CEMENT PLASTER (P1) COLOR TO MATCH SHERWIN WILLIAMS SW 7045 INTELECTUAL GRAY
115-01	PROJECTOR AND MOUNTING TO BE C.F.C.I. TYP.
115-04	MEDIUM - 57.5" X 92", 109" DIAG. - DA-LITE, MODEL B - PROJECTOR AND MOUNTING TO BE C.F.C.I. TYP.
115-05	LARGE - 69" X 110", 130" DIAG. - DA-LITE, MODEL C - PROJECTOR AND MOUNTING TO BE C.F.C.I. TYP.

ADD-ALTERNATES

LEGEND #2

ADD-ALT #5:
ADD-ALT #5:
ADD MOTORIZED ROLLER SHADES AT ALL EXTERIOR WINDOWS, BASE BID INCLUDES ALL ELECTRICAL WIRING TO FUTURE LOCATIONS AND SHADES IN LECTURE ROOM M126.

REFERENCED SHEETS:
A6.01, A6.02, A9.40, A9.41, E3.01, E3.02

GENERAL NOTES

1. MECHANICAL AND ELECTRICAL ITEMS ARE SHOWN ON REFLECTED CEILING PLANS FOR LOCATIONS. SEE MECHANICAL AND ELECTRICAL PLANS FOR FIXTURE AND EQUIPMENT INFORMATION.
2. SEE FINISH SCHEDULE AND LEGEND ON SHEET A2.53 FOR CEILING FINISHES.
3. CEILING HEIGHT IS MEASURED FROM THE FINISH FLOOR BELOW.
4. CENTER SUSPENDED ACOUSTICAL CEILING GRID IN ROOM OR SPACE UNLESS OTHERWISE INDICATED.
5. LIGHT FIXTURES AND OTHER DEVICES ARE TO BE CENTERED IN ACOUSTICAL CEILING TILE OR ALIGNED WITH CEILING GRID UNLESS NOTED OTHERWISE.
6. FOR TYPICAL SUSPENDED ACOUSTIC CEILING TILE DETAIL, SEE 1/A9.40.
7. FOR TYPICAL SUSPENDED GYPSUM BOARD CEILING DETAIL, SEE 1/A9.41.
8. FOR ADDITIONAL LIGHTING NOT SHOWN IN THE ARCHITECTURAL PLANS, SEE ELECTRICAL DRAWINGS FOR FULL LIGHTING FIXTURE PACKAGE AND TYPES.
9. ALL DIMENSIONS SHOWN ON THIS SHEET ARE TO FACE OF FINISH
10. RECESSED FIXTURES IN SOFFIT OF ALCOVES SHALL BE CENTERED IN BOTH DIRECTIONS, U.O.N.
11. ALIGN CEMENT PLASTER CONTROL JOINTS WITH EDGE OF WALL, CENTER OF MULLION, CENTER OF FIN, ETC. WHERE OCCURS.

CEILING LEGEND

(symbol)	GYPSUM BOARD CEILING
(symbol)	SUSPENDED ACOUSTICAL CEILING 24 X 24
(symbol)	SUSPENDED ACOUSTICAL CEILING 48 X 24
(symbol)	CEILING ACCESS PANEL
(symbol)	RETURN AIR REGISTER
(symbol)	SUPPLY AIR REGISTER
(symbol)	RECESSED LIGHT FIXTURE - SEE ELECTRICAL DRAWINGS
(symbol)	RECESSED CAN LIGHT FIXTURE - SEE ELECTRICAL DRAWINGS
+X'-XX"	CEILING HEIGHT
XXX	CEILING FINISH TYPE, SEE FINISH TYPE SCHEDULE AND LEGEND

WINDOW SHADES

RS1	ADD ALT #5 - MOTORIZED SINGLE ROLL LIGHT FILTERING SHADE, ELECTRICAL WIRING IS BASE BID, SEE ELECTRICAL
RS2	ADD ALT #5 - MOTORIZED DOUBLE ROLL BLACKOUT AND LIGHT FILTERING SHADE, ELECTRICAL WIRING IS BASE BID, SEE ELECTRICAL
RS3	BASE BID - MOTORIZED DOUBLE ROLL BLACKOUT AND LIGHT FILTERING SHADE, SEE ELECTRICAL FOR WIRING

FILE NO.34-C3

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
02-116163
AC IM FLS ___ SS ___
DATE 5-30-18
Rev 3

LICENSED ARCHITECT
C32210
COURTNEY McLEOD GOLDEN
REN. 05/31/19
STATE OF CALIFORNIA

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PLAN CHECK SET

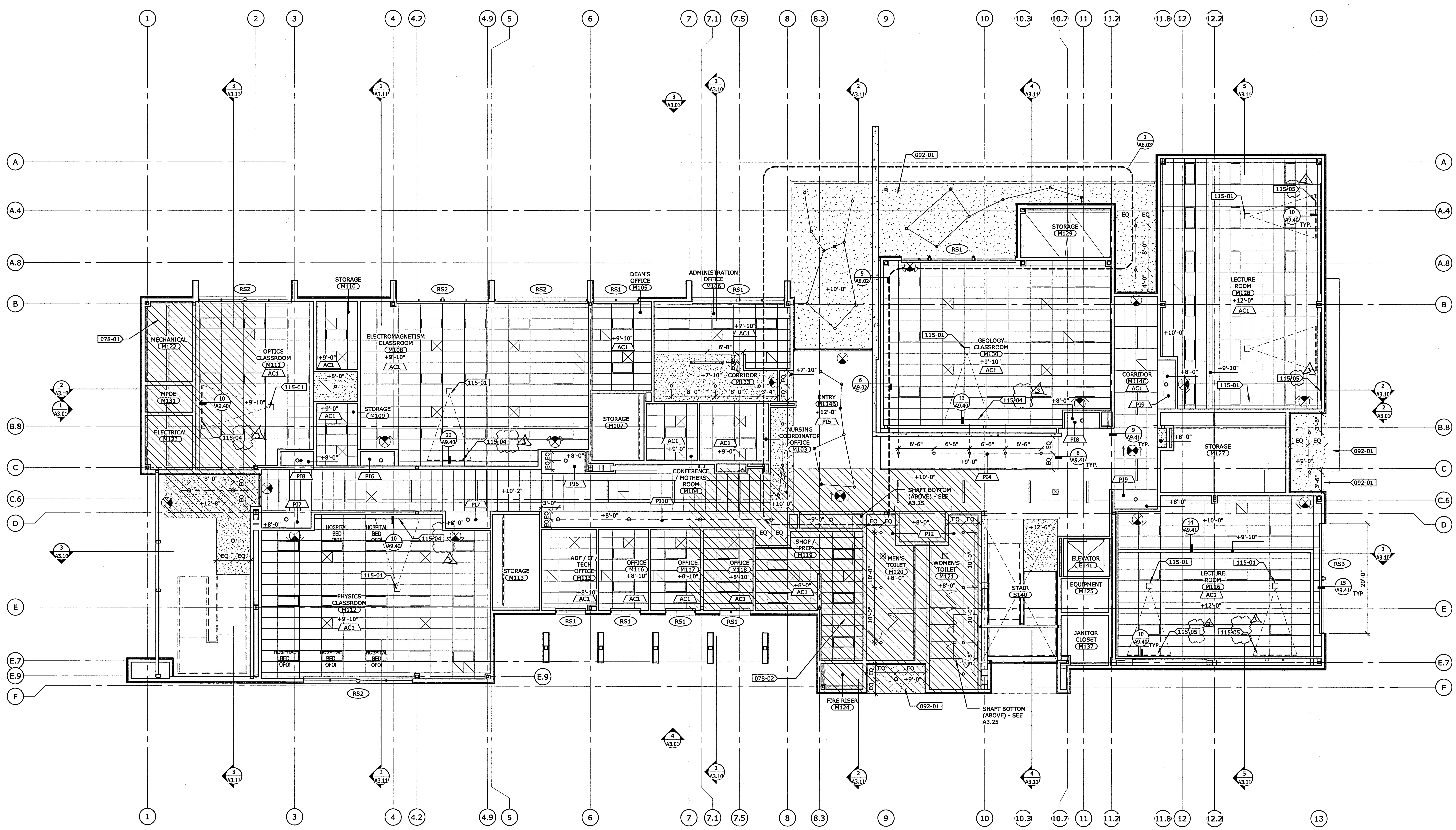
REVISION		BY	DATE
~~1~~	~~BACKCHECK 1~~		
~~2~~	~~BACKCHECK CHANGES~~		
3	REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE

MOHR HALL REPLACEMENT

REFLECTED CEILING PLAN - FIRST FLOOR



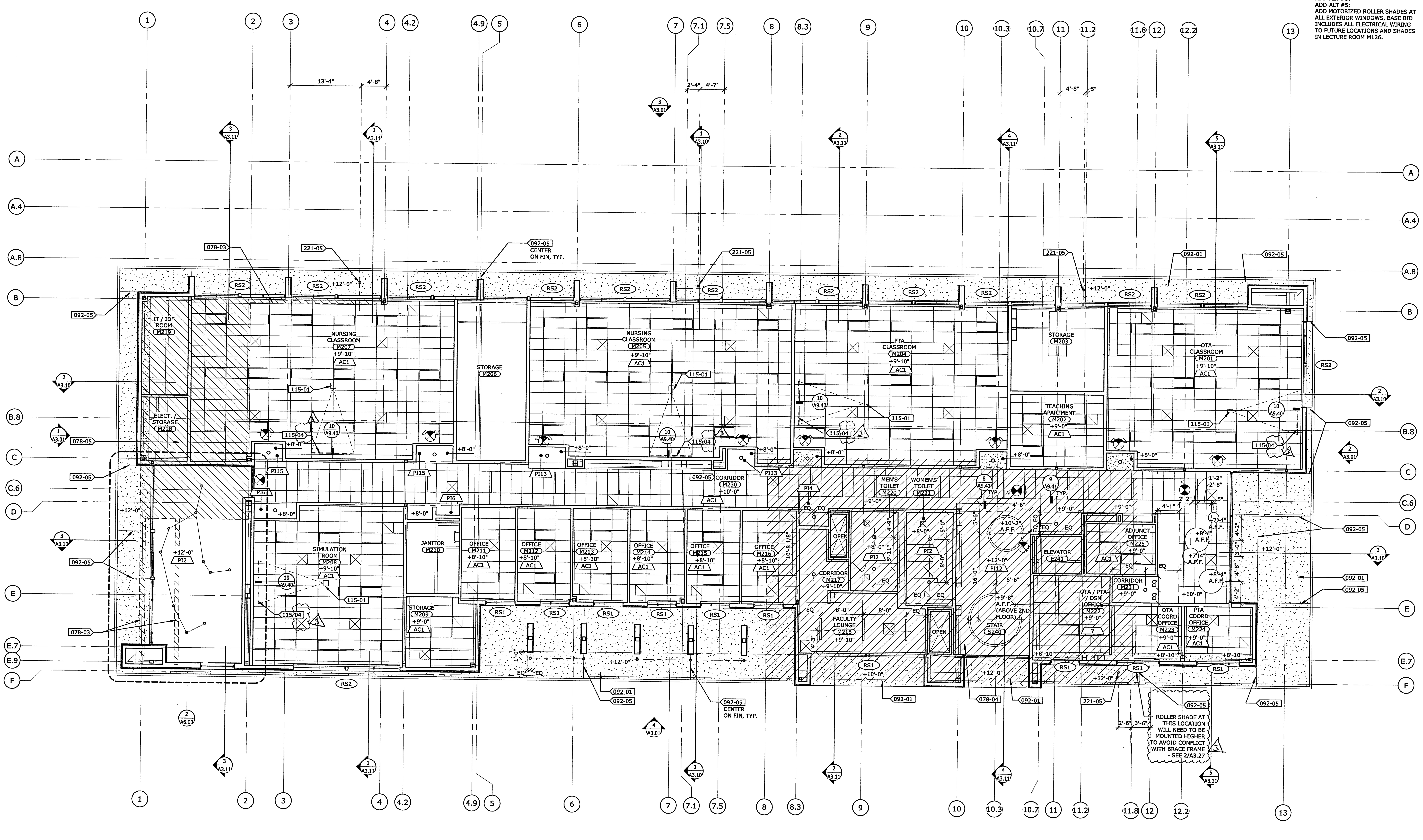
1 REFLECTED CEILING PLAN - FIRST FLOOR
1/8" = 1'-0"

NORTH

B5017.00
1/8" = 1'-0"
May 22, 2018

A6.01

C:\BIM\2016\Projects\B5017.00-LosRiosCCDMohrHall-A16-Central_glewis.rvt
5/22/2018 10:08:52 AM



1 REFLECTED CEILING PLAN - SECOND FLOOR
1/8" = 1'-0"

KEYNOTES:

000-00	KEYNOTE DESCRIPTION
078-03	SPRAY FIREPROOFING - SPRAY BEAMS PENETRATING RATED WALLS AND WHERE RATED HEAD OF WALL CONDITIONS TERMINATE INTO BEAMS
078-04	SPRAY FIREPROOFING - SPRAY TO EDGE OF DECK OR TO NEAREST SUPPORTED BAY AT GRIDLINES 8 to 11.8 AND C TO EDGE OF DECK
078-05	SPRAY FIREPROOFING - SPRAY TO EDGE OF DECK OR TO NEAREST SUPPORTED BAY AT GRIDLINES 2 TO EDGE OF DECK AND 3' PAST GRIDLINE D TO EDGE OF DECK
092-01	CEMENT PLASTER (P1) COLOR TO MATCH SHERWIN WILLIAMS SW 7045 INTELECTUAL GRAY
092-05	CEMENT PLASTER CONTROL JOINT
115-01	PROJECTOR AND MOUNTING TO BE C.F.C.I. TYP
115-04	MEDIUM - 57.5" X 92", 109" DIAG. - DA-LITE, MODEL B - PROJECTOR AND MOUNTING TO BE C.F.C.I. TYP.
221-05	OVERFLOW DRAIN DOWNSPOUT NOZZLE WITH PERFORATED BIRD SCREEN COVER - SEE A8.32 AND P2.2 FOR DETAILS

ADD-ALTERNATES
LEGEND #2

ADD-ALT #5:
ADD-ALT #5:
ADD MOTORIZED ROLLER SHADES AT ALL EXTERIOR WINDOWS, BASE BID INCLUDES ALL ELECTRICAL WIRING TO FUTURE LOCATIONS AND SHADES IN LECTURE ROOM M126.

REFERENCED SHEETS: A6.01, A6.02, A9.40, A9.41, E3.01, E3.02

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3540 Folsom Blvd
Sacramento, CA
95816-6699
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GENERAL NOTES

1. MECHANICAL AND ELECTRICAL ITEMS ARE SHOWN ON REFLECTED CEILING PLANS FOR LOCATIONS. SEE MECHANICAL AND ELECTRICAL PLANS FOR FIXTURE AND EQUIPMENT INFORMATION.
2. SEE FINISH SCHEDULE AND LEGEND ON SHEET A2.53 FOR CEILING FINISHES.
3. CEILING HEIGHT IS MEASURED FROM THE FINISH FLOOR BELOW.
4. CENTER SUSPENDED ACOUSTICAL CEILING GRID IN ROOM OR SPACE UNLESS OTHERWISE INDICATED.
5. LIGHT FIXTURES AND OTHER DEVICES ARE TO BE CENTERED IN ACOUSTICAL CEILING TILE OR ALIGNED WITH CEILING GRID UNLESS NOTED OTHERWISE.
6. FOR TYPICAL SUSPENDED ACOUSTIC CEILING TILE DETAIL, SEE 1/A9.40.
7. FOR TYPICAL SUSPENDED GYPSUM BOARD CEILING DETAIL, SEE 1/A9.41.
8. FOR ADDITIONAL LIGHTING NOT SHOWN IN THE ARCHITECTURAL PLANS, SEE ELECTRICAL DRAWINGS FOR FULL LIGHTING FIXTURE PACKAGE AND TYPES.
9. ALL DIMENSIONS SHOWN ON THIS SHEET ARE TO FACE OF FINISH
10. RECESSED FIXTURES IN SOFFIT OF ALCOVES SHALL BE CENTERED IN BOTH DIRECTIONS, U.O.N.
11. ALIGN CEMENT PLASTER CONTROL JOINTS WITH EDGE OF WALL, CENTER OF MULLION, CENTER OF FIN, ETC. WHERE OCCURS.

CEILING LEGEND

- GYPSUM BOARD CEILING
- SUSPENDED ACOUSTICAL CEILING 24 X 24
- SUSPENDED ACOUSTICAL CEILING 48 X 24
- CEILING ACCESS PANEL
- RETURN AIR REGISTER
- SUPPLY AIR REGISTER
- RECESSED LIGHT FIXTURE - SEE ELECTRICAL DRAWINGS
- RECESSED CAN LIGHT FIXTURE - SEE ELECTRICAL DRAWINGS
- +X'-XX" CEILING HEIGHT
- XXX CEILING FINISH TYPE, SEE FINISH TYPE SCHEDULE AND LEGEND

WINDOW SHADES

RS1	ADD ALT #5 - MOTORIZED SINGLE ROLL LIGHT FILTERING SHADE, ELECTRICAL WIRING IS BASE BID, SEE ELECTRICAL
RS2	ADD ALT #5 - MOTORIZED DOUBLE ROLL BLACKOUT AND LIGHT FILTERING SHADE, ELECTRICAL WIRING IS BASE BID, SEE ELECTRICAL
RS3	BASE BID - MOTORIZED DOUBLE ROLL BLACKOUT AND LIGHT FILTERING SHADE, SEE ELECTRICAL FOR WIRING

FILE NO.34-C3
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02-116163
Rev 3
AC TM FLS ✓ SS ✓
DATE 5-30-18

LICENSED ARCHITECT C32210 COURTNEY MCLEOD GOLDEN REN. 05/31/19 STATE OF CALIFORNIA

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PLAN CHECK SET

	REVISION	BY	DATE
1	BACKCHECK 1		
2	BACKCHECK CHANGES		
3	REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

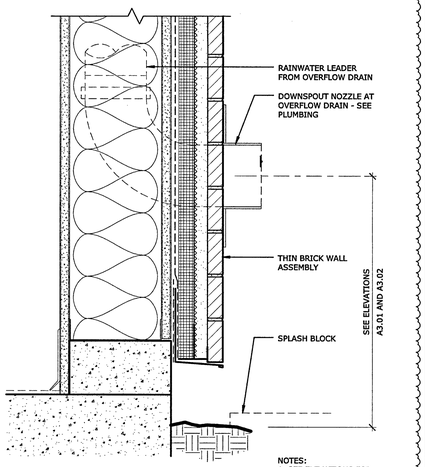
REFLECTED CEILING PLAN - SECOND FLOOR

NORTH

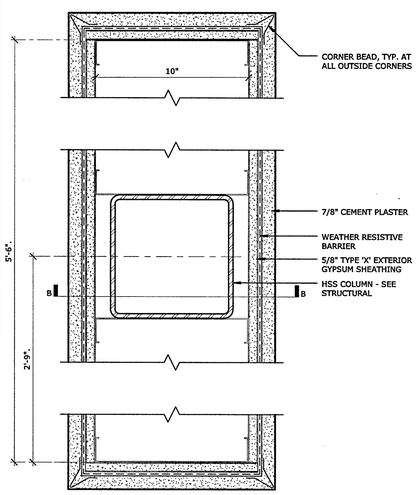
B5017.00
1/8" = 1'-0"
May 22, 2018

A6.02

5/22/2018 10:08:59 AM

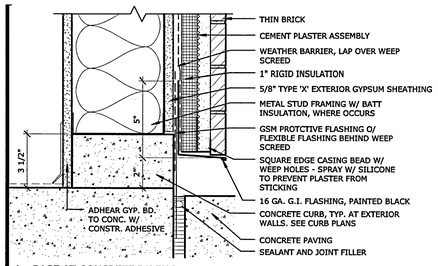


OVERFLOW RAINWATER LEADER AT WALL (12)
3" = 1'-0" REFERENCE:

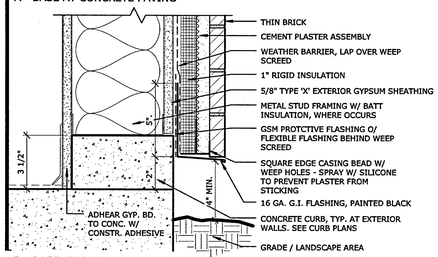


A - PLAN

NOTES:
1. SEE STRUCTURAL FOR FRAMING -S3.02



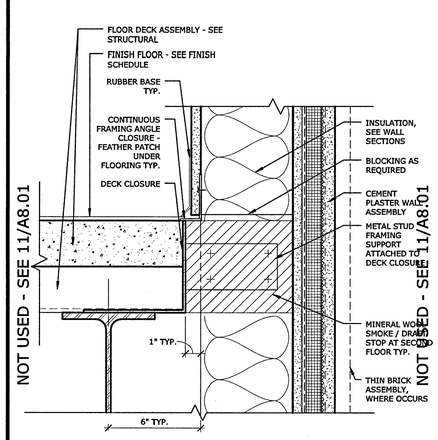
A - BASE AT CONCRETE PAVING



B - BASE AT GRADE

EXTERIOR THIN BRICK WALL - BASE (7)
3" = 1'-0" REFERENCE: A2.00 / 1

NOT USED - SEE 11/A8.01

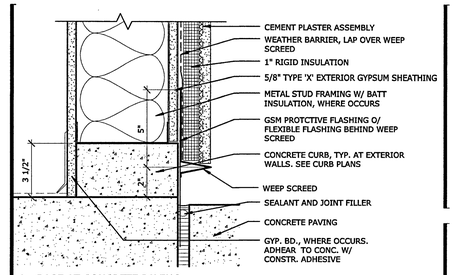


NOT USED - SEE 11/A8.01

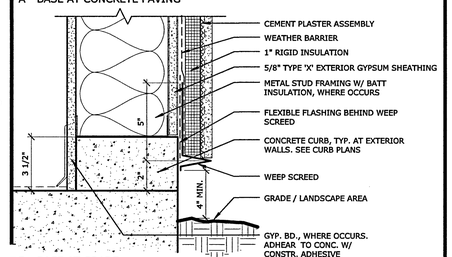
NOT USED - SEE 11/A8.01

NOT USED - SEE 11/A8.01

SECOND FLOOR EXT. WALL INTERSECTION TYP. (4)
3" = 1'-0" REFERENCE: A3.20 / 1



A - BASE AT CONCRETE PAVING



B - BASE AT GRADE

EXTERIOR CEMENT PLASTER WALL W/ CURB- BASE (1)
3" = 1'-0" REFERENCE: A2.00 / 1

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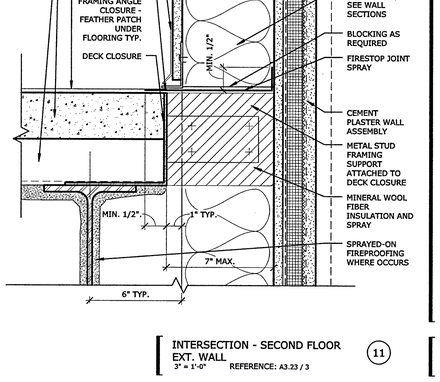
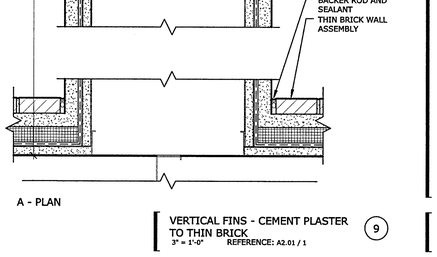
dreyfussblackford.com



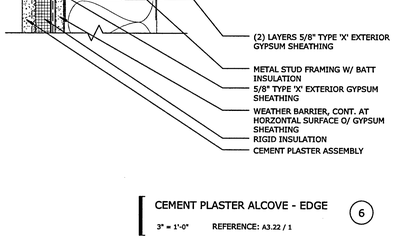
B - HEAD AT SOFFIT

C - BASE AT GRADE

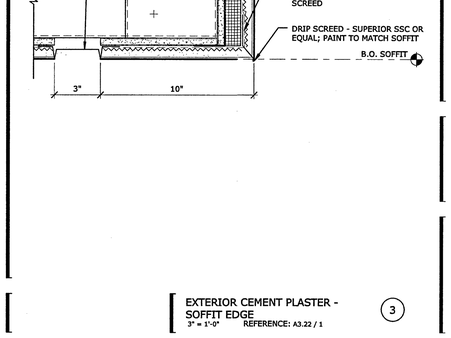
VERTICAL FINS - CEMENT PLASTER (10)
3" = 1'-0" REFERENCE: A1.02 / 2



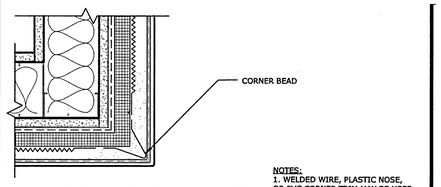
THIN BRICK - CEMENT PLASTER SOFFIT (8)
3" = 1'-0" REFERENCE: A3.20 / 1



CEMENT PLASTER - CEMENT PLASTER SOFFIT (5)
3" = 1'-0" REFERENCE:



A - INSIDE CORNER AT CEMENT PLASTER



B - OUTSIDE CORNER AT CEMENT PLASTER

NOTES:
1. WELDED WIRE, PLASTIC NOSE, OR PVC CORNER TRIM MAY BE USED
2. FILL SPACE SOLID WITH CEMENT PLASTER BASE

EXTERIOR CEMENT PLASTER - CORNERS (2)
3" = 1'-0" REFERENCE: A3.20 / 2

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LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

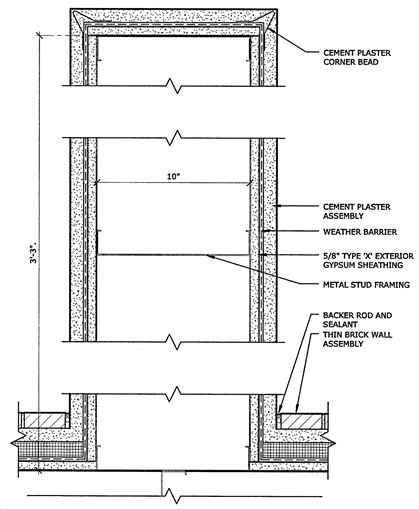
EXTERIOR DETAILS

B5017.00

May 22, 2018

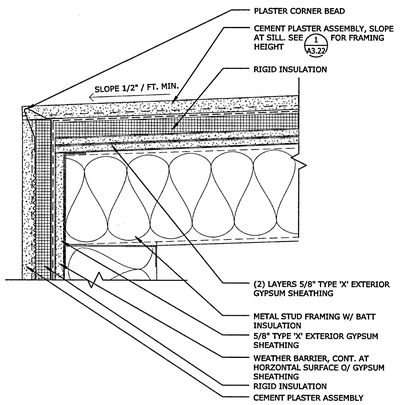
A8.01

INTERSECTION - SECOND FLOOR EXT. WALL (11)
3" = 1'-0" REFERENCE: A3.23 / 3

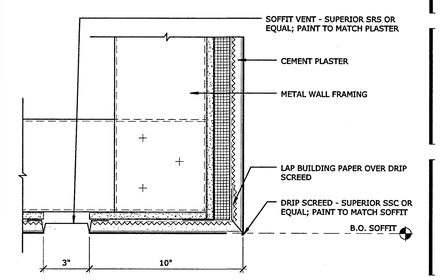


A - PLAN

VERTICAL FINS - CEMENT PLASTER TO THIN BRICK (9)
3" = 1'-0" REFERENCE: A2.01 / 1

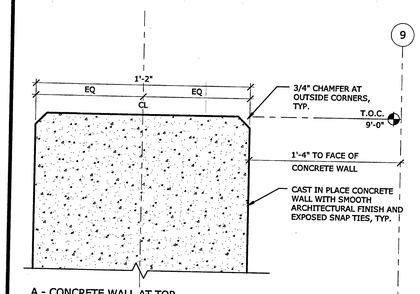


CEMENT PLASTER ALCOVE - EDGE (6)
3" = 1'-0" REFERENCE: A3.22 / 1

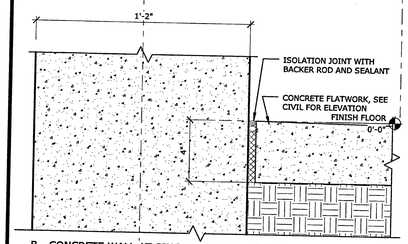


EXTERIOR CEMENT PLASTER - SOFFIT EDGE (3)
3" = 1'-0" REFERENCE: A3.22 / 1

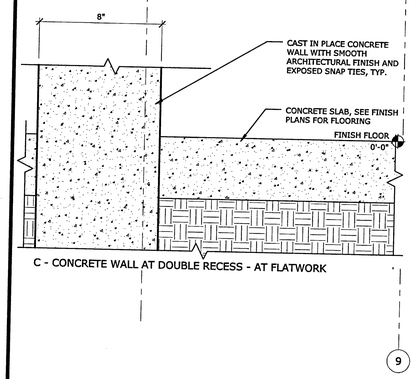
5/22/2018 10:09:03 AM C:\BIM\2016\Projects\B5017.00-LosRiosCCDMohrHall-A16-Central_gilewis.rvt



A - CONCRETE WALL AT TOP

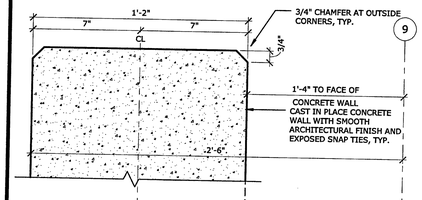


B - CONCRETE WALL AT SINGLE RECESS - AT FLATWORK

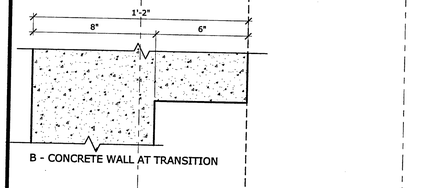


C - CONCRETE WALL AT DOUBLE RECESS - AT FLATWORK

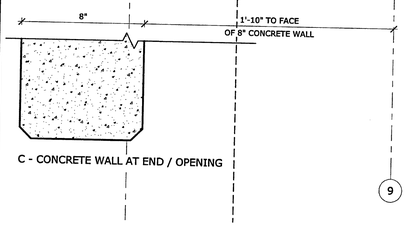
CONCRETE WALL - TYP. - SECTION 8
3" = 1'-0" REFERENCE: A2.00 / 1



A - CONCRETE WALL AT END

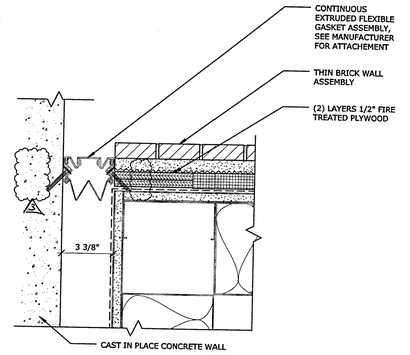


B - CONCRETE WALL AT TRANSITION



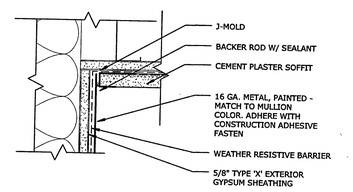
C - CONCRETE WALL AT END / OPENING

CONCRETE WALL - PLAN 5
3" = 1'-0" REFERENCE: A4.02 / 6

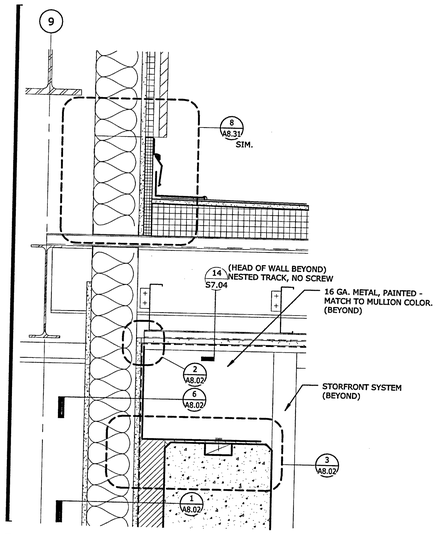


A - PLAN

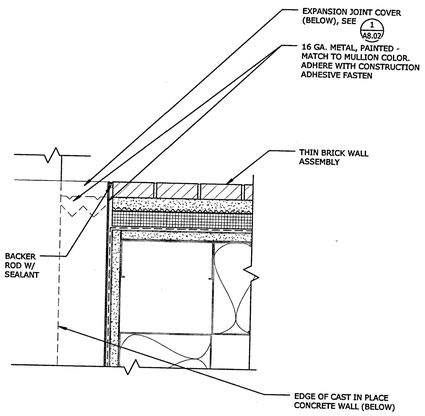
EXPANSION JOINT 1
3" = 1'-0" REFERENCE: A4.02 / 6



SOFFIT CANOPY - AT HEAD OF CONRETE WALL 2
3" = 1'-0" REFERENCE: A8.02 / 9

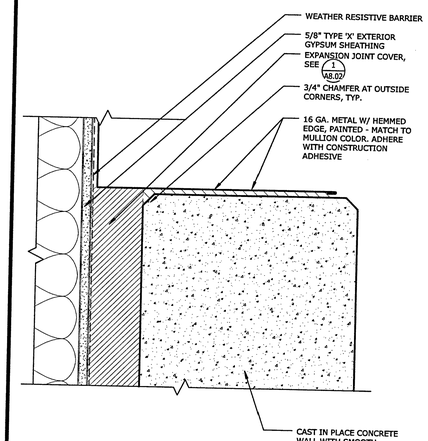


SOFFIT CANOPY - AT HEAD OF CONRETE WALL2 9
1 1/2" = 1'-0" REFERENCE: A2.01 / 1



A - PLAN

THIN BRICK CAPTURE EDGE - AT SHEET METAL WALL 6
3" = 1'-0" REFERENCE:



HEAD OF CONCRETE WALL 3
3" = 1'-0" REFERENCE: A8.02 / 9

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dreyfussblackford.com

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EXP. 05/31/19
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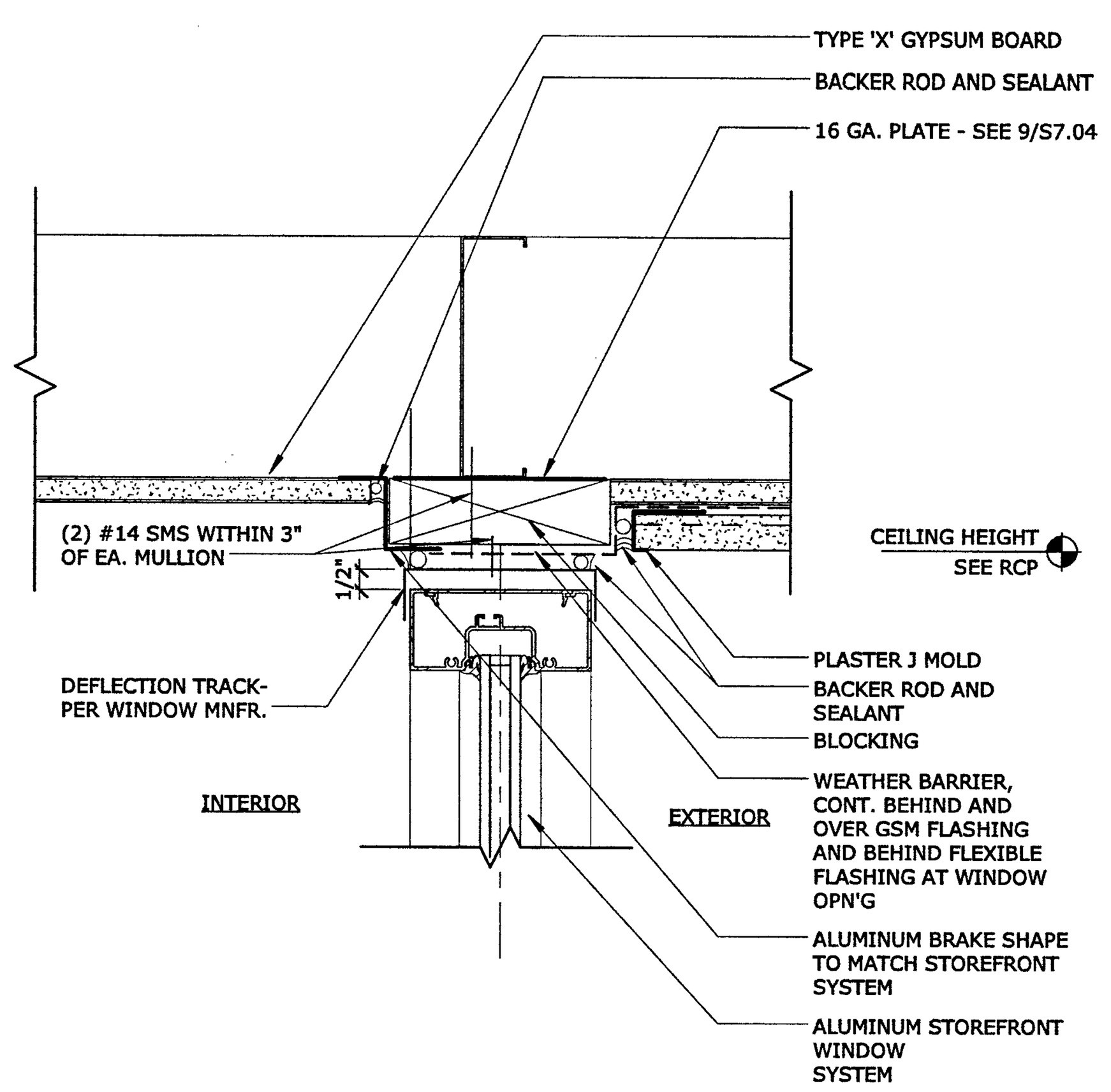
LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

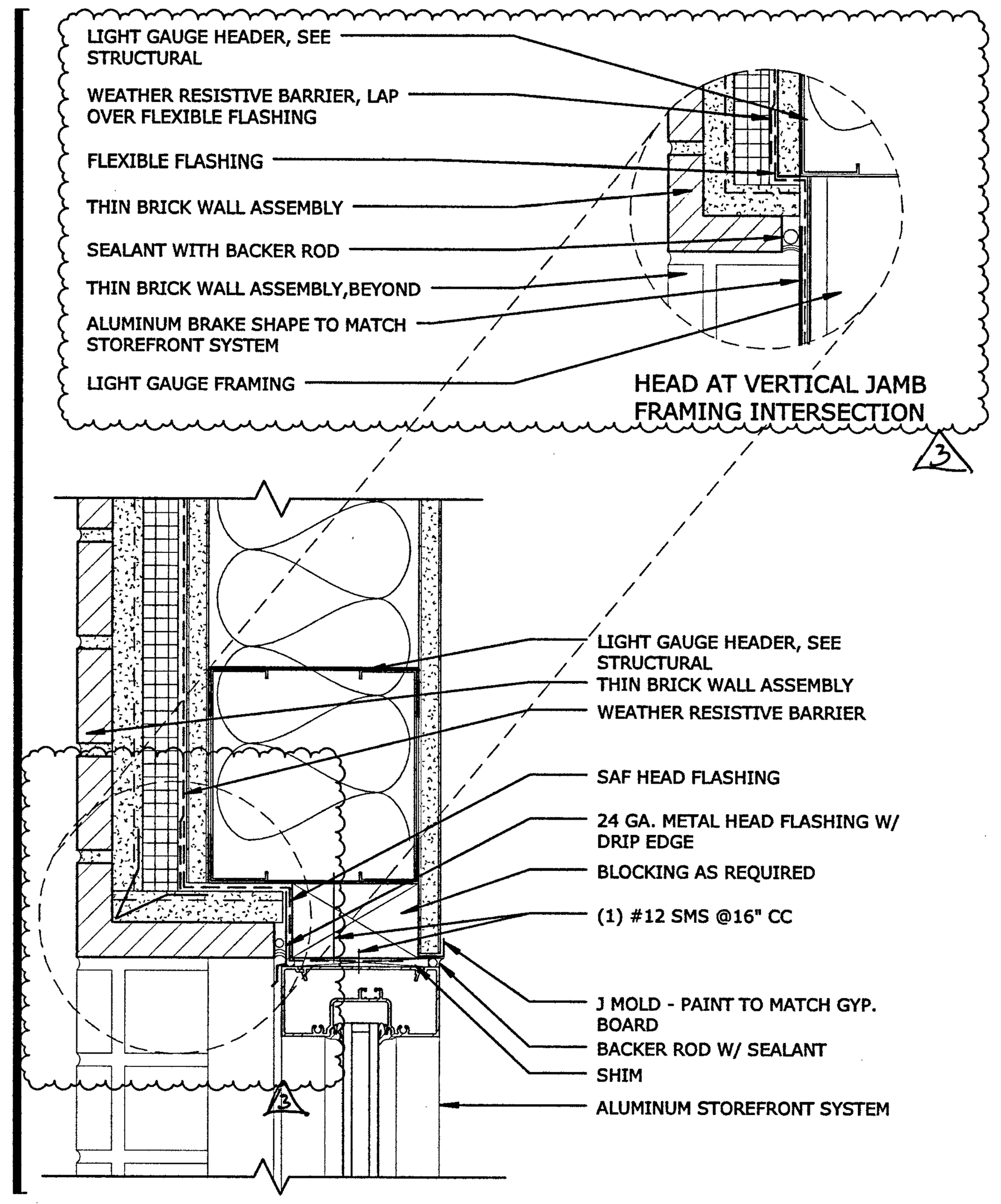
EXTERIOR DETAILS

B5017.00
As Indicated
May 22, 2018

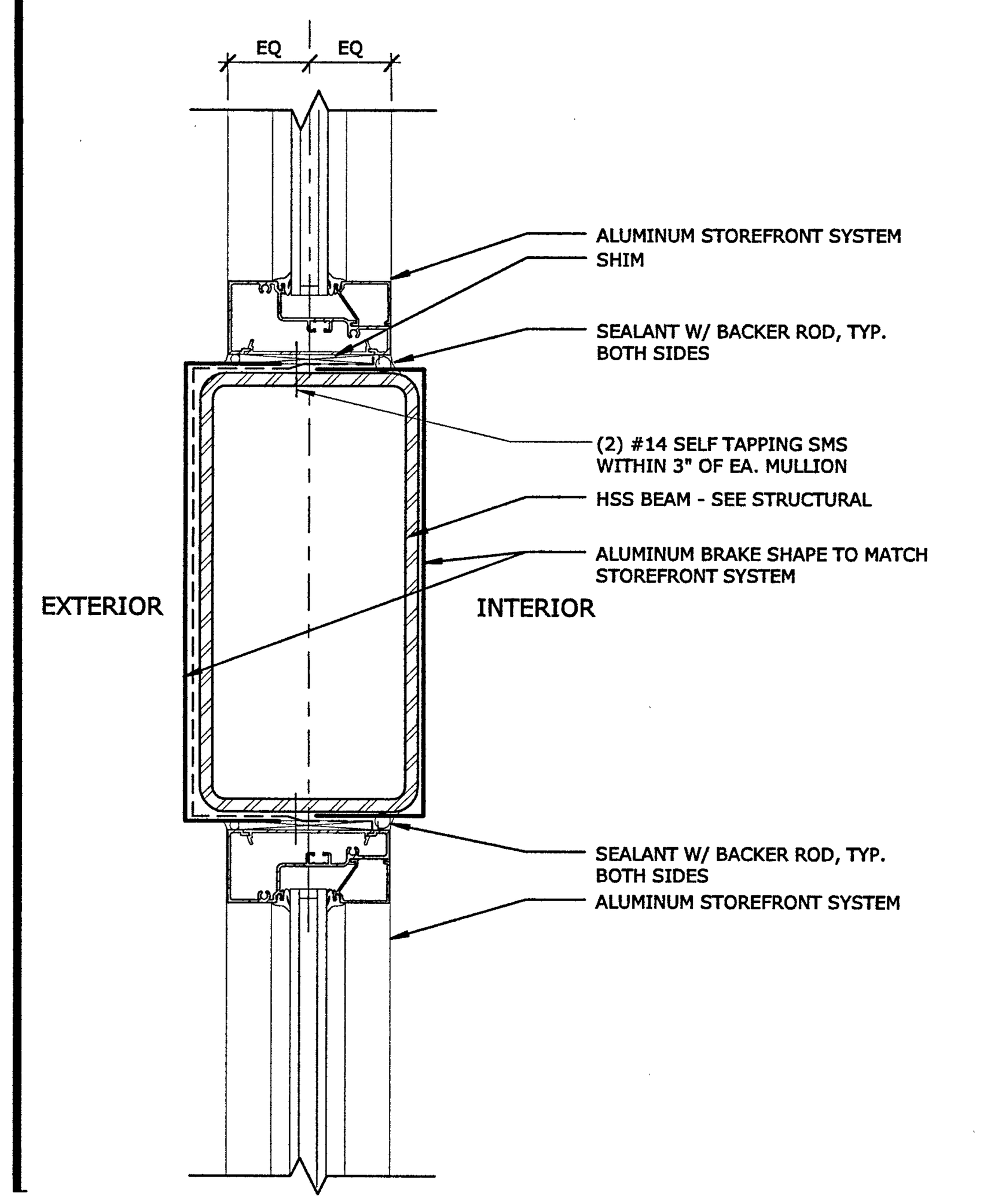
A8.02



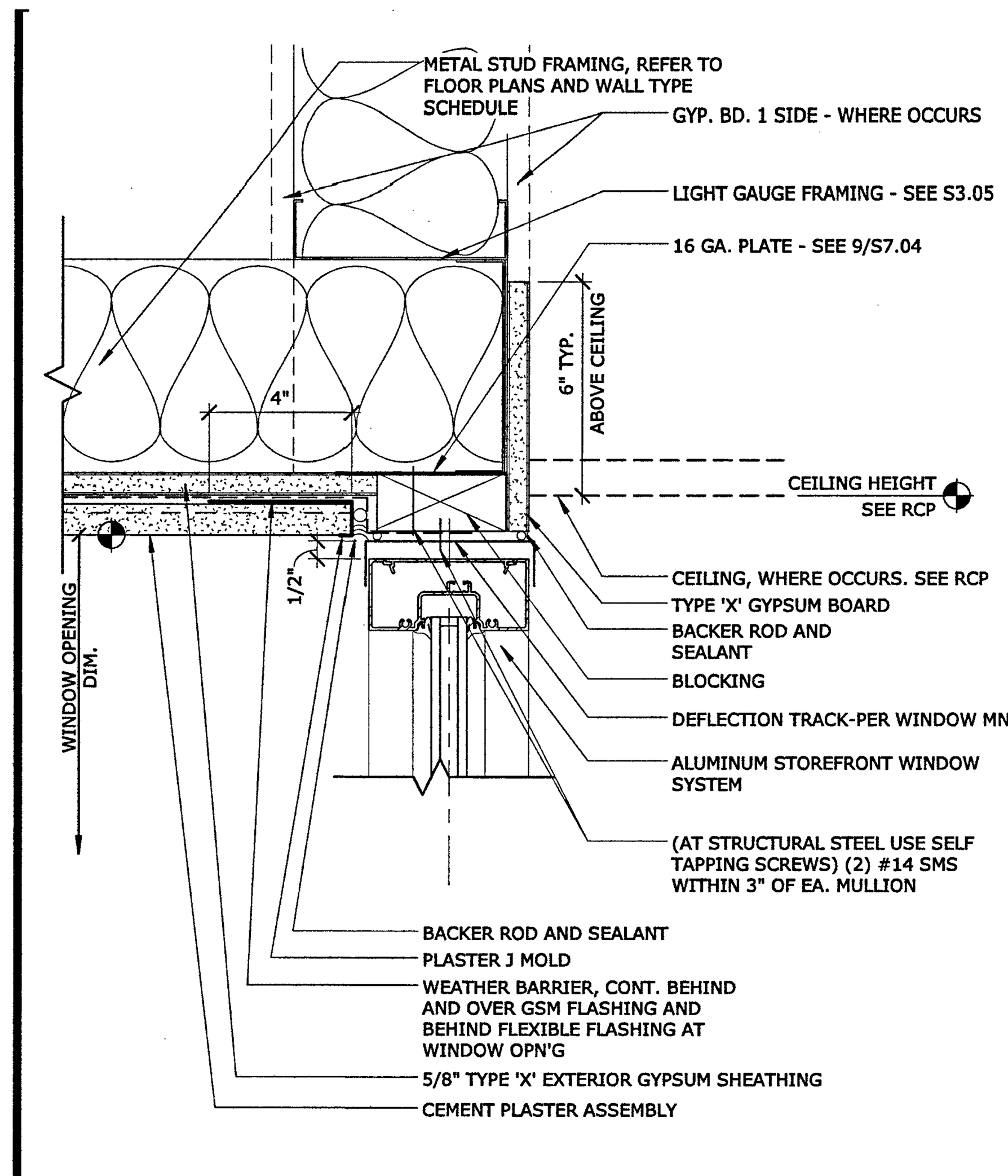
EXTERIOR STOREFRONT HEAD - AT BEAM (13)
3" = 1'-0" REFERENCE: A2.50 / 6



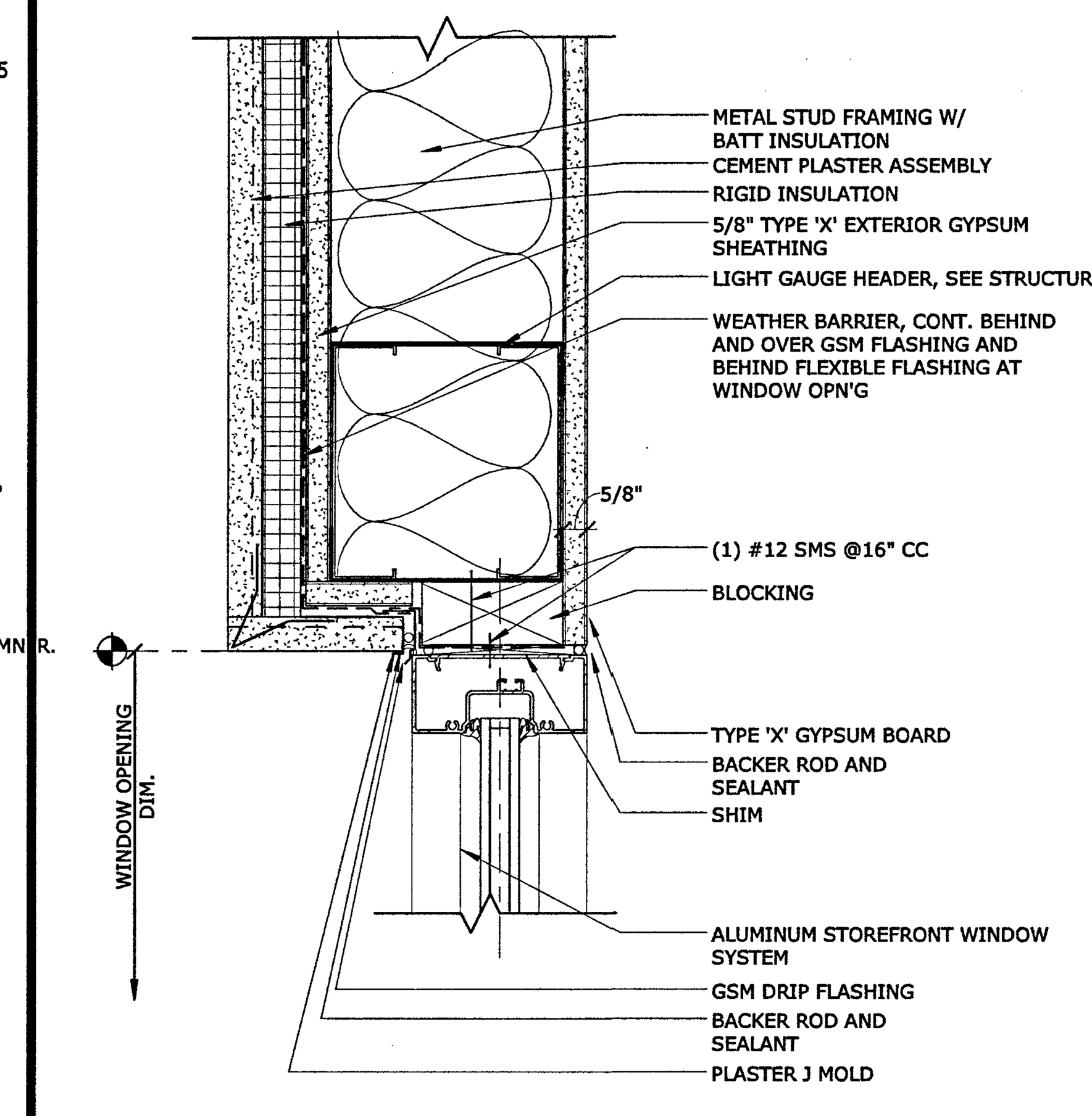
EXTERIOR STOREFRONT HEAD - THIN BRICK (10)
3" = 1'-0" REFERENCE: A2.50 / 7



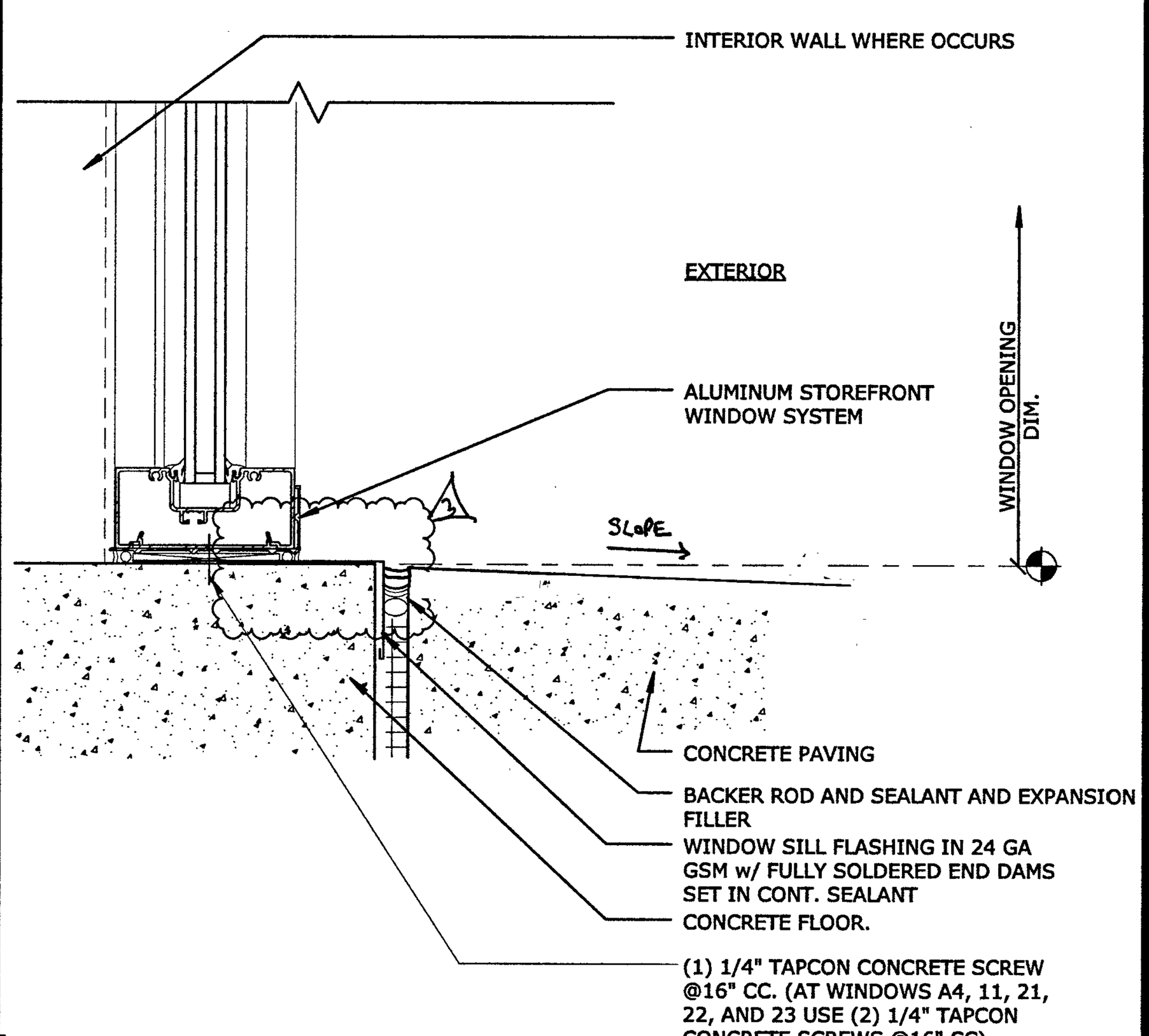
EXTERIOR STOREFRONT HEAD AND SILL - AT BEAM (7)
3" = 1'-0" REFERENCE: A2.50 / 6



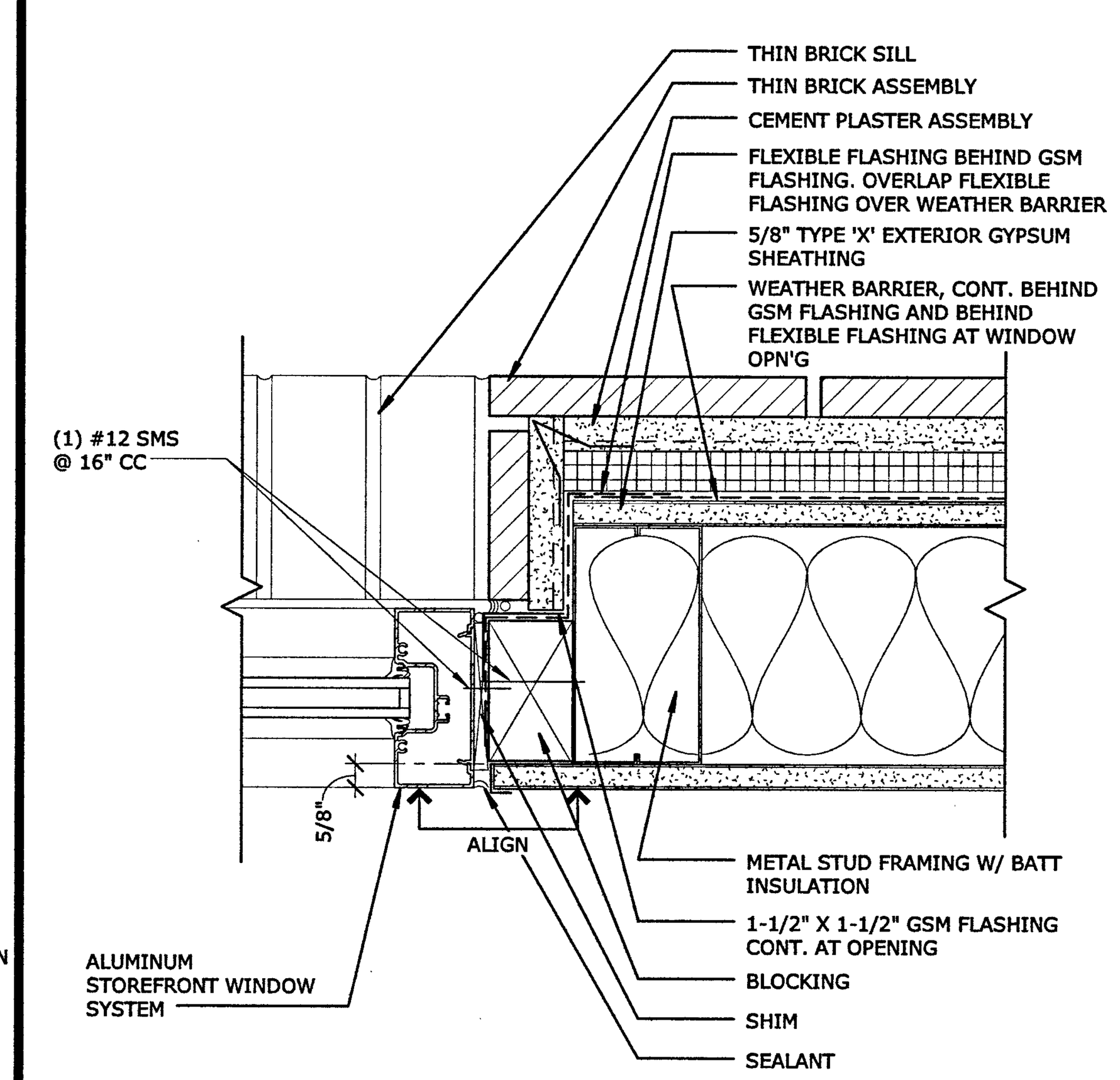
EXTERIOR STOREFRONT HEAD AT PLASTER SOFFIT (4)
3" = 1'-0" REFERENCE: A2.50 / 1



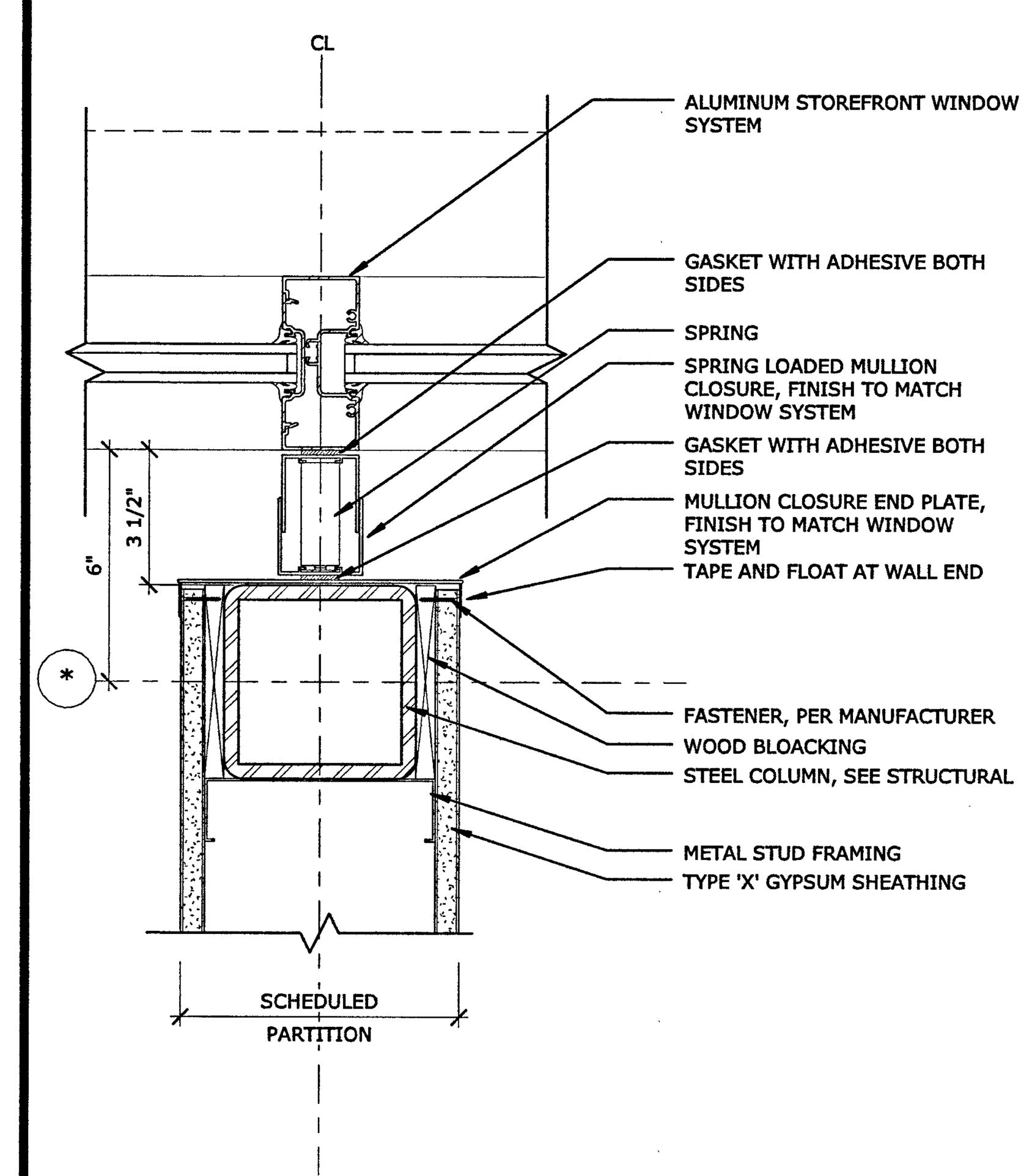
EXTERIOR STOREFRONT HEAD AT PLASTER WALL (1)
3" = 1'-0" REFERENCE:



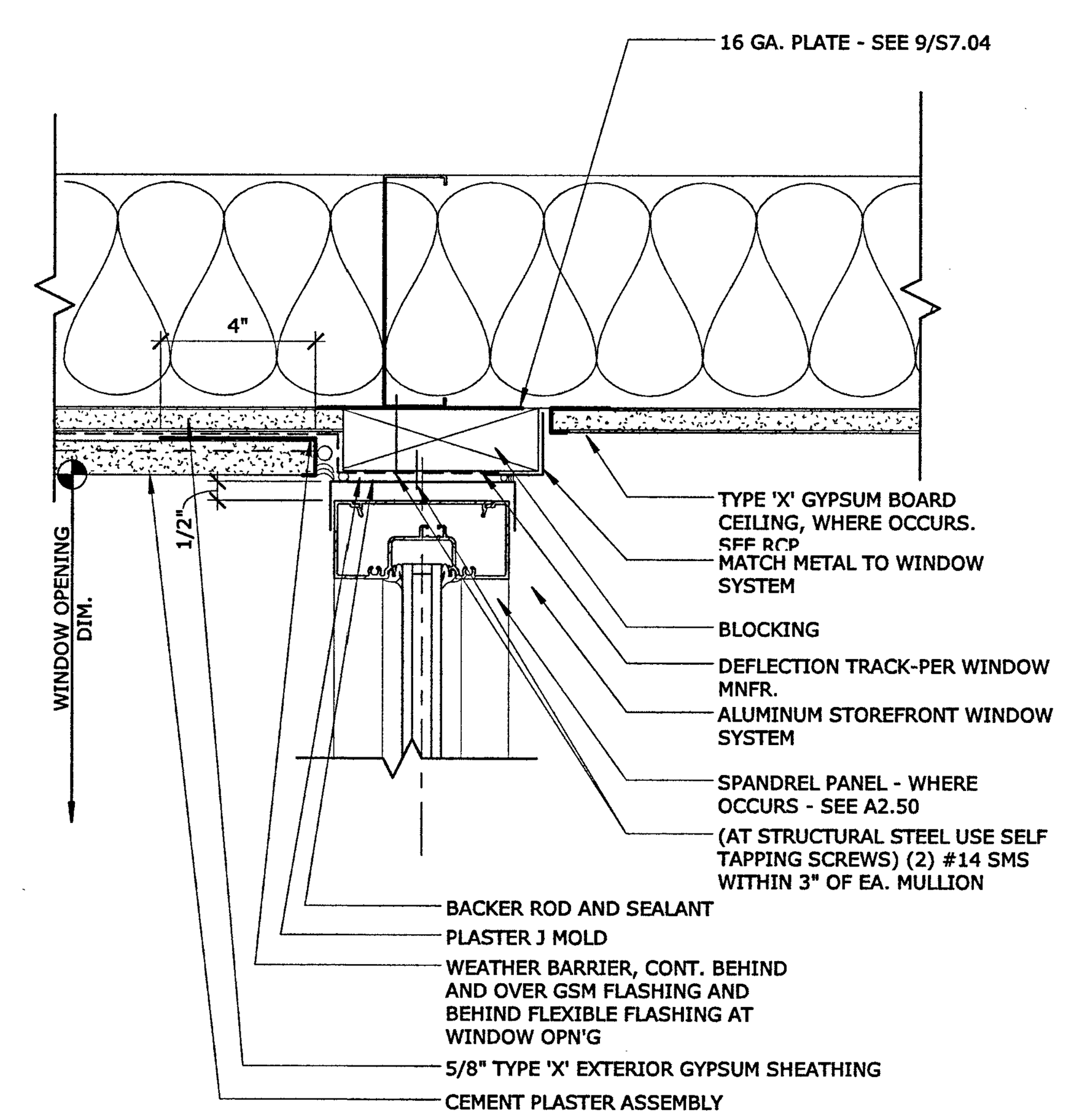
EXTERIOR STOREFRONT SILL AT SLAB (14)
3" = 1'-0" REFERENCE: A2.50 / 1



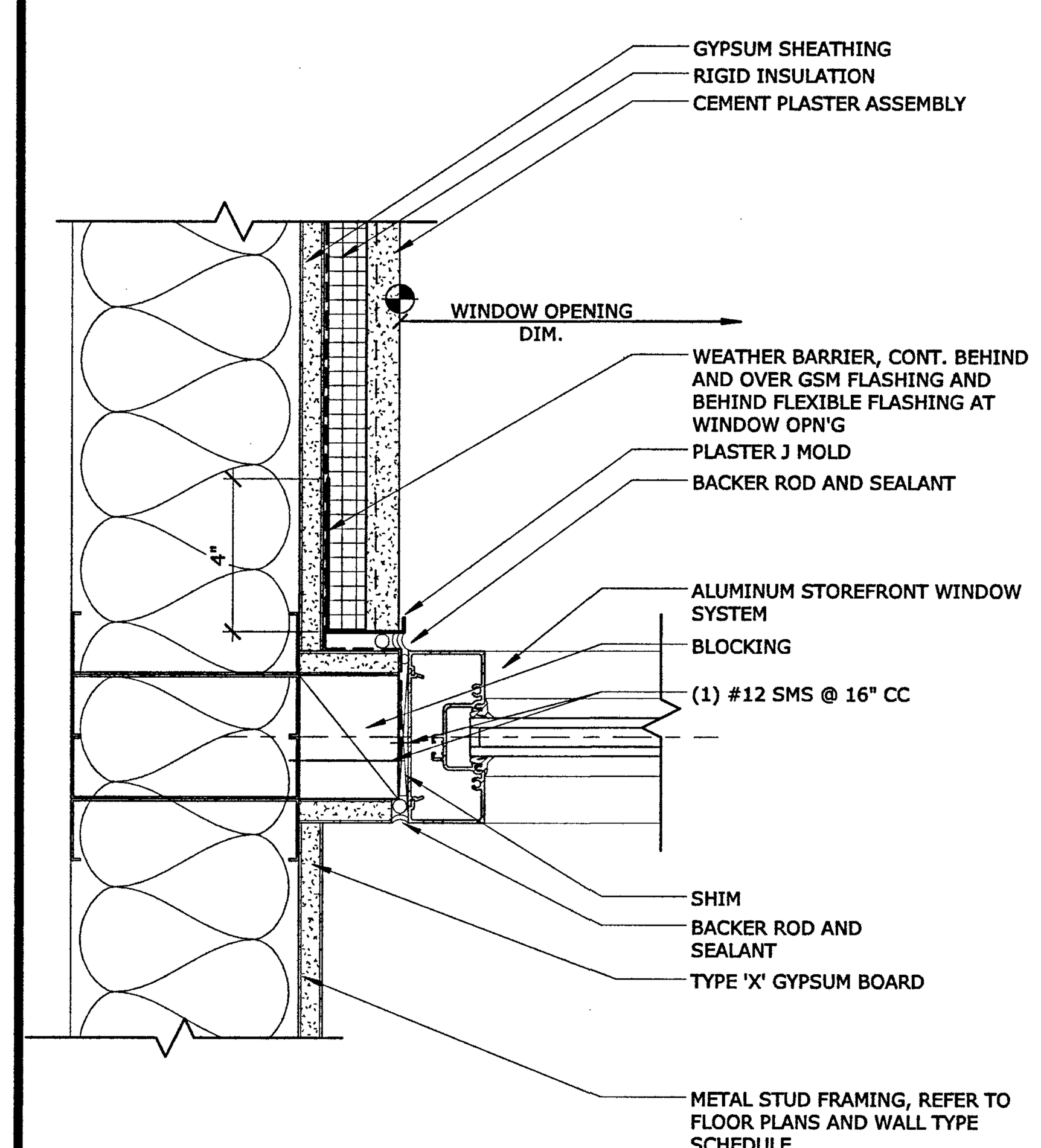
EXTERIOR STOREFRONT JAMB - THIN BRICK (11)
3" = 1'-0" REFERENCE: A2.50 / 2



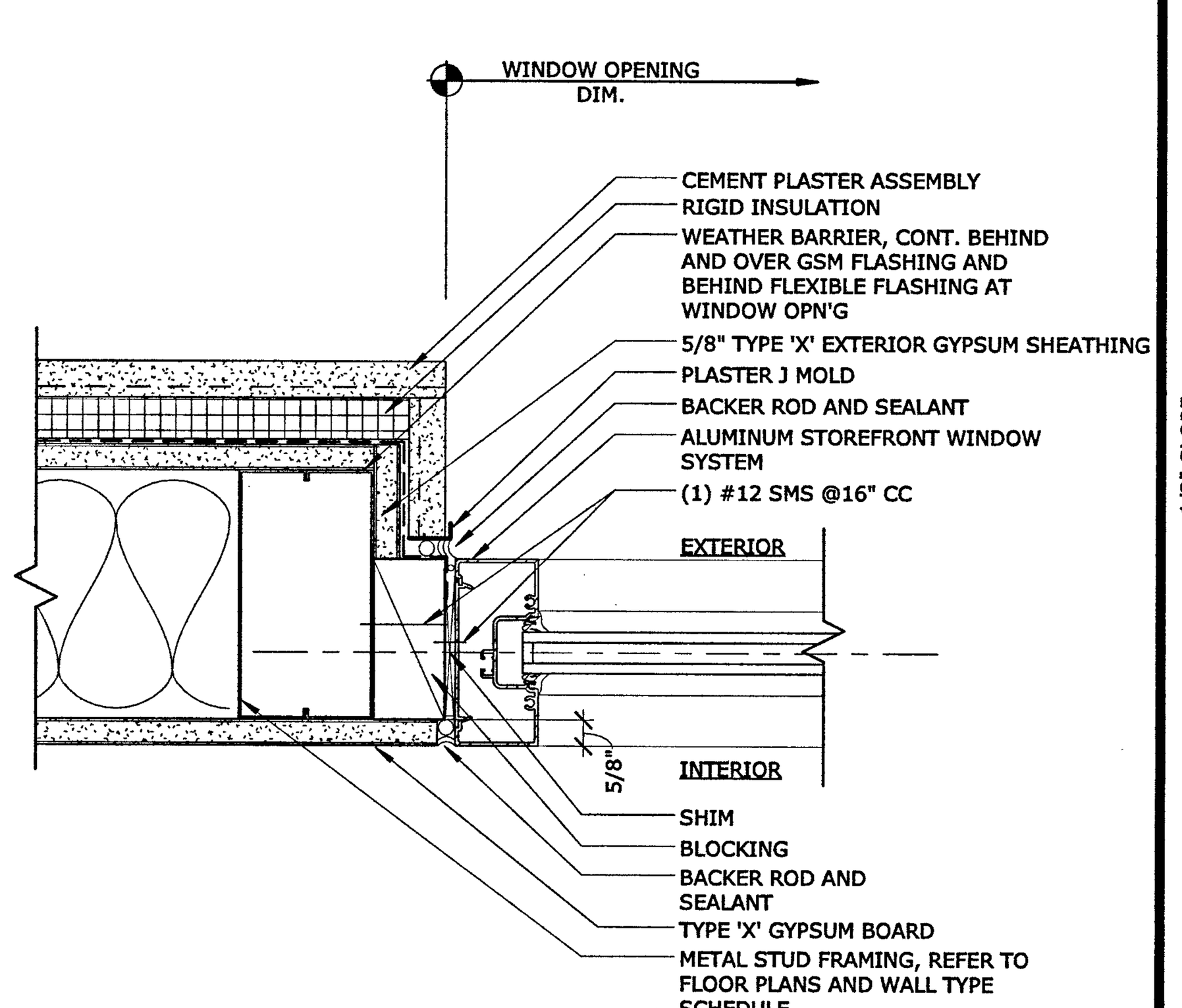
TYPICAL MULLION PARTITION END AT STOREFRONT WITH COLUMN (8)
3" = 1'-0" REFERENCE: A2.02 / 1



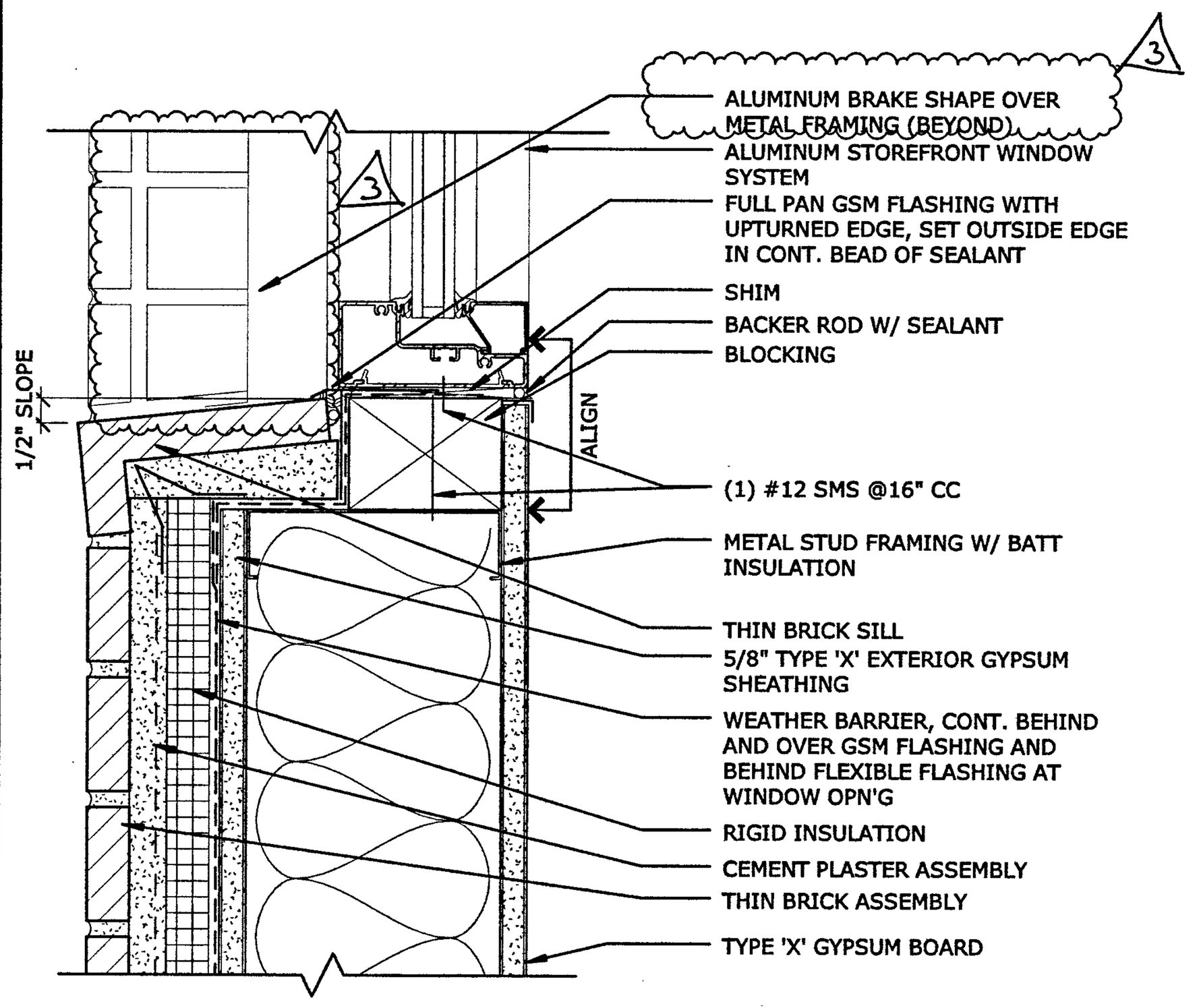
EXTERIOR STOREFRONT HEAD AT PLASTER SOFFIT 2 (5)
3" = 1'-0" REFERENCE: A2.50 / 8



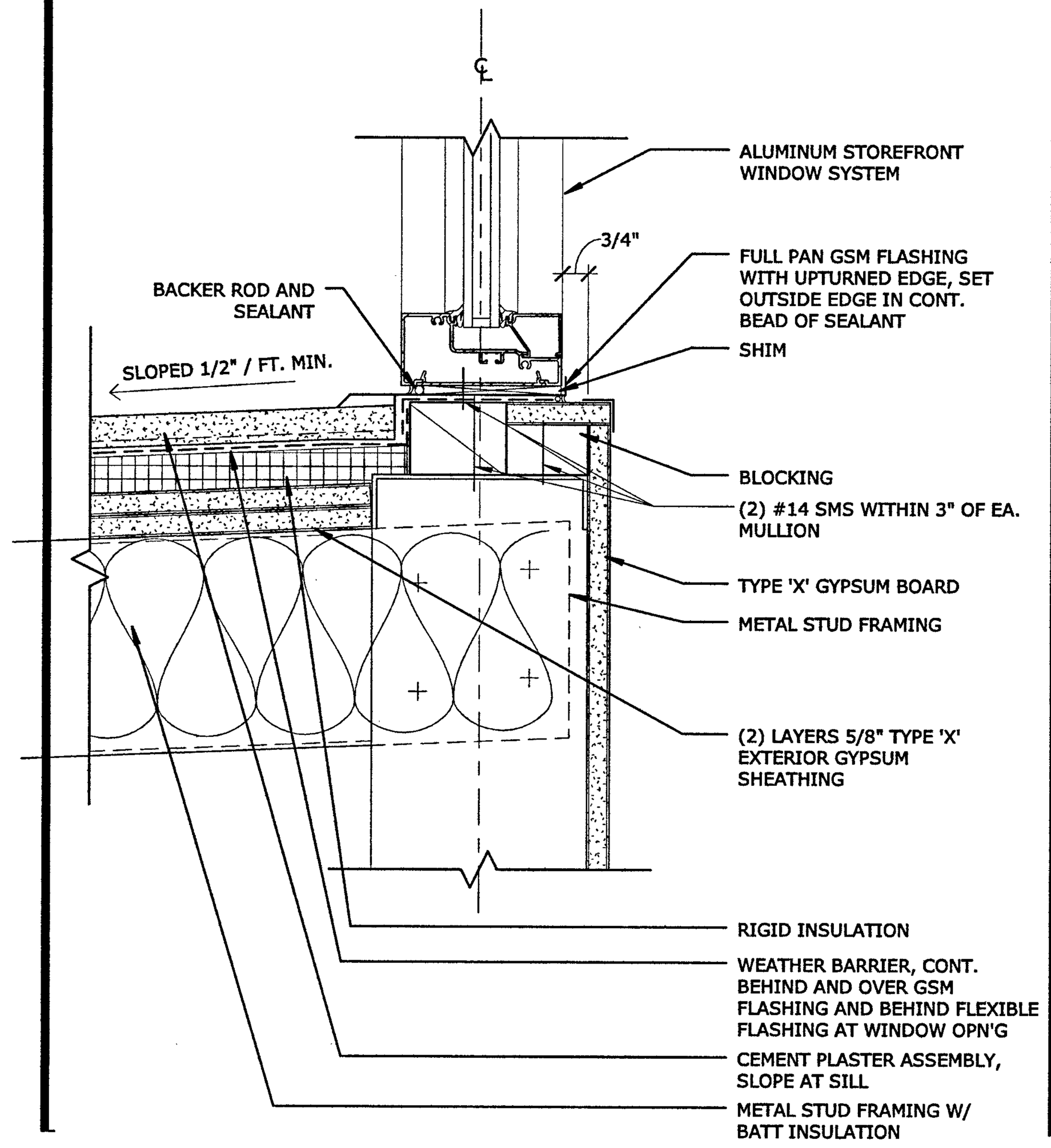
EXTERIOR STOREFRONT JAMB AT CEMENT PLASTER (2)
3" = 1'-0" REFERENCE: A2.50 / 5



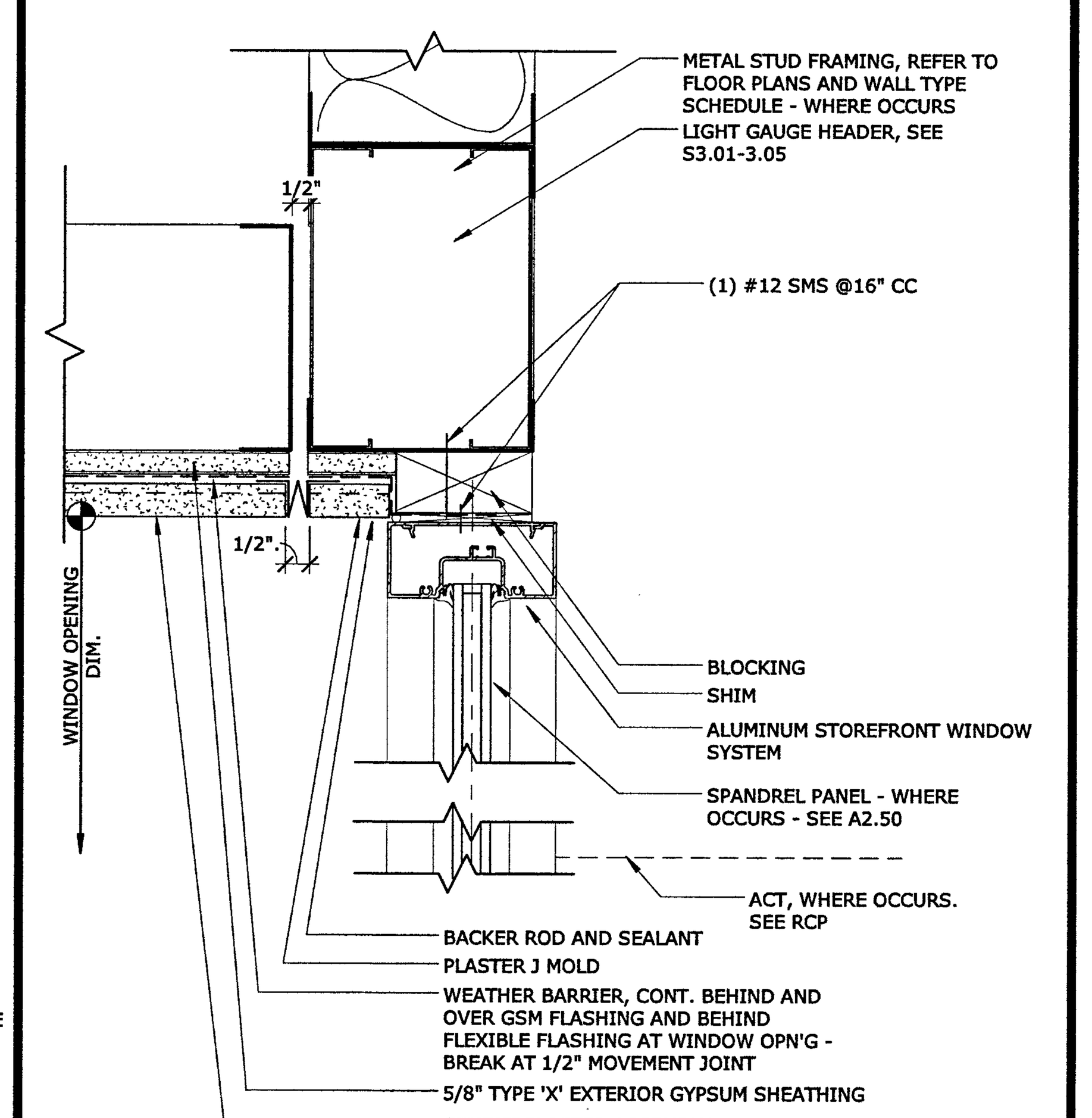
EXTERIOR STOREFRONT JAMB AT CEMENT PLASTER WALL (15)
3" = 1'-0" REFERENCE:



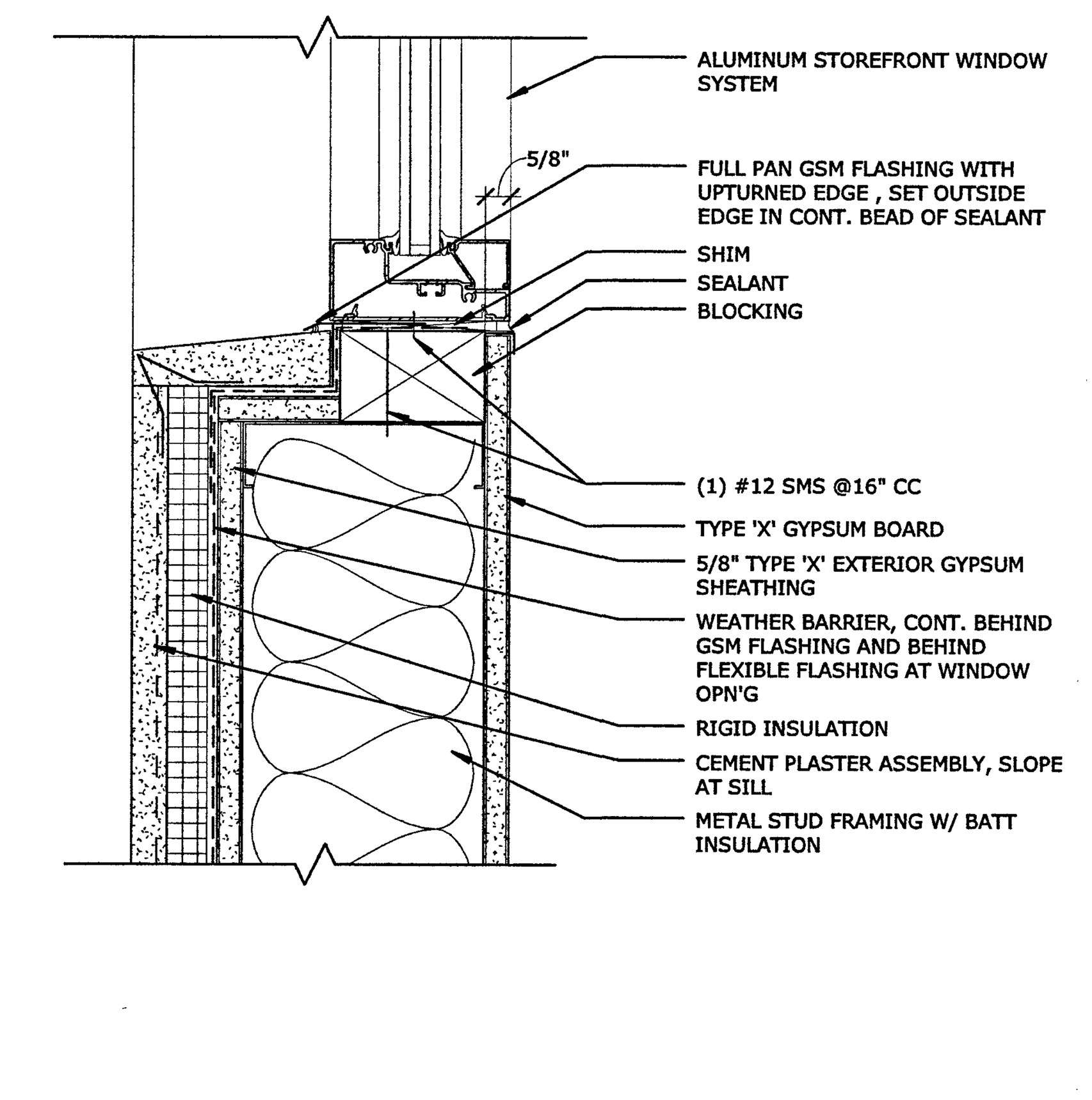
EXTERIOR STOREFRONT SILL - THIN BRICK (12)
3" = 1'-0" REFERENCE: A2.50 / 2



EXTERIOR STOREFRONT SILL (DEEP) - CEMENT PLASTER WALL (9)
3" = 1'-0" REFERENCE: A2.50 / 8



EXTERIOR STOREFRONT HEAD AT PLASTER SOFFIT -HEADER (6)
3" = 1'-0" REFERENCE: A2.01 / 1



EXTERIOR STOREFRONT SILL - CEMENT PLASTER WALL (3)
3" = 1'-0" REFERENCE: A3.20 / 2

C:\BIM\2016\Projects\B5017.00-LosRiosCCDMohrHall-A16-Central_glewis.rvt

5/22/2018 10:09:08 AM

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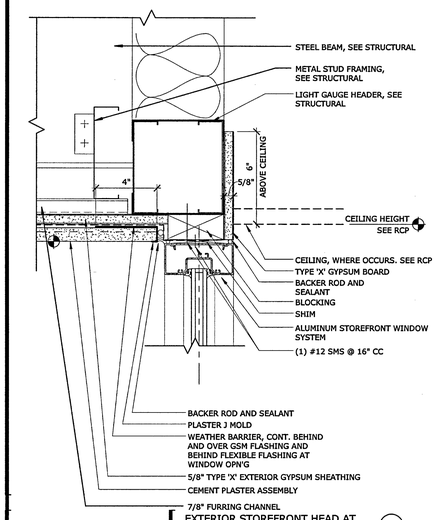
LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

EXTERIOR WINDOW DETAILS

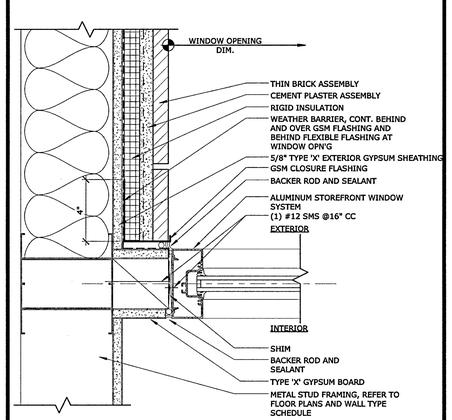
B5017.00

May 22, 2018

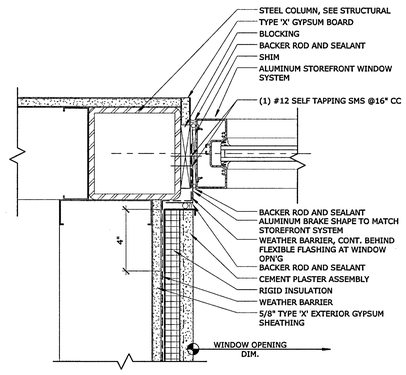
A8.20



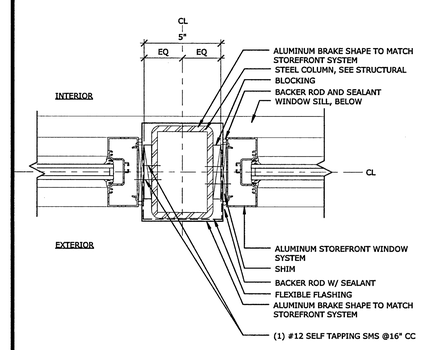
EXTERIOR STOREFRONT HEAD AT PLASTER SOFFIT - CANOPY (13)
3" = 1'-0" REFERENCE:



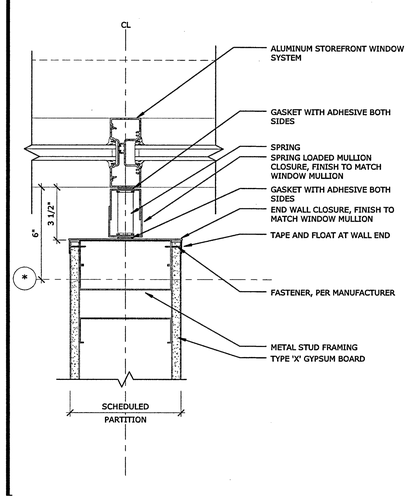
EXTERIOR STOREFRONT JAMB AT THIN BRICK (10)
3" = 1'-0" REFERENCE: A2.50 / 1



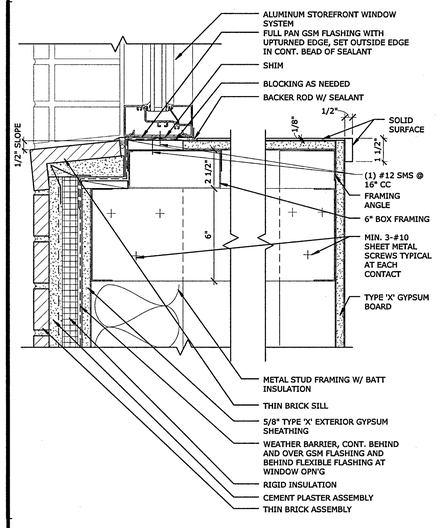
EXTERIOR STOREFRONT JAMB AT CEMENT PLASTER - STAIR 1 (7)
3" = 1'-0" REFERENCE: A2.50 / 8



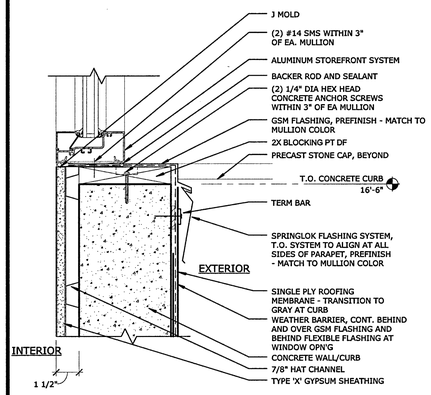
EXTERIOR STOREFRONT JAMB - CENTER MULLION STEEL (4)
3" = 1'-0" REFERENCE:



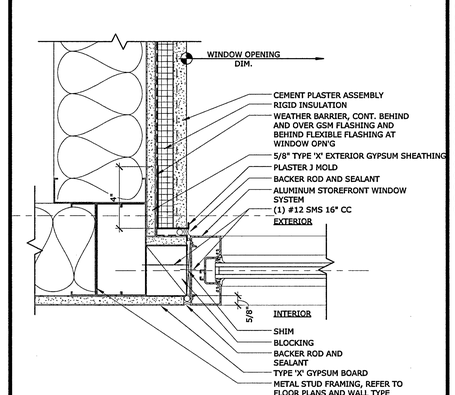
TYPICAL PARTITION END AT STOREFRONT (1)
3" = 1'-0" REFERENCE: A2.02 / 1



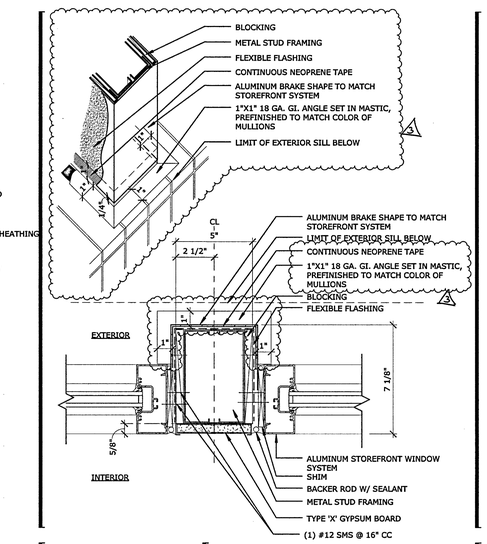
EXTERIOR STOREFRONT SILL - THIN BRICK 2 (14)
3" = 1'-0" REFERENCE: A3.27 / 2



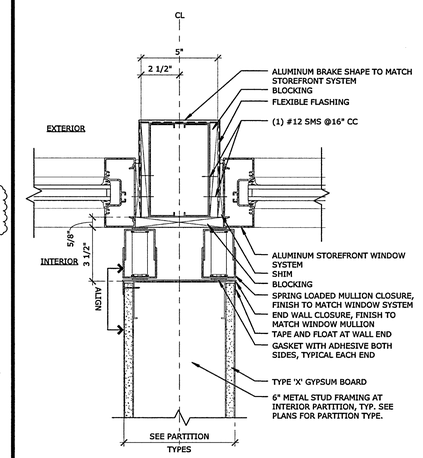
EXTERIOR STOREFRONT SILL AT CONCRETE CURB (11)
3" = 1'-0" REFERENCE: A2.50 / 5



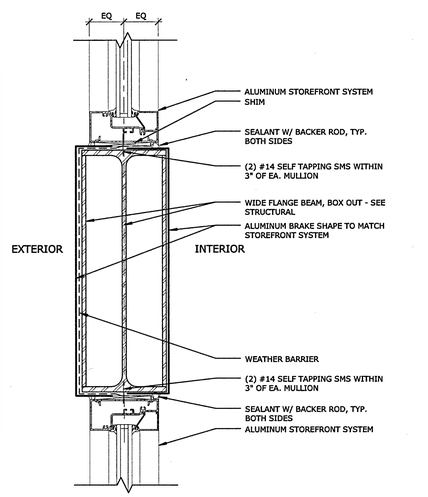
EXTERIOR STOREFRONT JAMB AT CEMENT PLASTER DEEP SILL (8)
3" = 1'-0" REFERENCE:



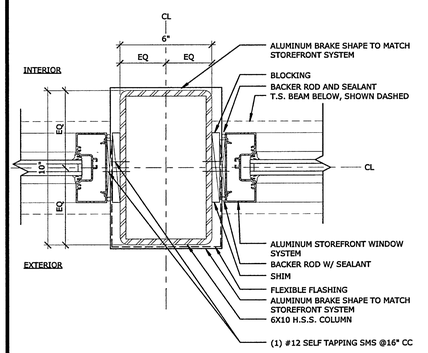
EXTERIOR STOREFRONT JAMB - CENTER MULLION FRAMING (5)
3" = 1'-0" REFERENCE: A2.50 / 2



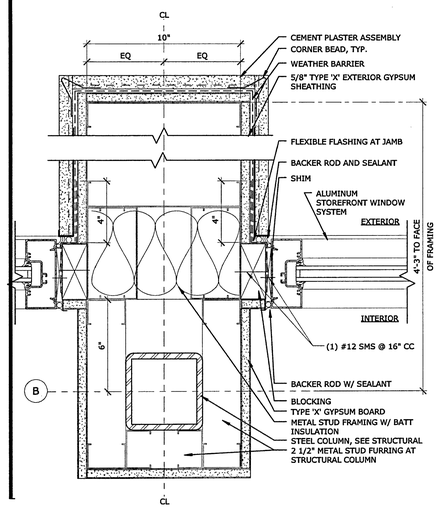
PARTITION END AT STOREFRONT AT CENTER MULLION FRAMING (2)
3" = 1'-0" REFERENCE:



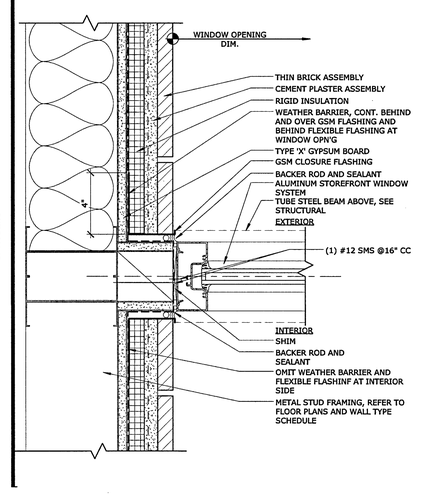
EXTERIOR STOREFRONT HEAD AND SILL - AT WIDE FLANGE BEAM (15)
3" = 1'-0" REFERENCE: A2.50 / 8



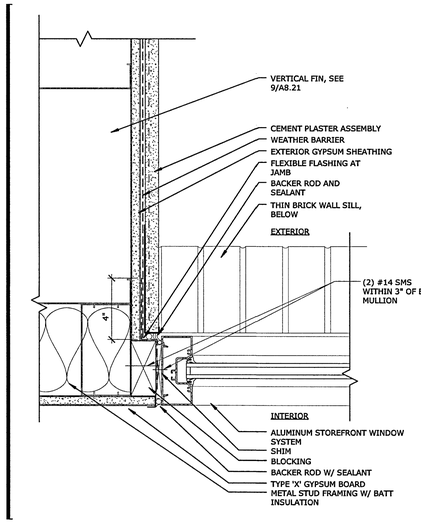
EXTERIOR STOREFRONT JAMB - STEEL COLUMN (12)
3" = 1'-0" REFERENCE: A2.50 / 6



EXTERIOR STOREFRONT JAMB - VERTICAL FINS PLASTER SILL (9)
3" = 1'-0" REFERENCE: A2.01 / 1



EXTERIOR STOREFRONT JAMB AT THIN BRICK BOTH SIDES (6)
3" = 1'-0" REFERENCE: A2.50 / 6



EXTERIOR STOREFRONT JAMB - VERTICAL FINS BRICK SILL (3)
3" = 1'-0" REFERENCE:

Dreyfuss+ Blackford architecture
3540 Folsom Blvd
Sacramento, CA
95816-6699
T 916.453.1234
dreyfussblackford.com

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~~2 BACKCHECK CHANGES~~		
3 REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

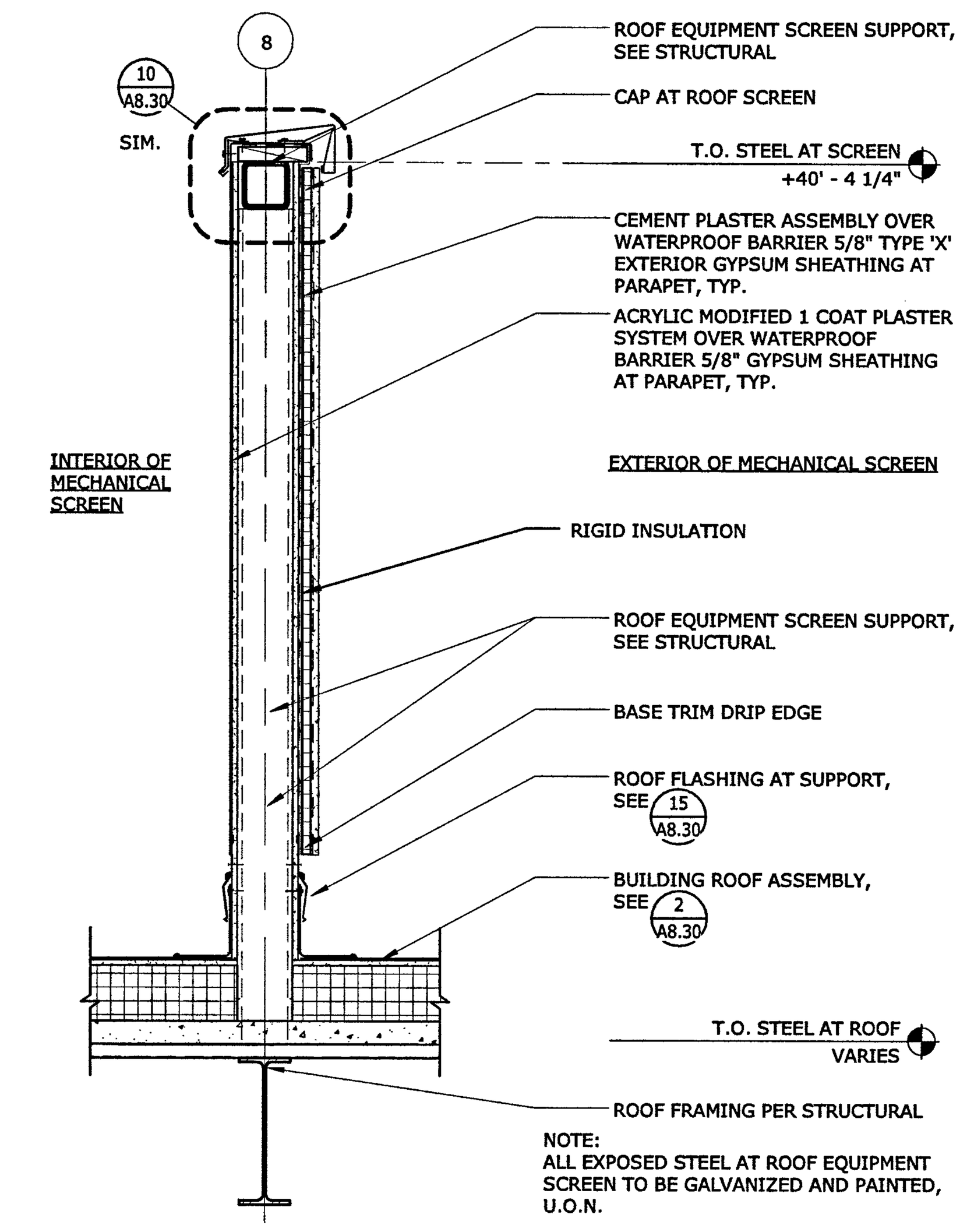
LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

EXTERIOR WINDOW DETAILS

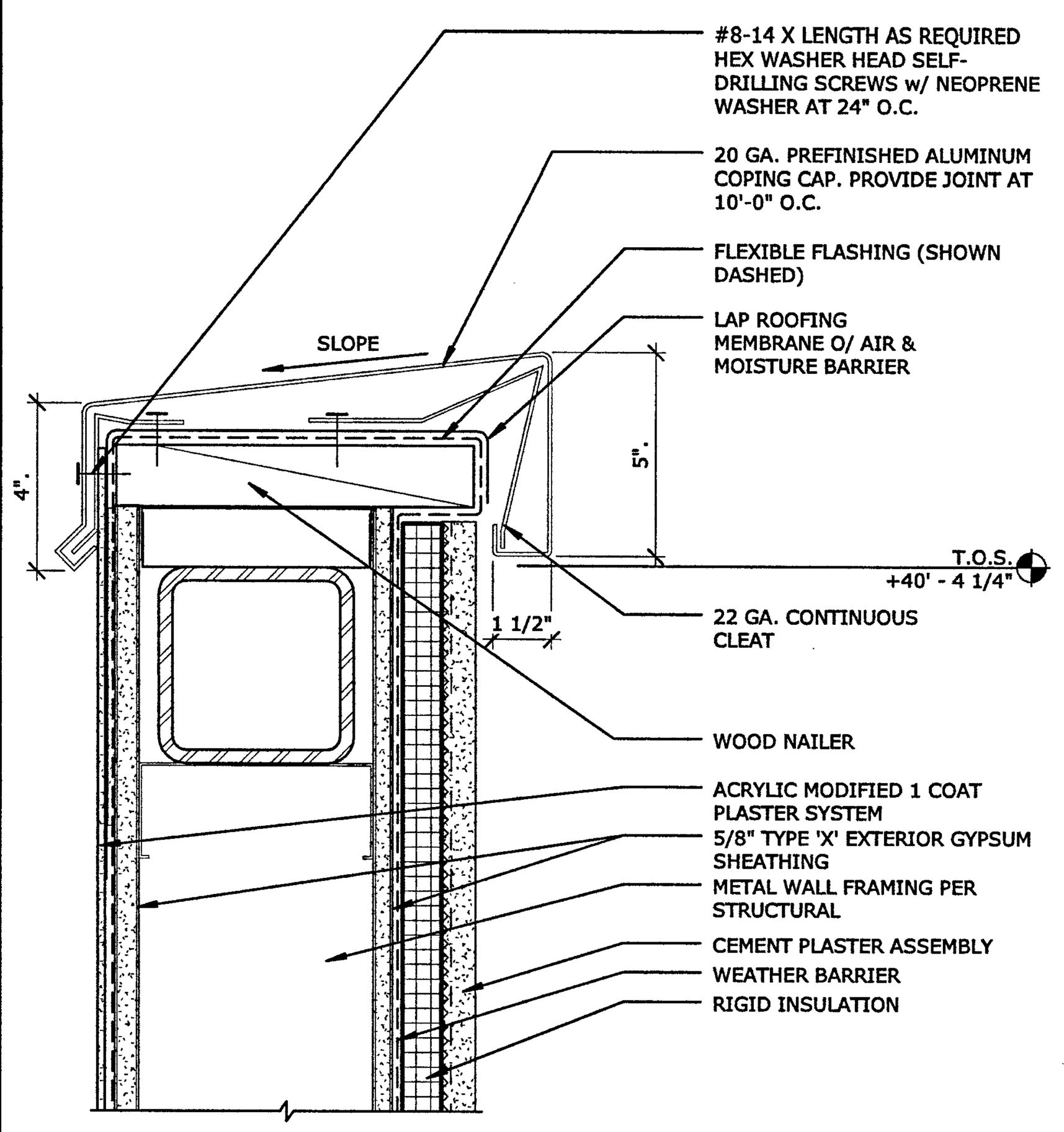
B5017.00
3" = 1'-0"
May 22, 2018

A8.21

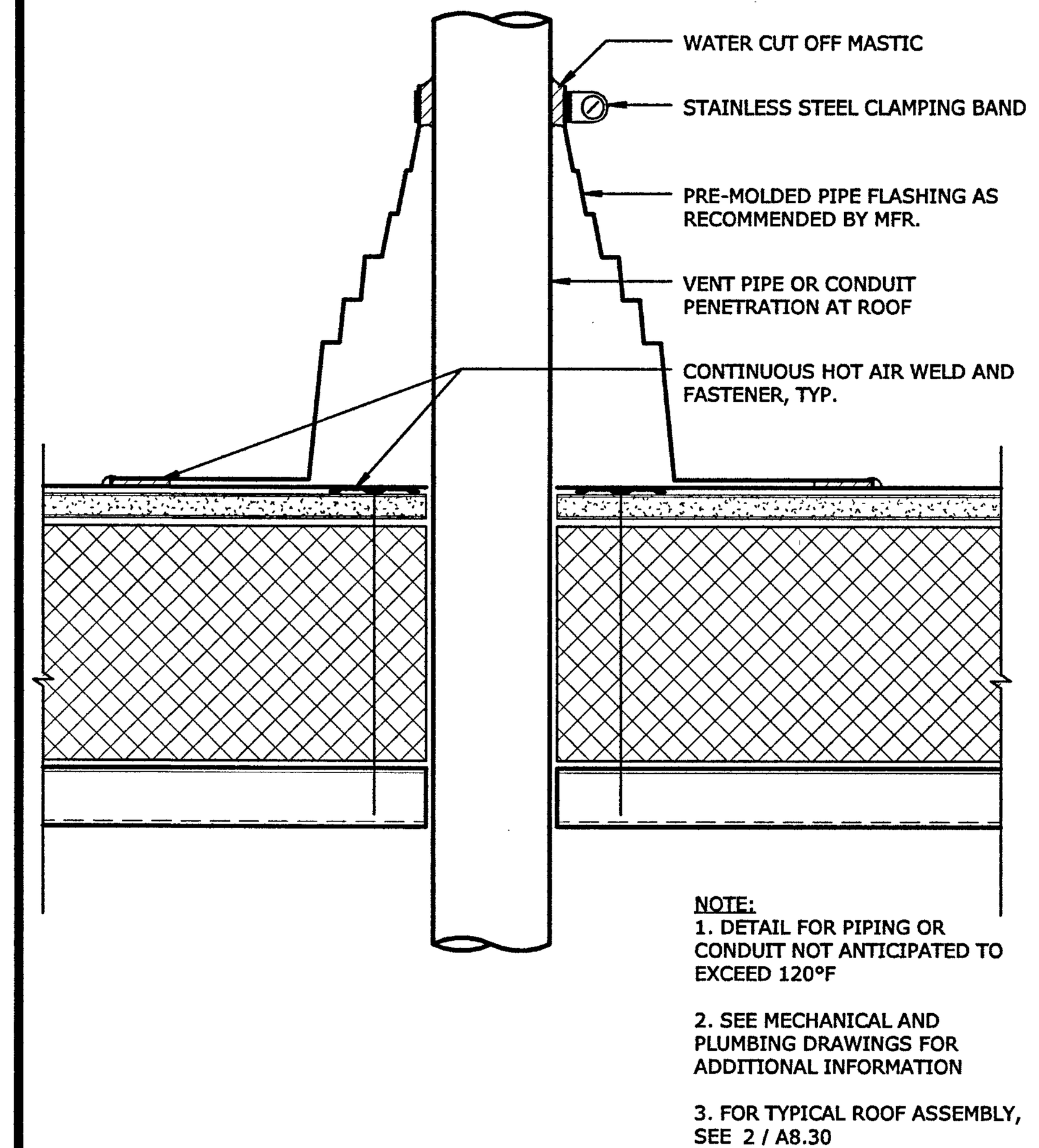
5/22/2018 10:09:14 AM C:\BIM\2016\Projects\B5017.00-LosRiosCCDMohrHall-A16-Central_gilewis.rvt



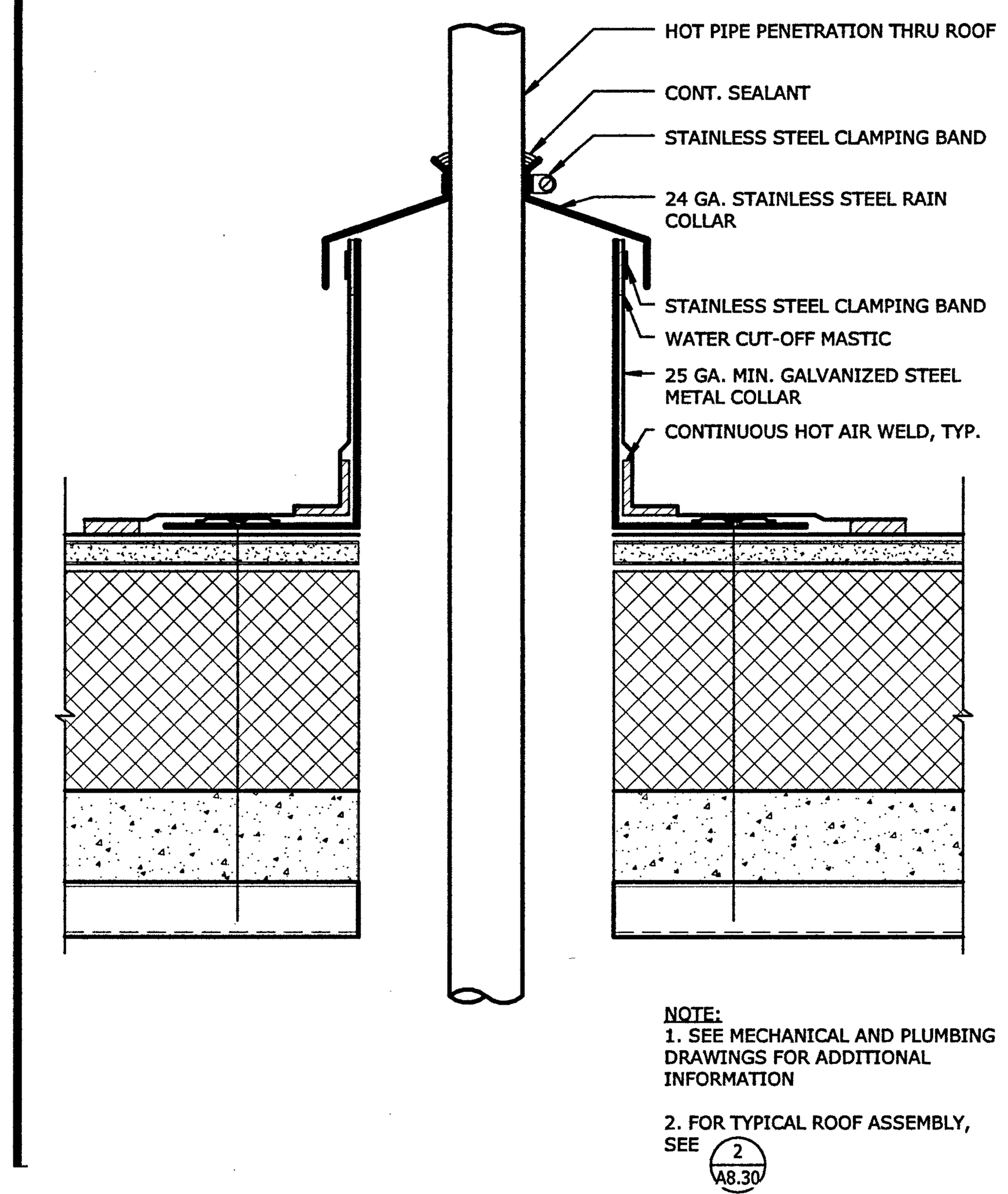
ROOF EQUIPMENT SCREEN / PARAPET (13)
3/4" = 1'-0" REFERENCE: A2.60 / 1



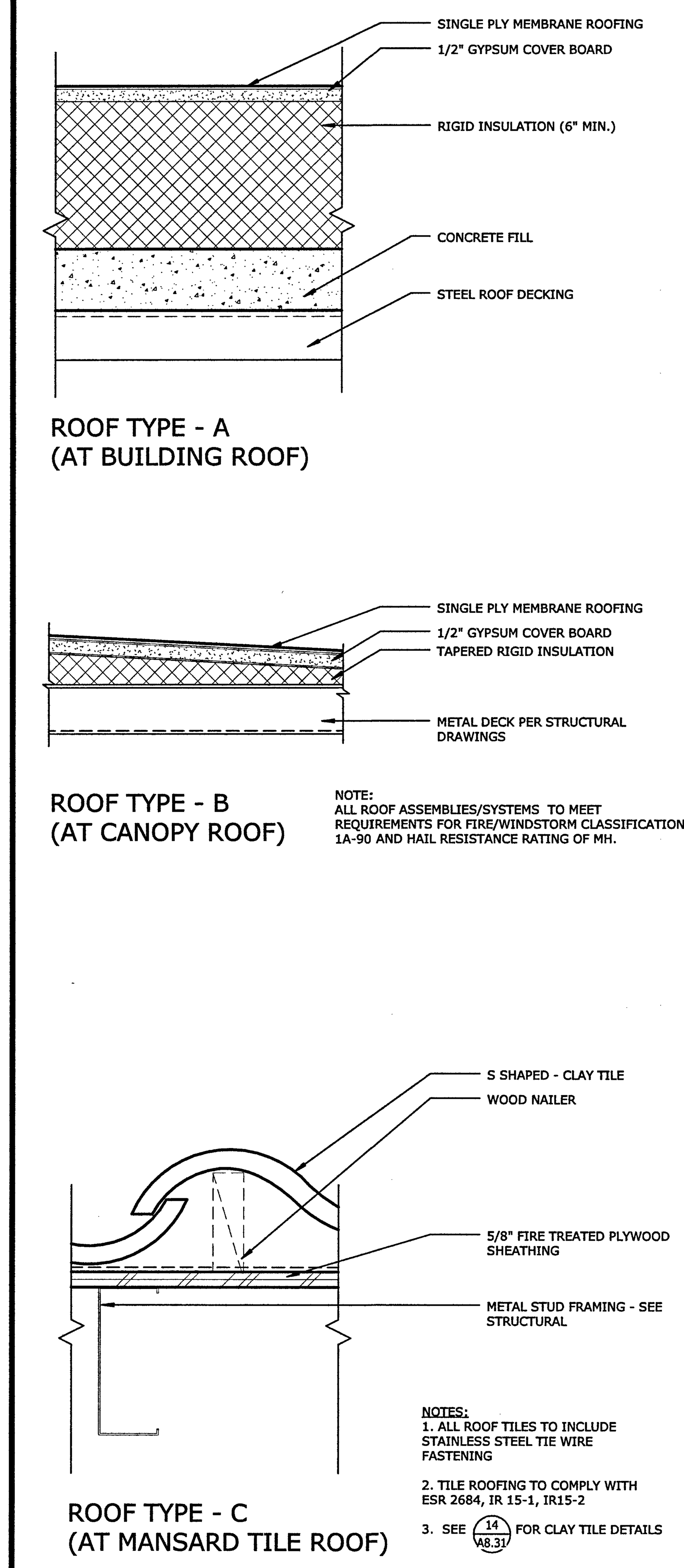
ROOF EQUIPMENT SCREEN / PARAPET - AT CAP (10)
3" = 1'-0" REFERENCE: A3.22 / 1



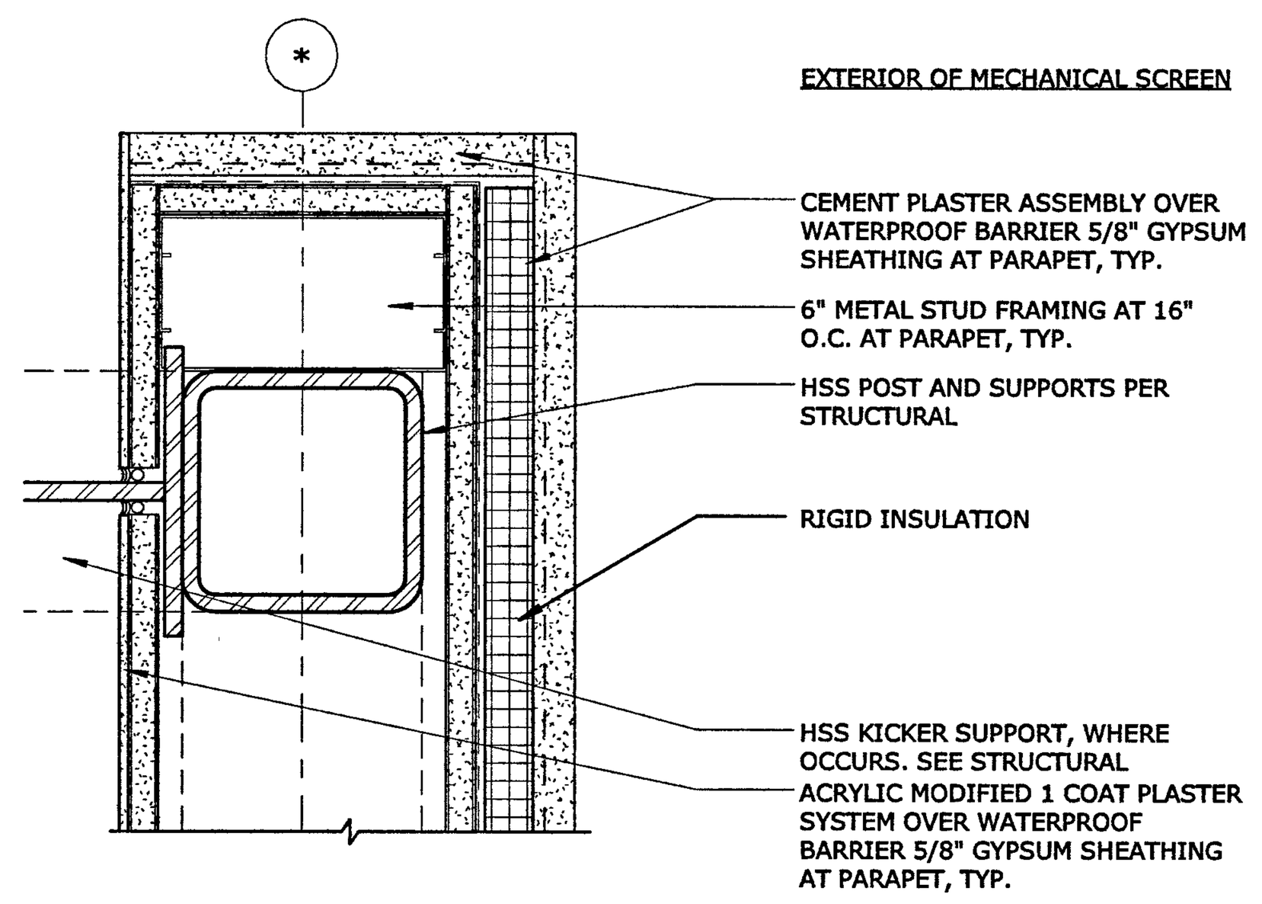
FLASHING AT ROOF PIPE PENETRATION-COLD (7)
3" = 1'-0" REFERENCE:



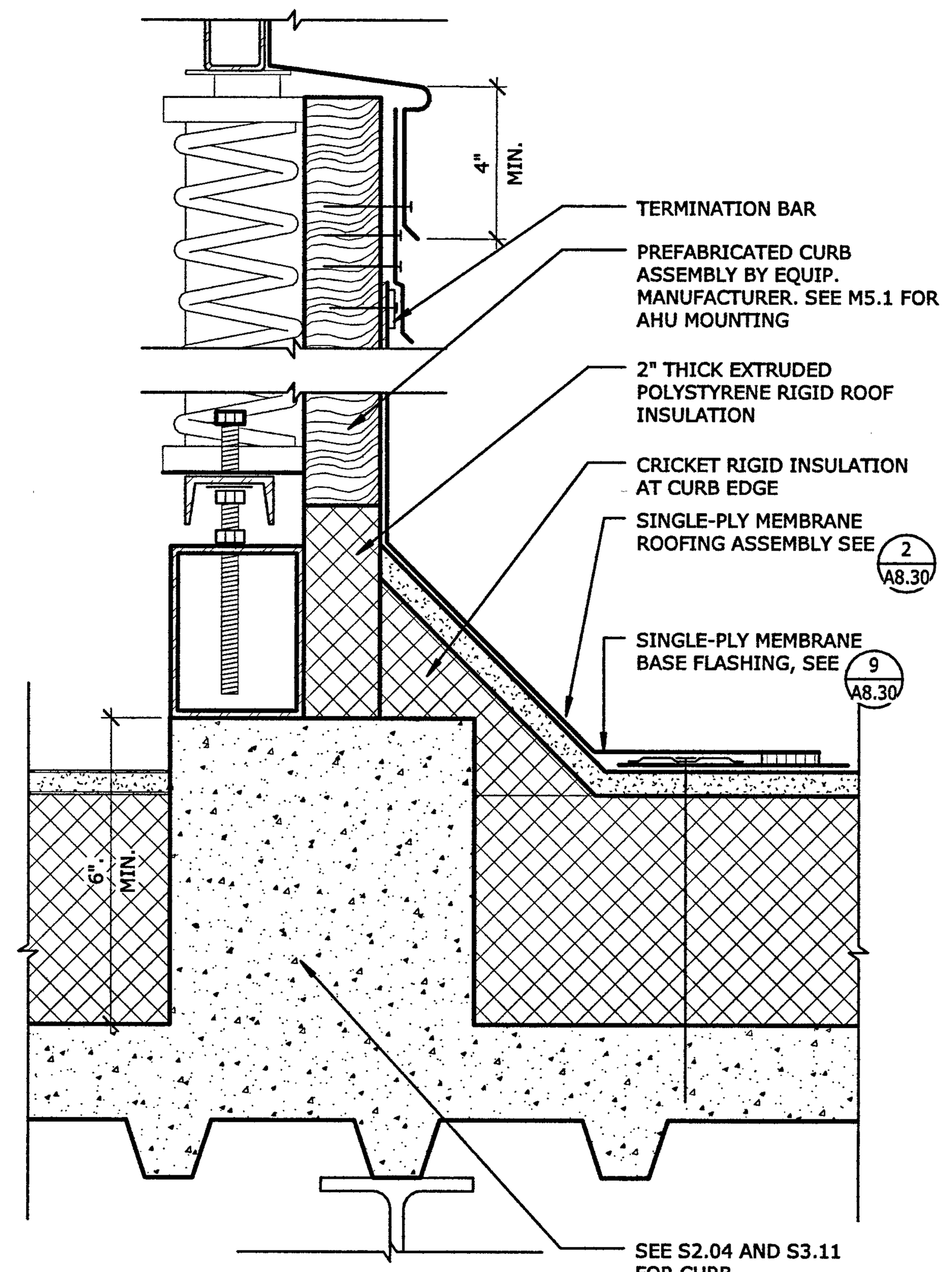
FLASHING AT ROOF PIPE PENETRATION-HOT (4)
3" = 1'-0" REFERENCE:



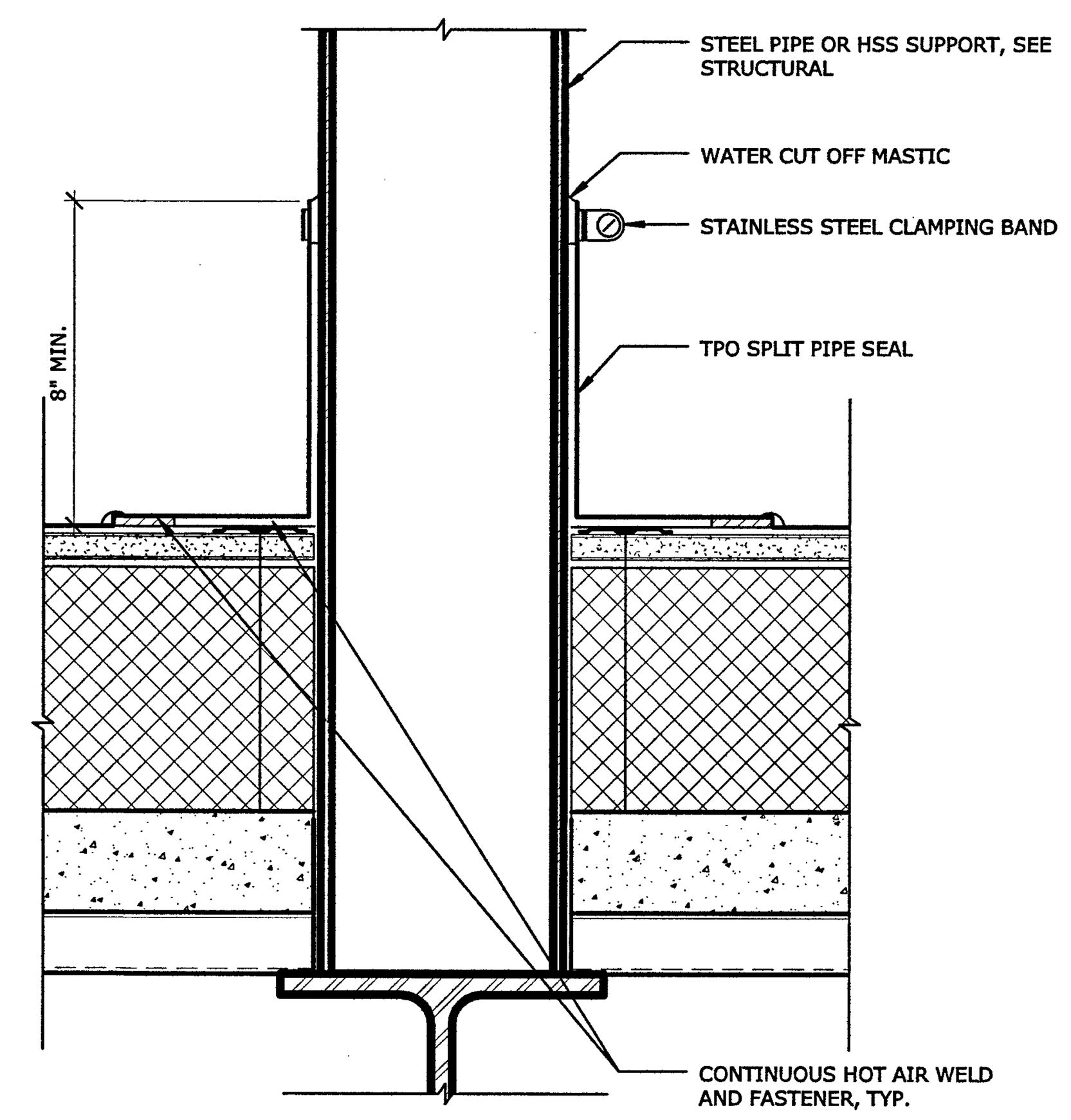
TYPICAL ROOF ASSEMBLIES (2)
3" = 1'-0" REFERENCE:



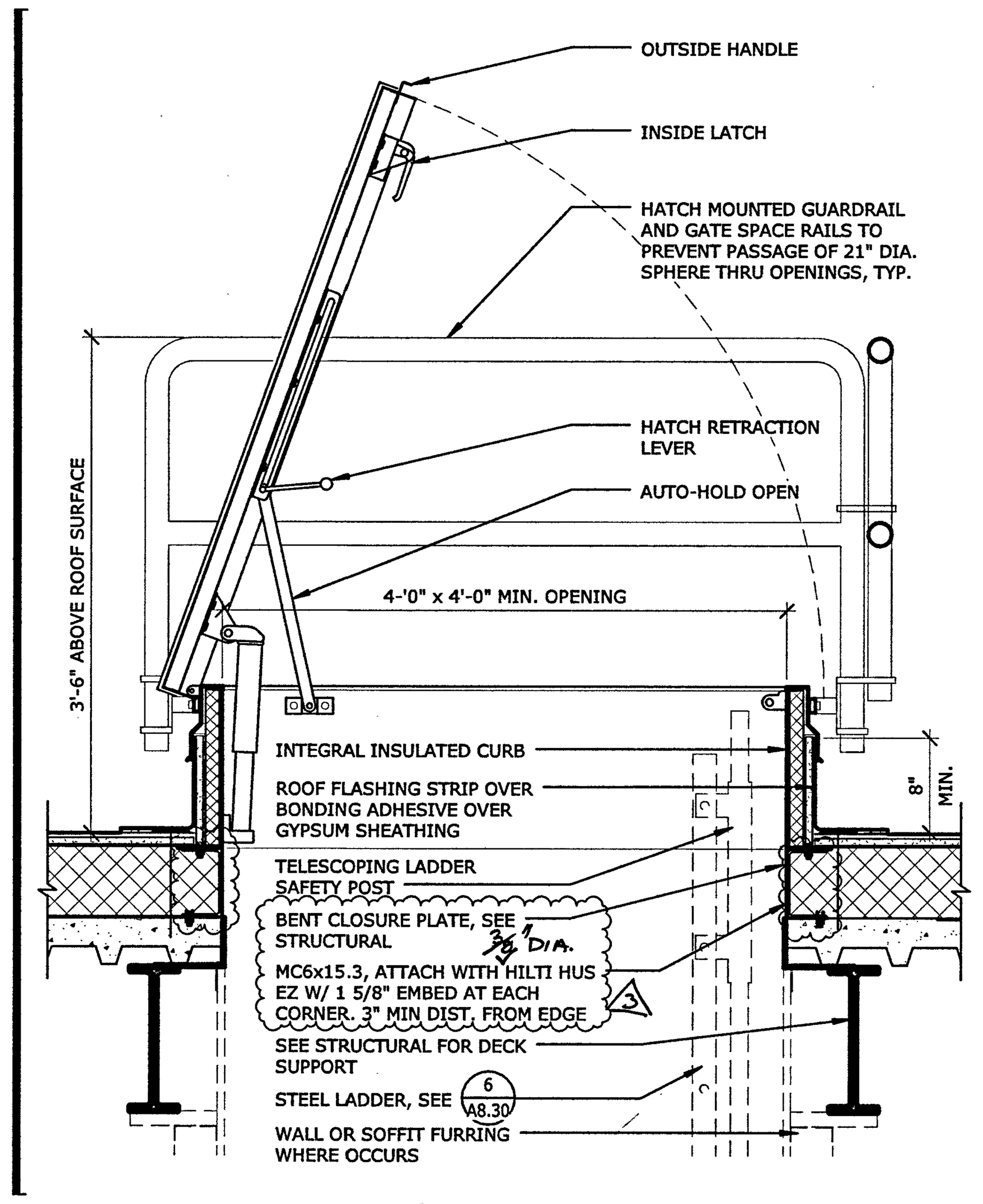
ROOF EQUIPMENT SCREEN - AT END WALL (14)
3" = 1'-0" REFERENCE: A2.60 / 1



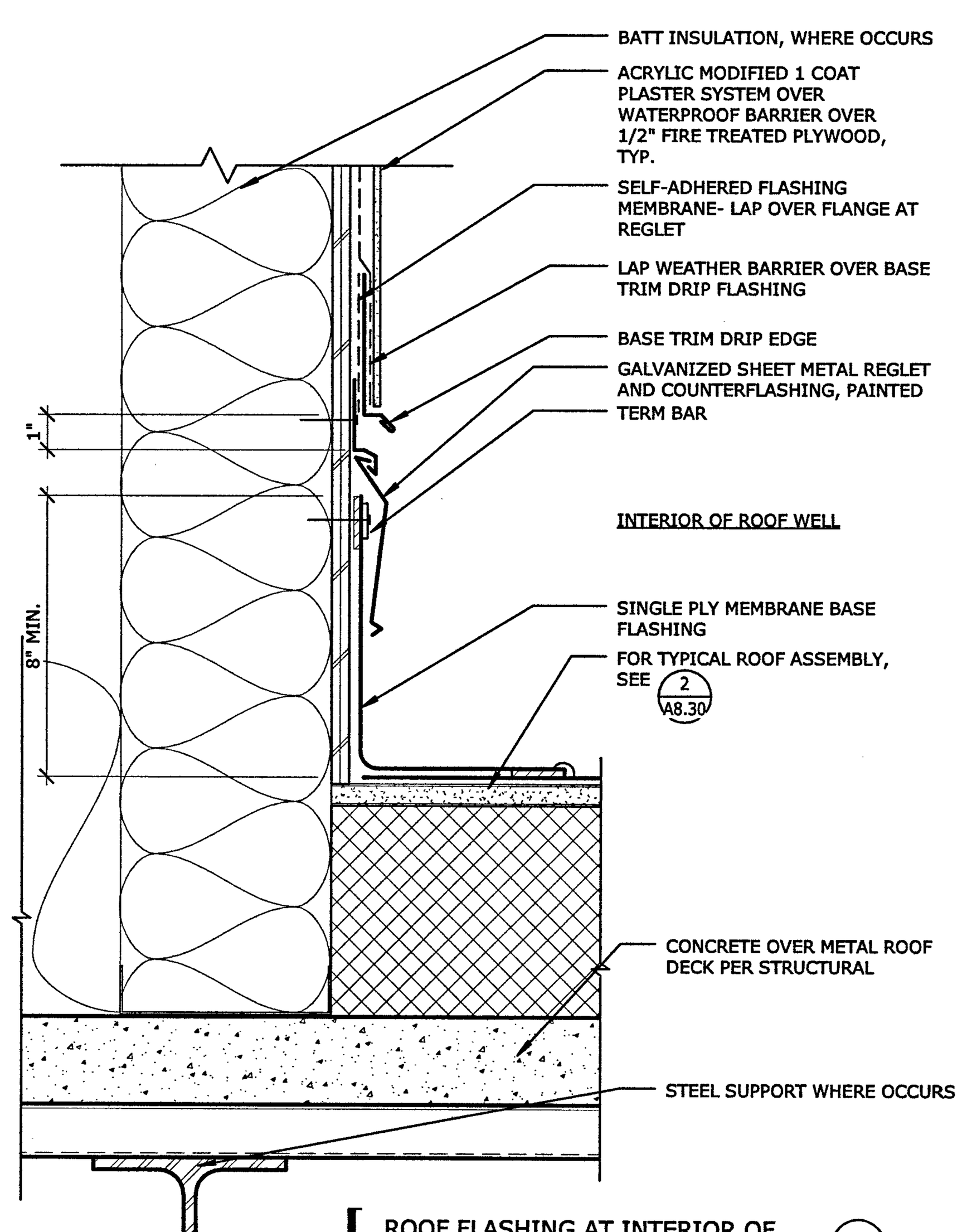
TYPICAL ROOFTOP EQUIPMENT CURB (11)
3" = 1'-0" REFERENCE: A2.60 / 1



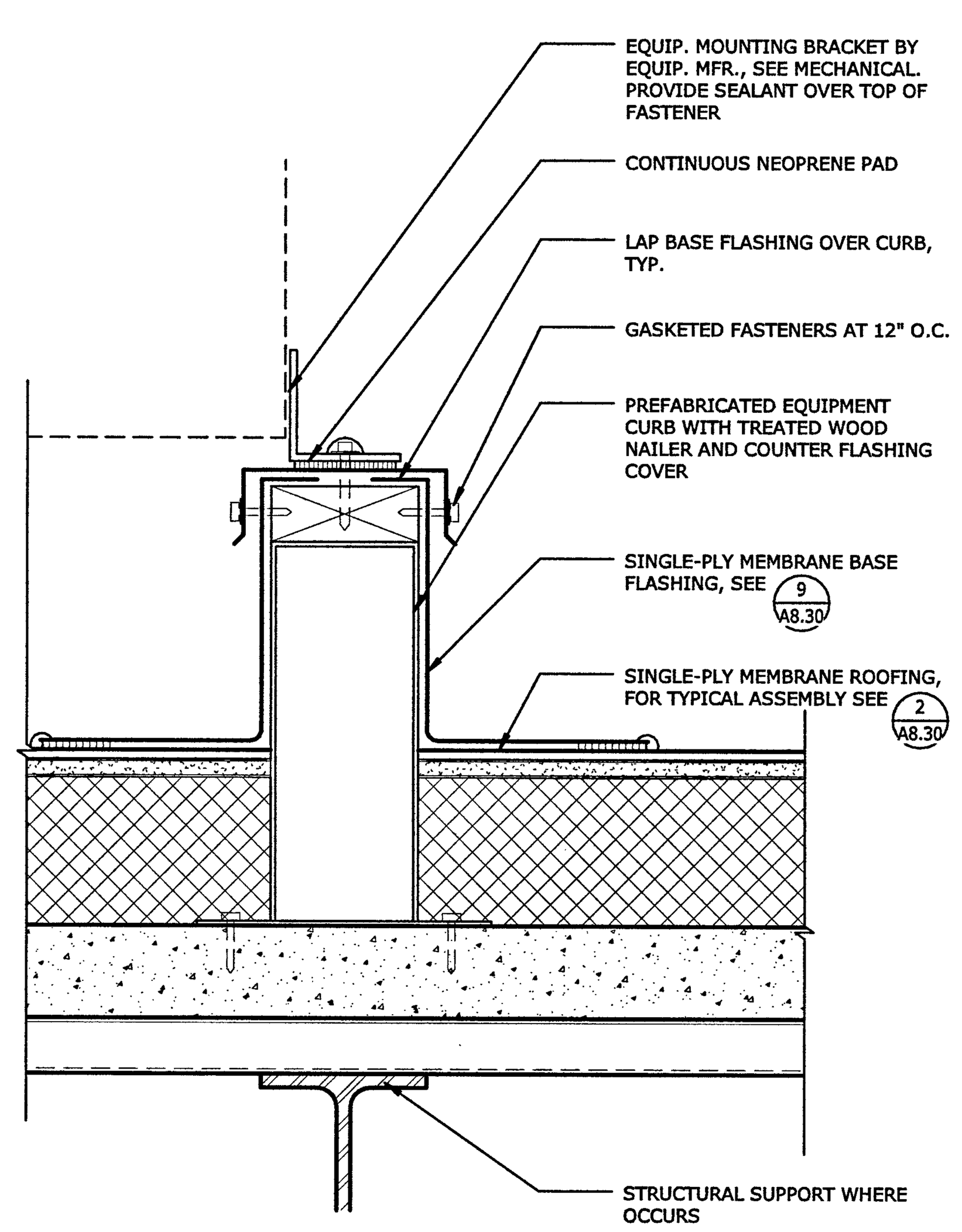
FLASHING AT ROOF SUPPORT (8)
3" = 1'-0" REFERENCE:



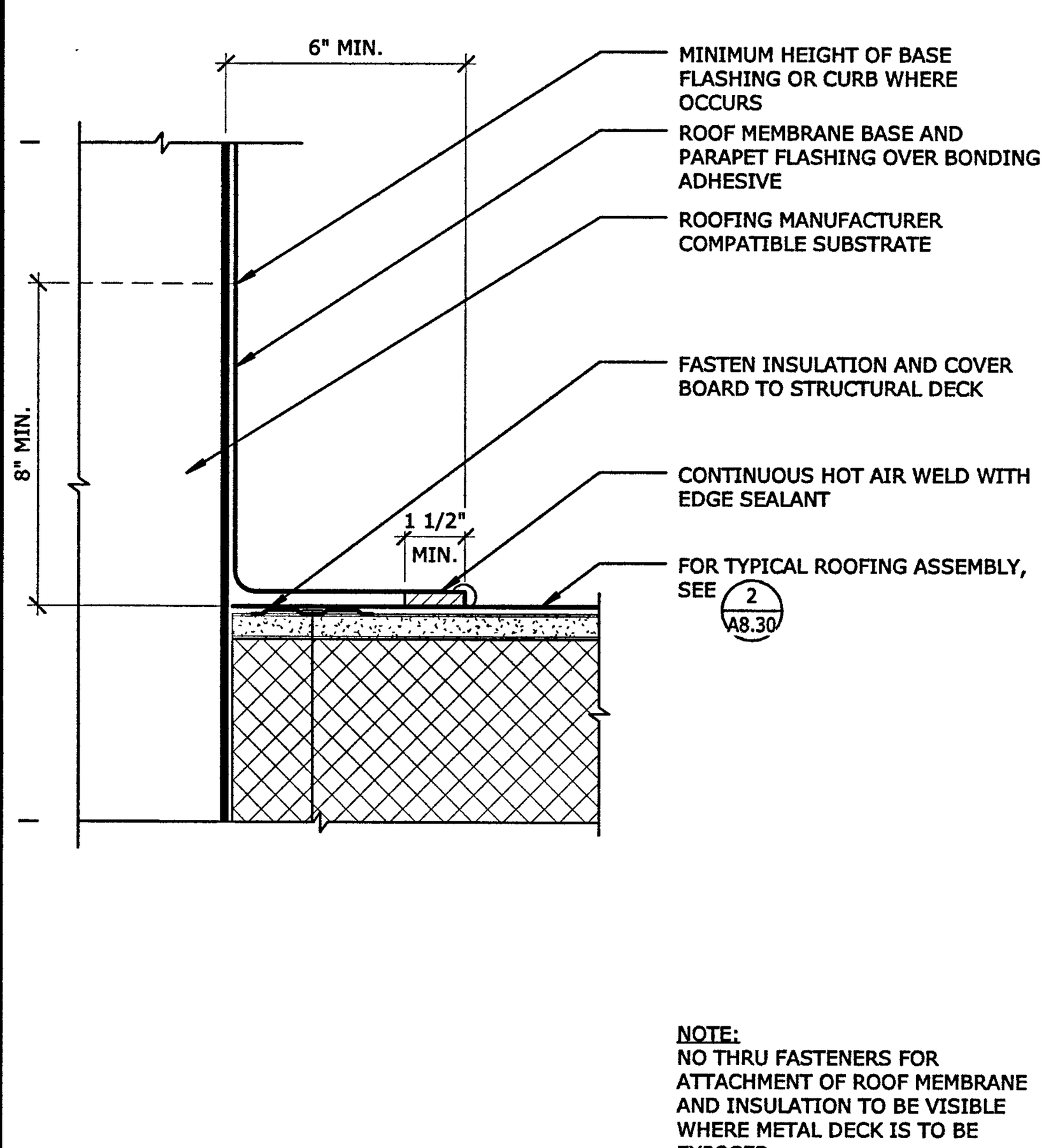
ROOF HATCH (5)
1" = 1'-0" REFERENCE: A2.60 / 1



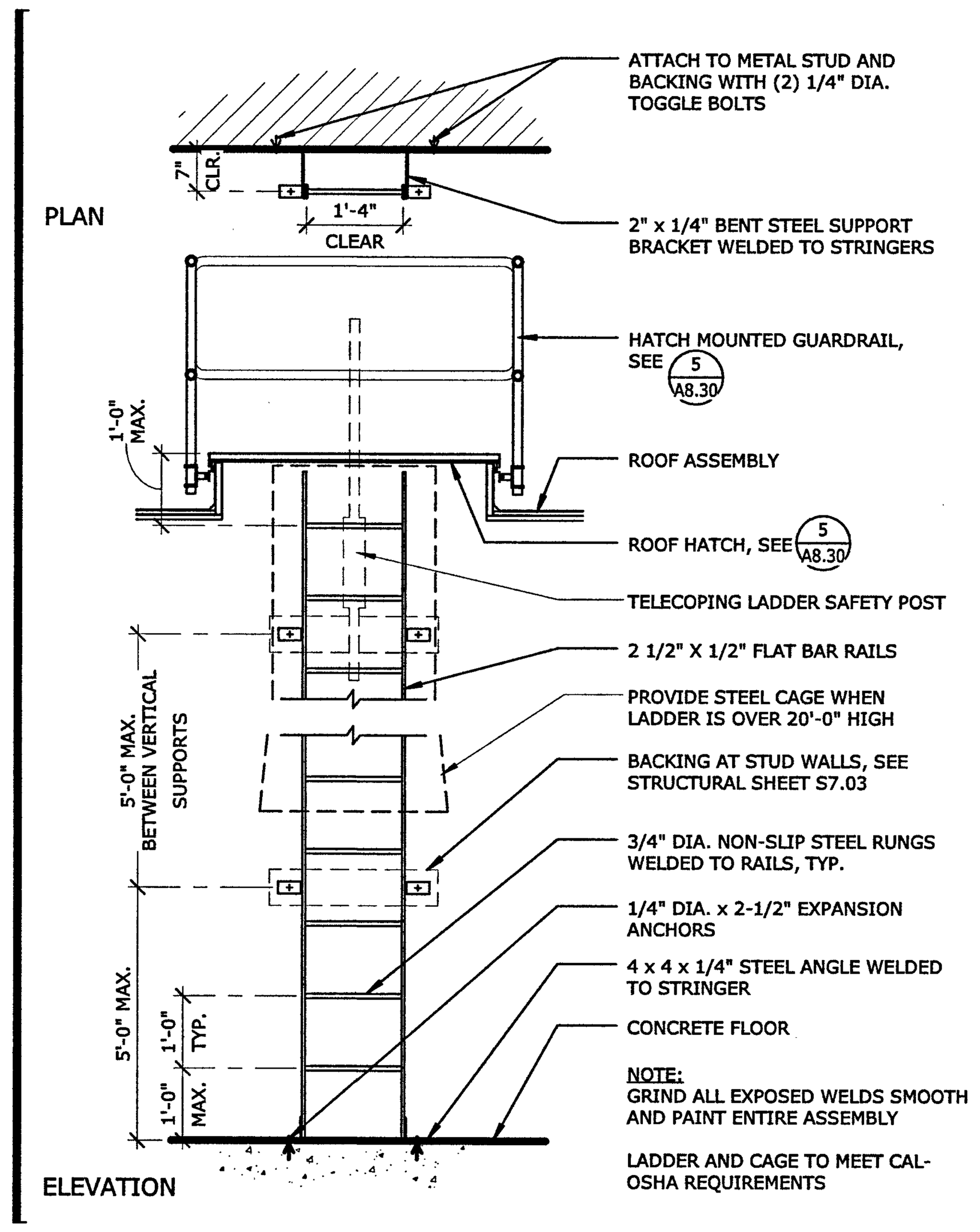
ROOF FLASHING AT INTERIOR OF MANSARD ROOF WELL (15)
3" = 1'-0" REFERENCE: A2.60 / 1



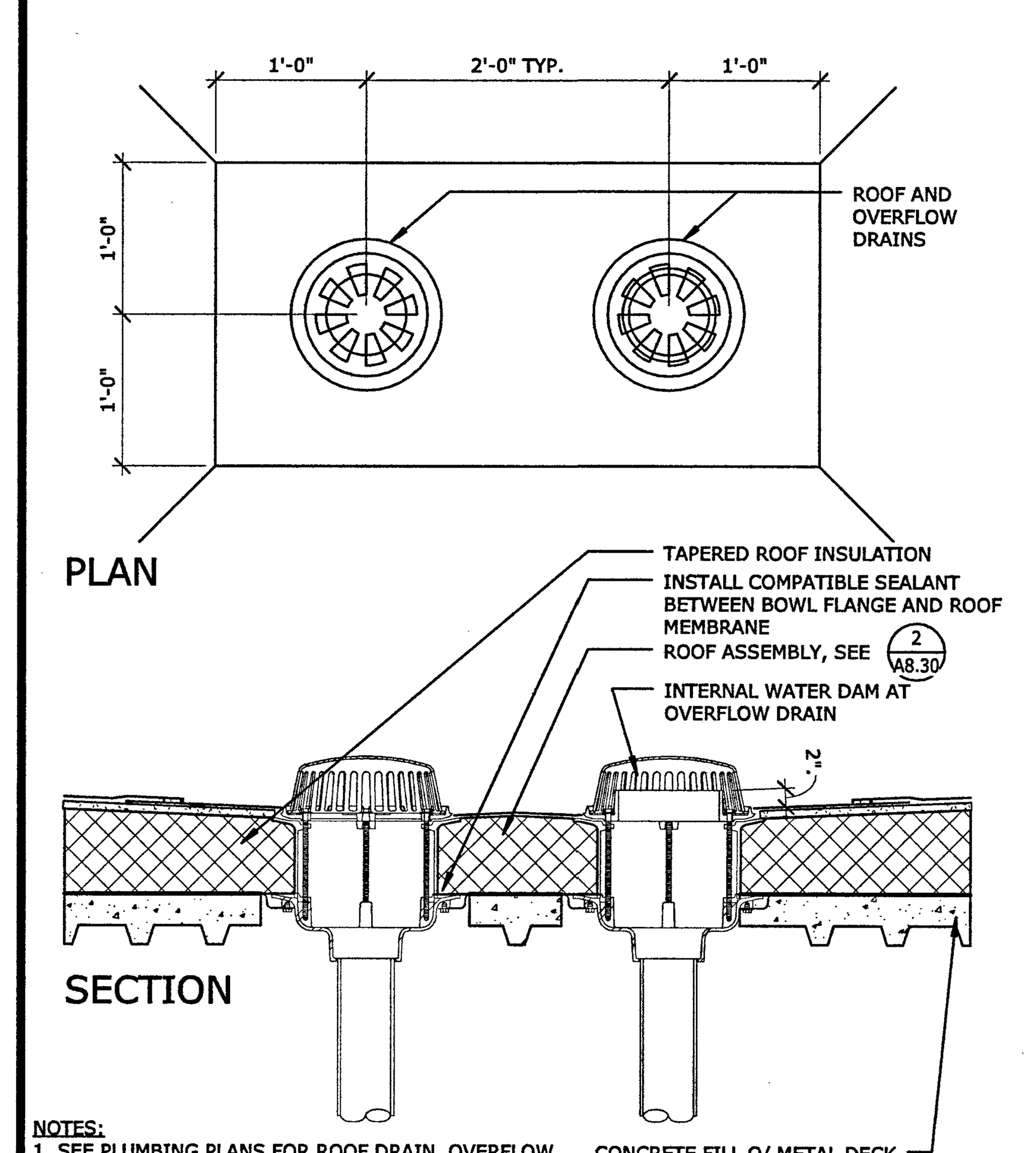
FLASHING AT ROOF EQUIPMENT CURB (12)
3" = 1'-0" REFERENCE:



TYPICAL ROOF BASE FLASHING (9)
3" = 1'-0" REFERENCE:



LADDER AT ROOF HATCH (6)
1/2" = 1'-0" REFERENCE:



NOTES:
1. SEE PLUMBING PLANS FOR ROOF DRAIN, OVERFLOW, AND RAIN WATER LEADER SIZES
2. SEE 16/S5.01 FOR TYPICAL OPENING AT METAL ROOF DECK

TYPICAL ROOF DRAIN AND OVERFLOW DRAIN (3)
1" = 1'-0" REFERENCE: A2.60 / 1

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T 916.453.1234
dreyfussblackford.com

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LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

EXTERIOR ROOF DETAILS

B5017.00

May 22, 2018

A8.30

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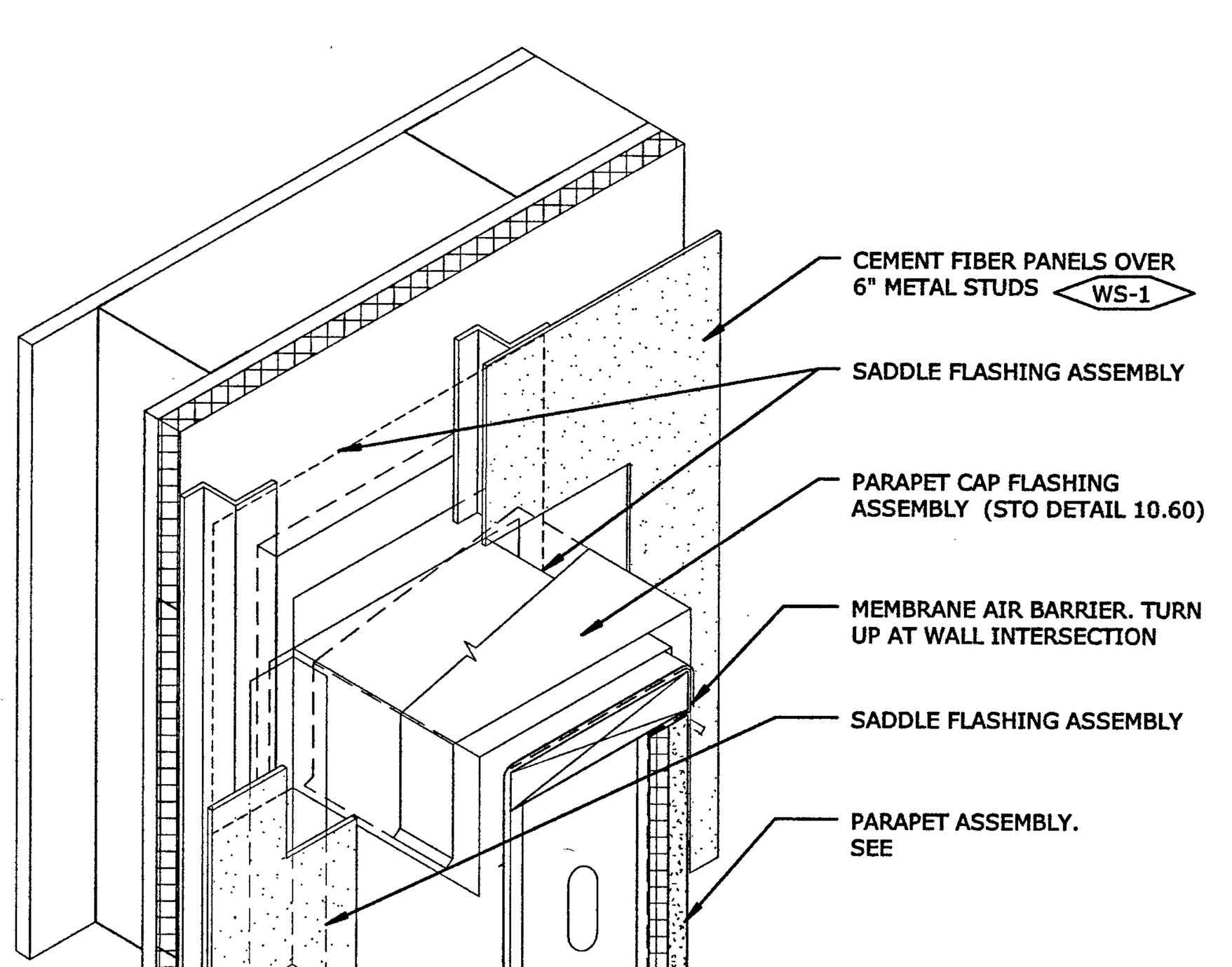
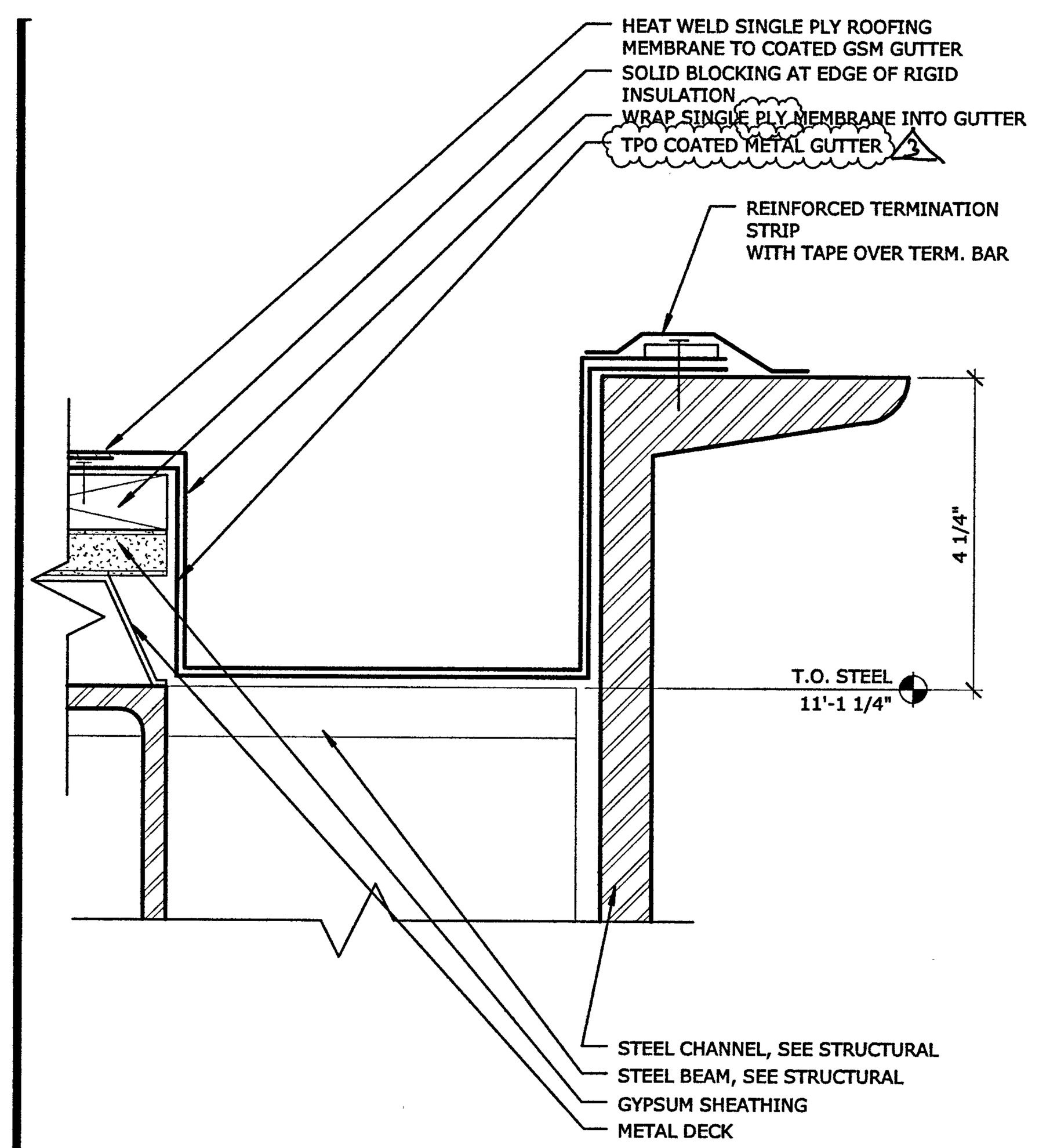
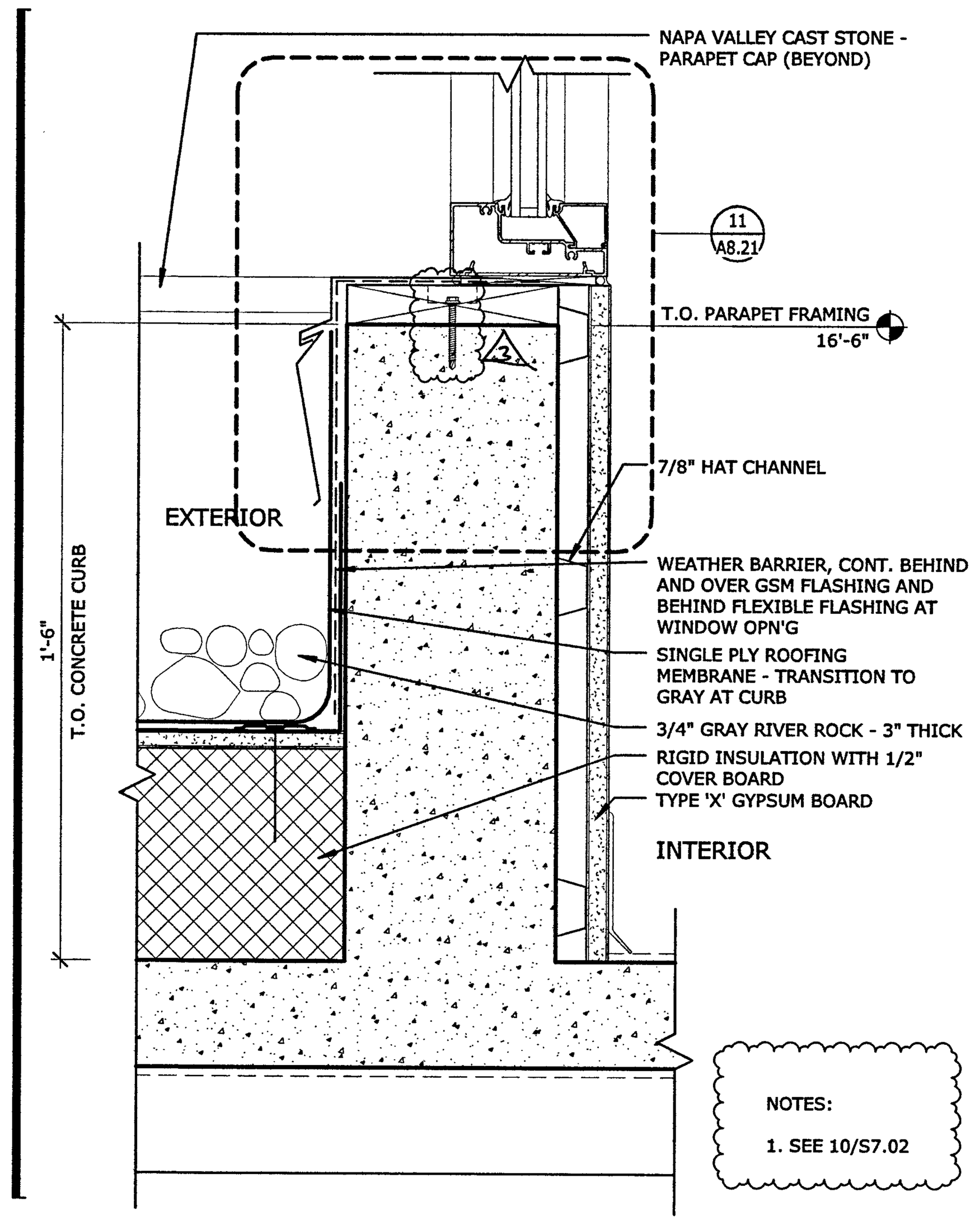


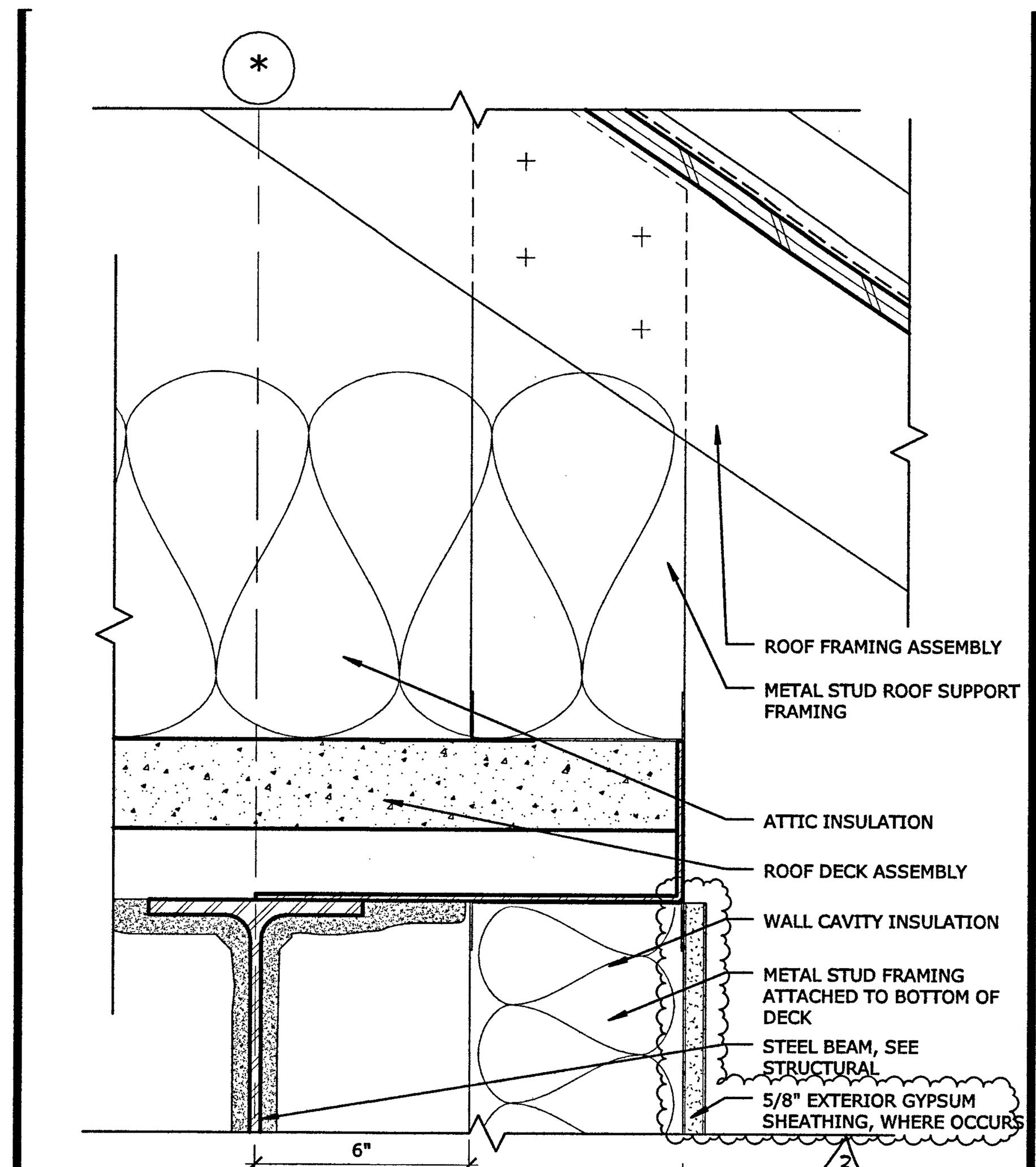
SADDLE FLASHING AT PARAPET ISOMETRIC (12)
1 1/2" = 1'-0" REFERENCE:



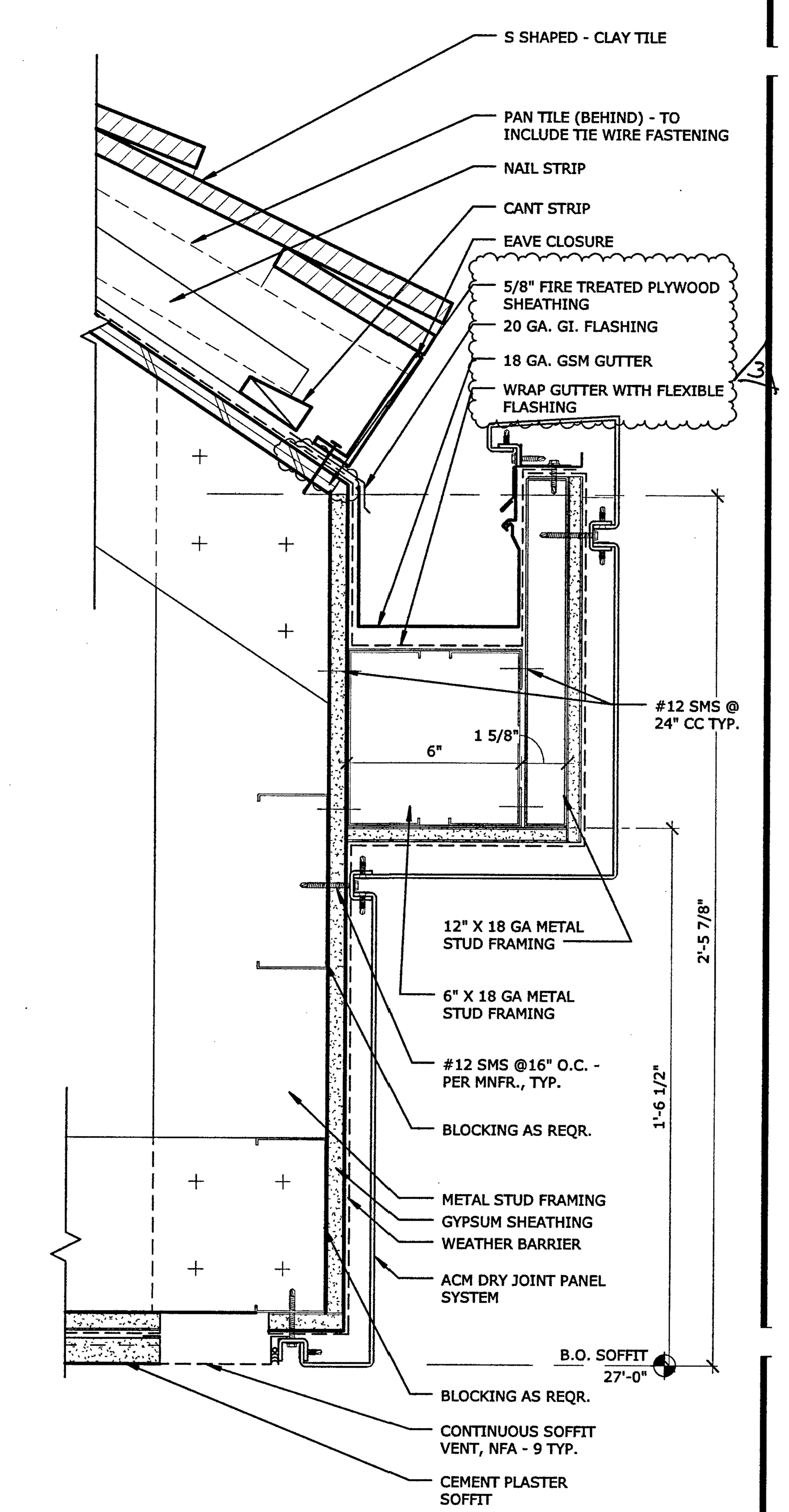
FASCIA - CANOPY W/ INTREGAL GUTTER FLASHING (9)
6" = 1'-0" REFERENCE: A8.31 / 7



LOWER ROOF AT EXTERIOR WALL (6)
3" = 1'-0" REFERENCE: A2.00 / 2

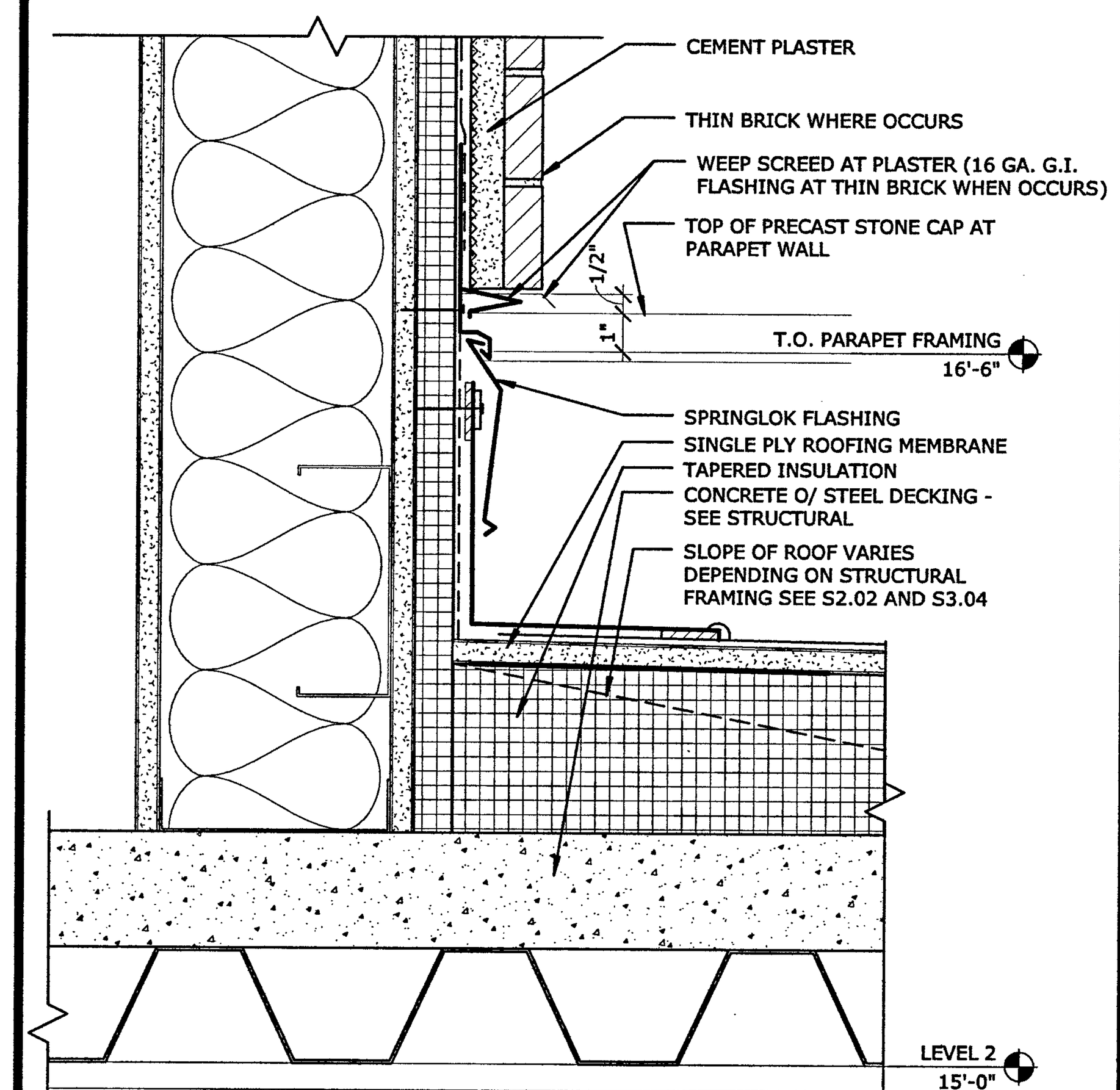


MANSARD ATTIC - ROOF TO WALL INTERSECTION (3)
3" = 1'-0" REFERENCE: A3.20 / 1

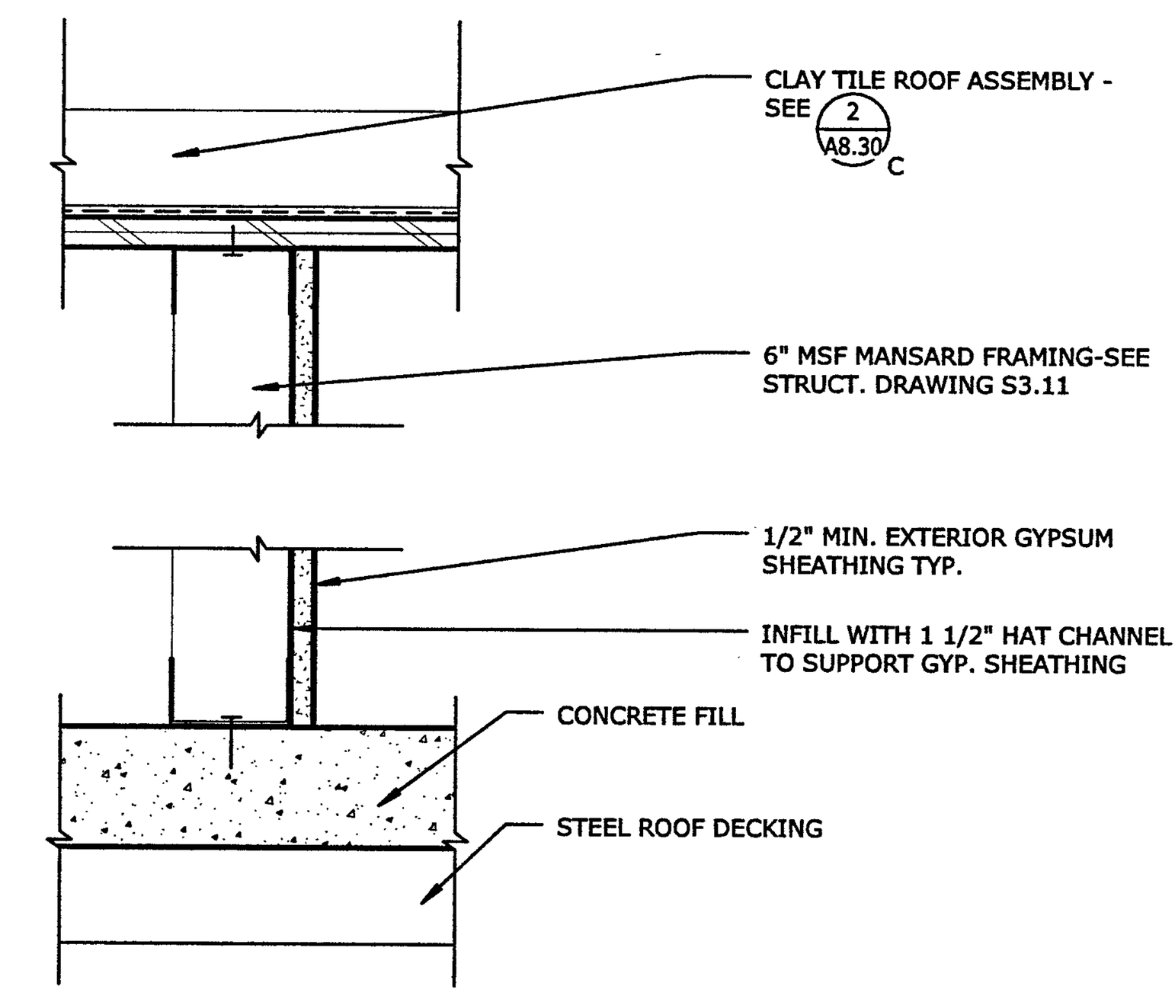


NOTES:
1. ALL ROOF TILES TO INCLUDE STAINLESS STEEL TIE WIRE FASTENING
2. TILE ROOFING TO COMPLY WITH ESR 2684, IR 15-1, IR15-2
3. SEE 14/A8.31 FOR CLAY TILE DETAILS

FASCIA - MANSARD GUTTER (1)
3" = 1'-0" REFERENCE: A2.60 / 1

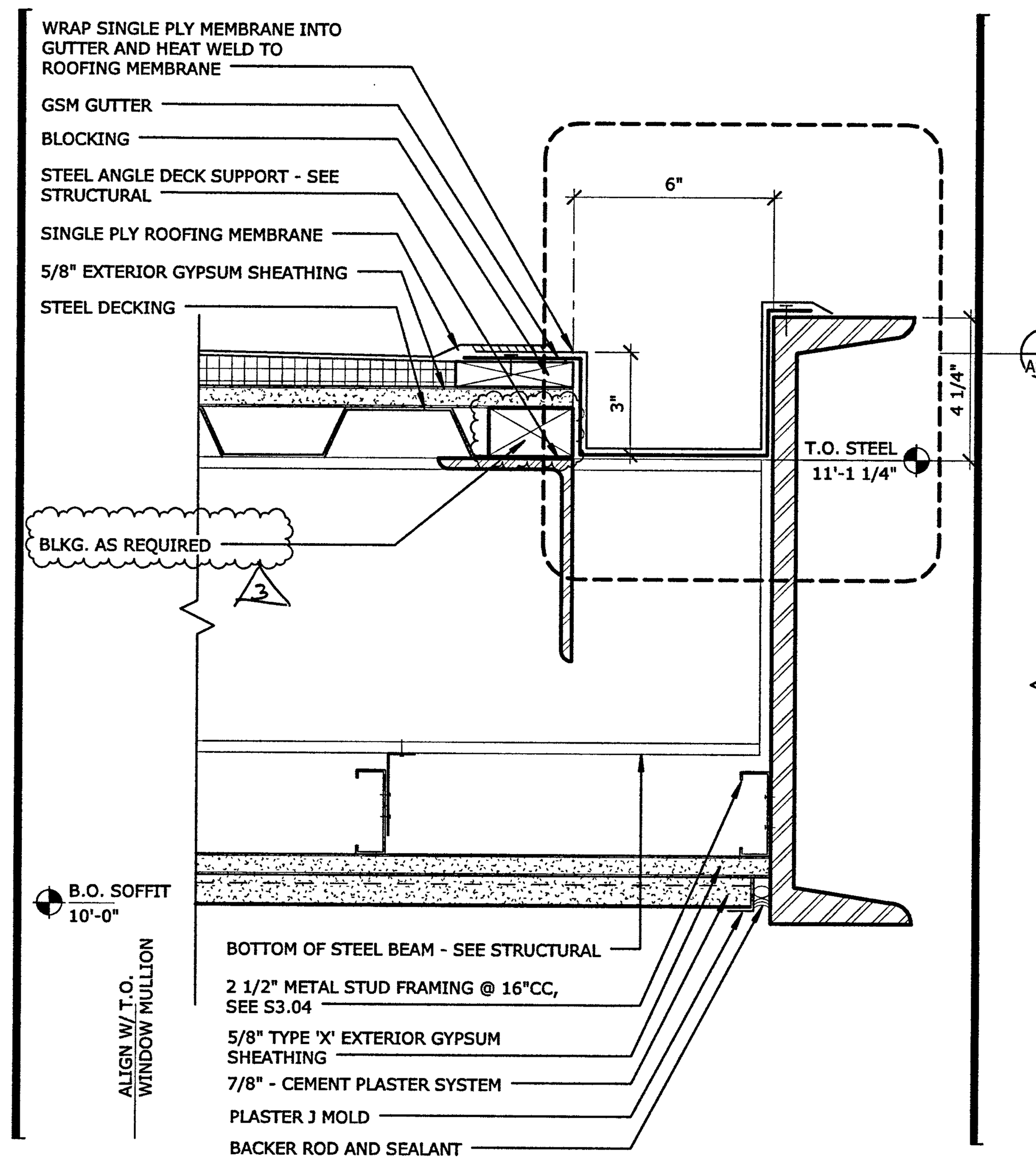


ROOF TO WALL AT LOWER ROOF - PARAPET (13)
3" = 1'-0" REFERENCE: A3.24 / 1

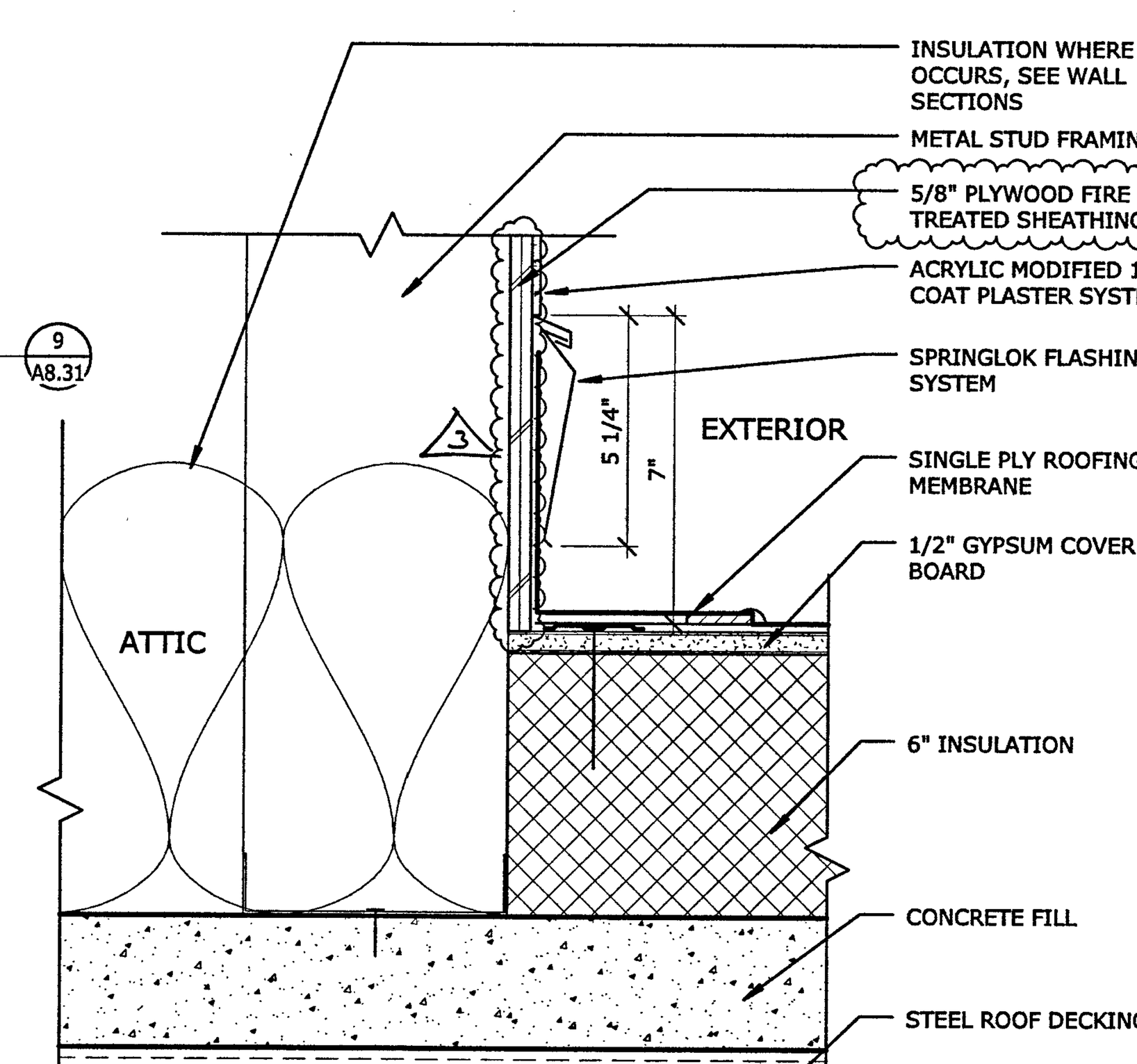


NOTES:
1. FOOR DRAFTSTOP DOORS SEE 1/A2.60, 15/A8.10

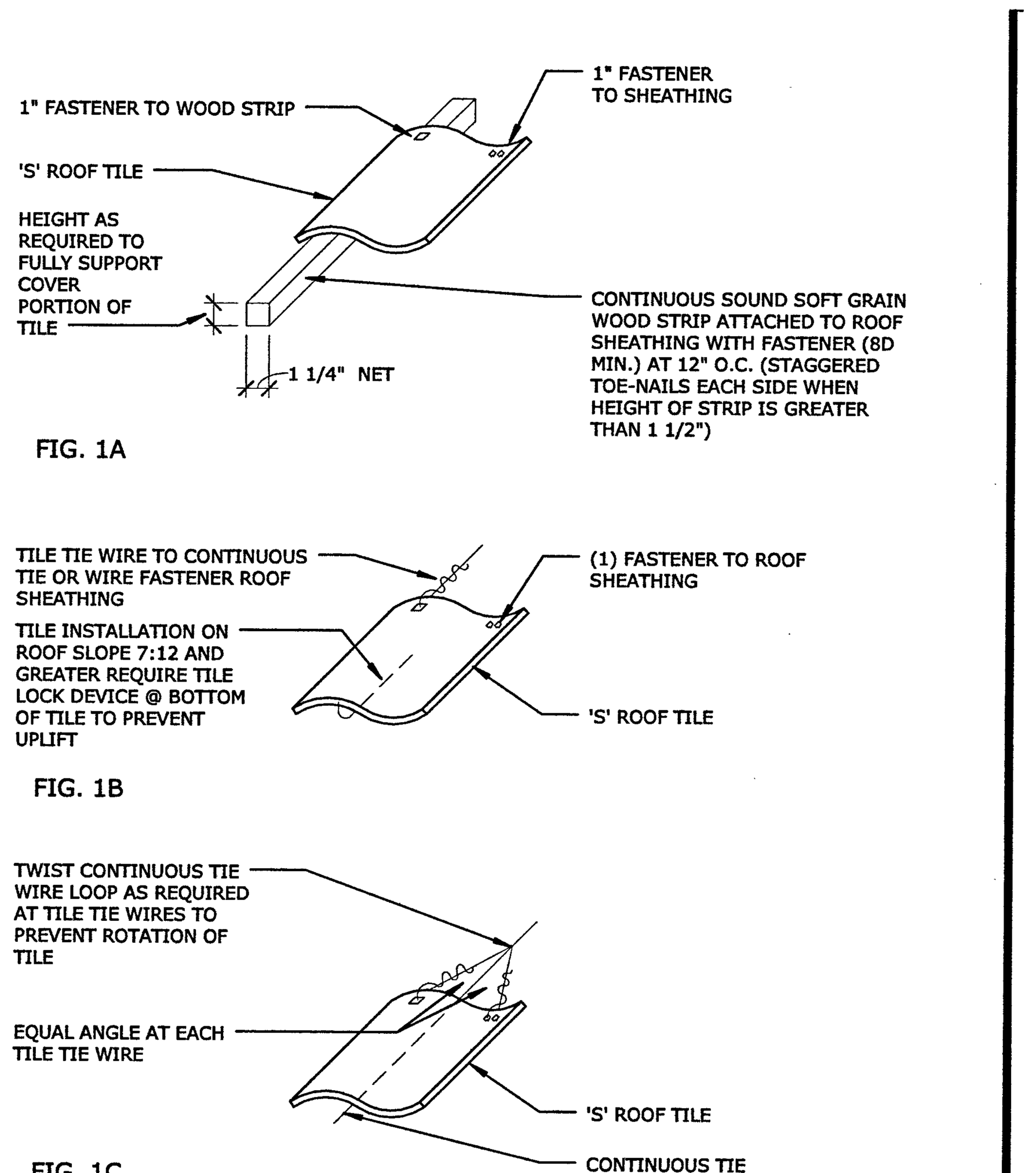
DRAFTSTOP WALL TYP. - MANSARD ATTIC (10)
3" = 1'-0" REFERENCE:



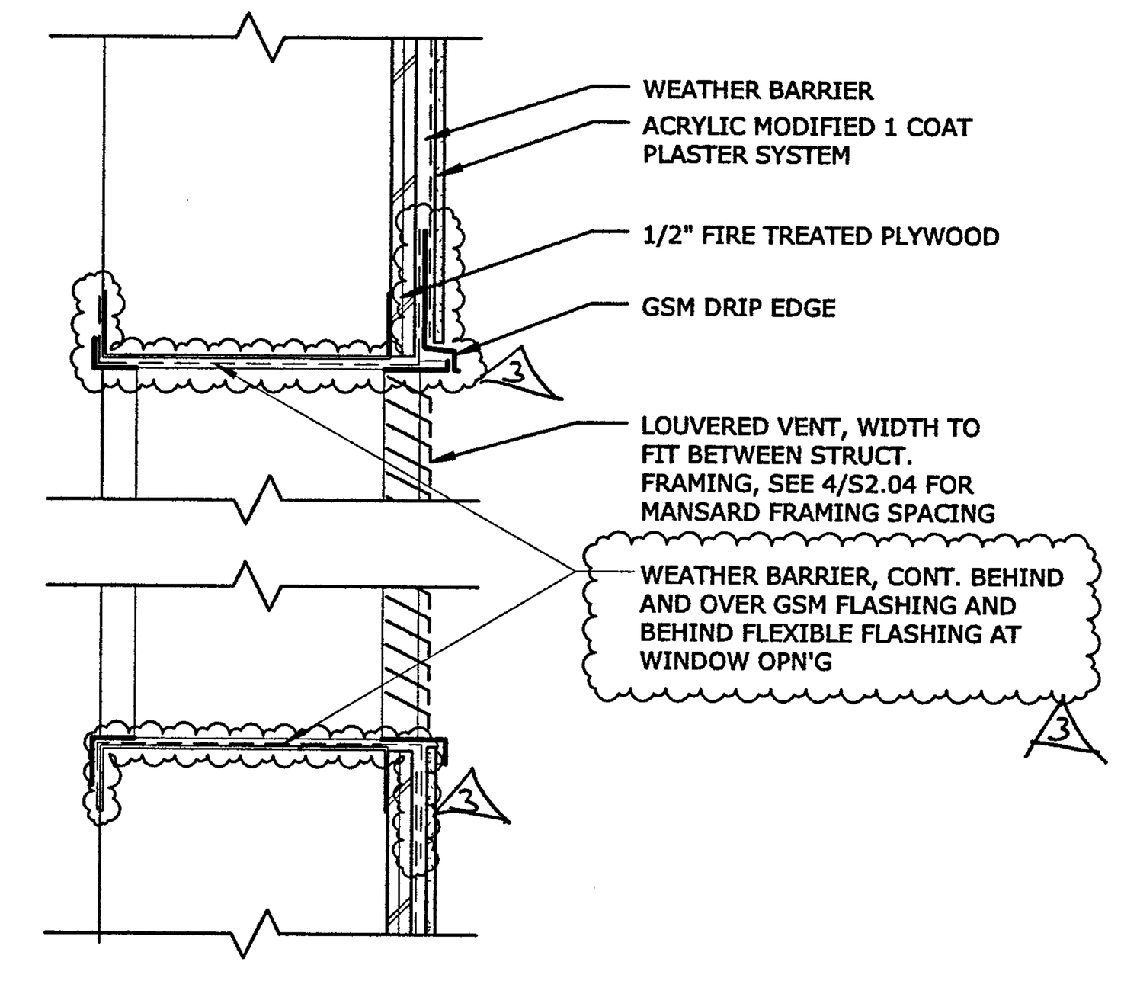
FASCIA - CANOPY W/ INTEGRAL GUTTER (7)
3" = 1'-0" REFERENCE: A2.60 / 1



PARAPET TO ROOF DECK (4)
3" = 1'-0" REFERENCE:

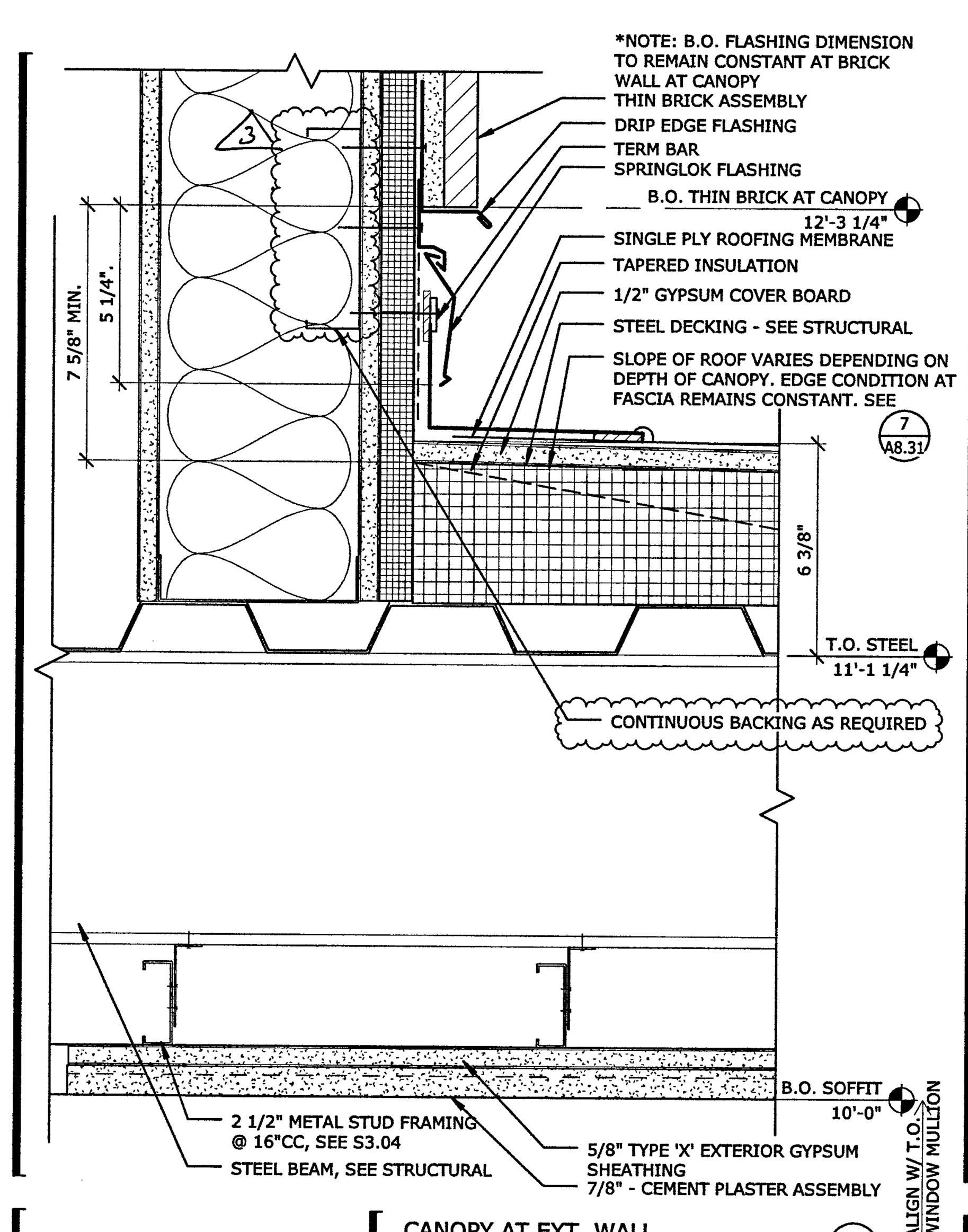


CLAY TILE ROOFING (14)
1 1/2" = 1'-0" REFERENCE:

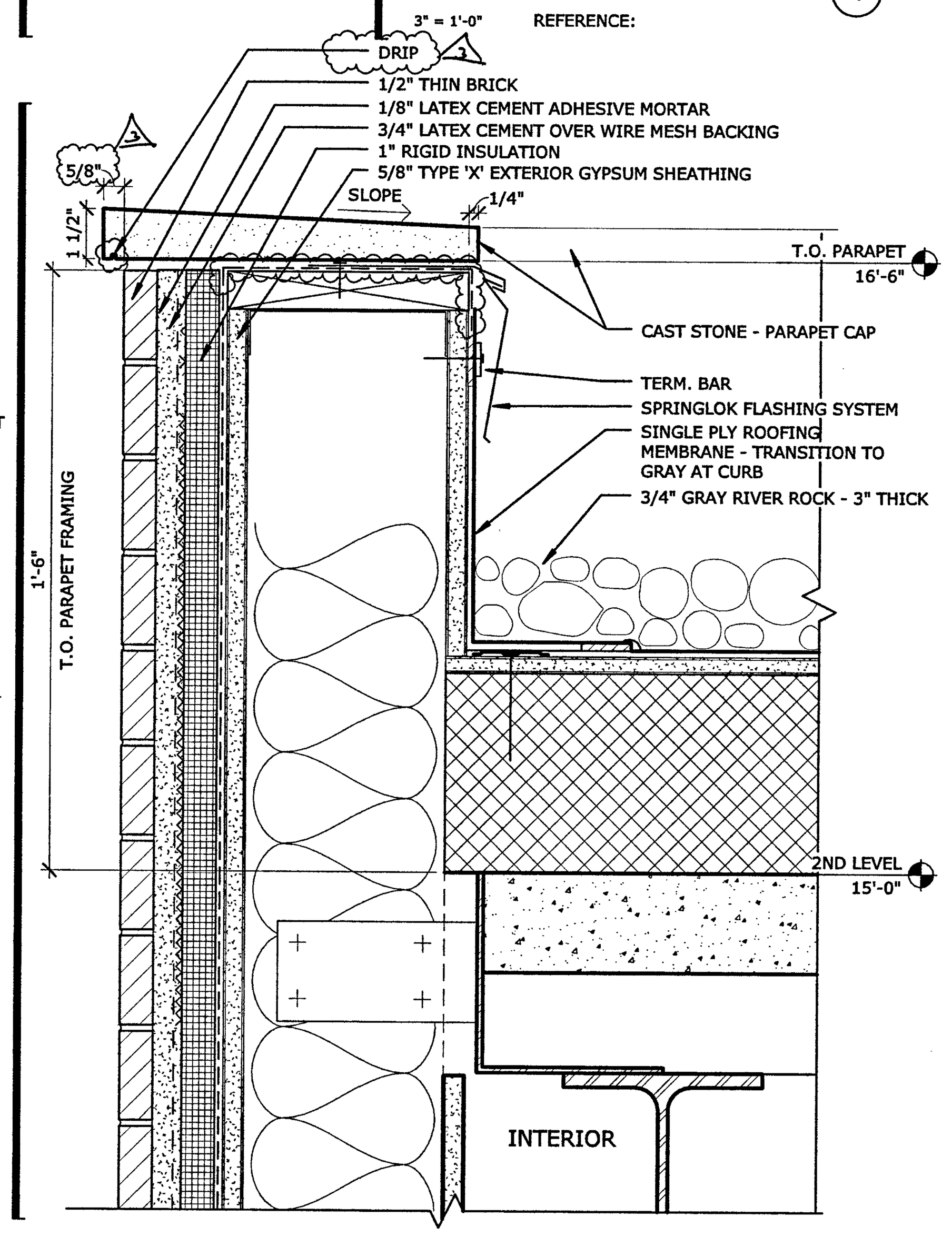


NOTES:
1. LOUVERED VENTS TO MEET ATTIC VENTILATION REQUIREMENTS - 250.32 NFA PER VENT - SEE ROOF PLAN FOR LOCATIONS

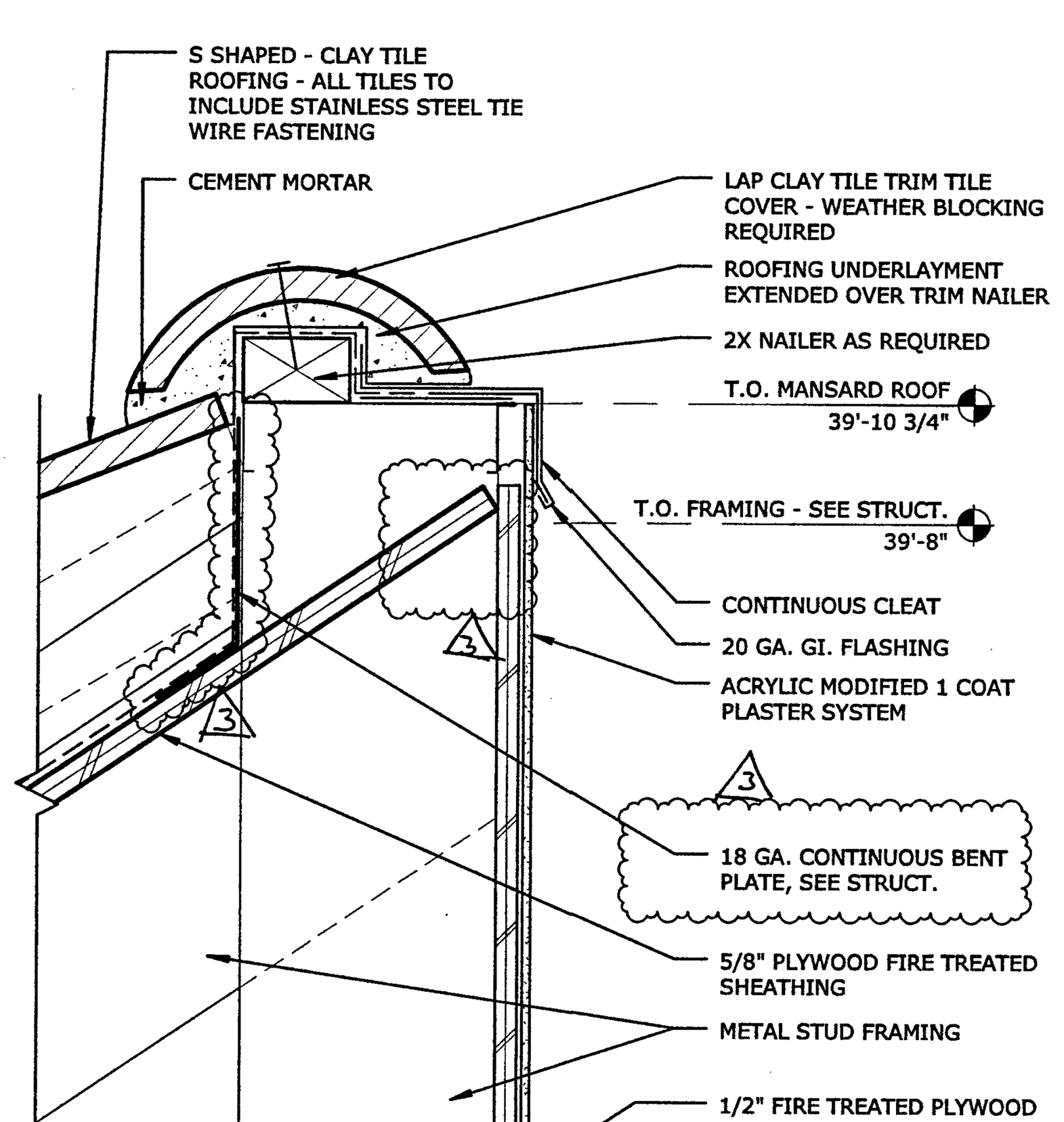
WALL LOUVERED VENT (11)
3" = 1'-0" REFERENCE:



CANOPY AT EXT. WALL (8)
3" = 1'-0" REFERENCE: A3.23 / 3



LOWER ROOF - SECOND FLOOR TO PARAPET (5)
3" = 1'-0" REFERENCE: A3.21 / 2



NOTES:
1. ALL ROOF TILES TO INCLUDE STAINLESS STEEL TIE WIRE FASTENING
2. TILE ROOFING TO COMPLY WITH ESR 2684, IR 15-1, IR15-2
~~3. SEE 14/A8.31 FOR CLAY TILE DETAILS~~
4. SEE S/S3.11 AND 13/S7.04 FOR ADDITIONAL INFORMATION

ROOF EDGE - TOP OF MANSARD (2)
3" = 1'-0" REFERENCE: A2.60 / 1

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dreyfussblackford.com

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MOHR HALL REPLACEMENT

EXTERIOR ROOF / CANOPY DETAILS

B5017.00

May 22, 2018

A8.31

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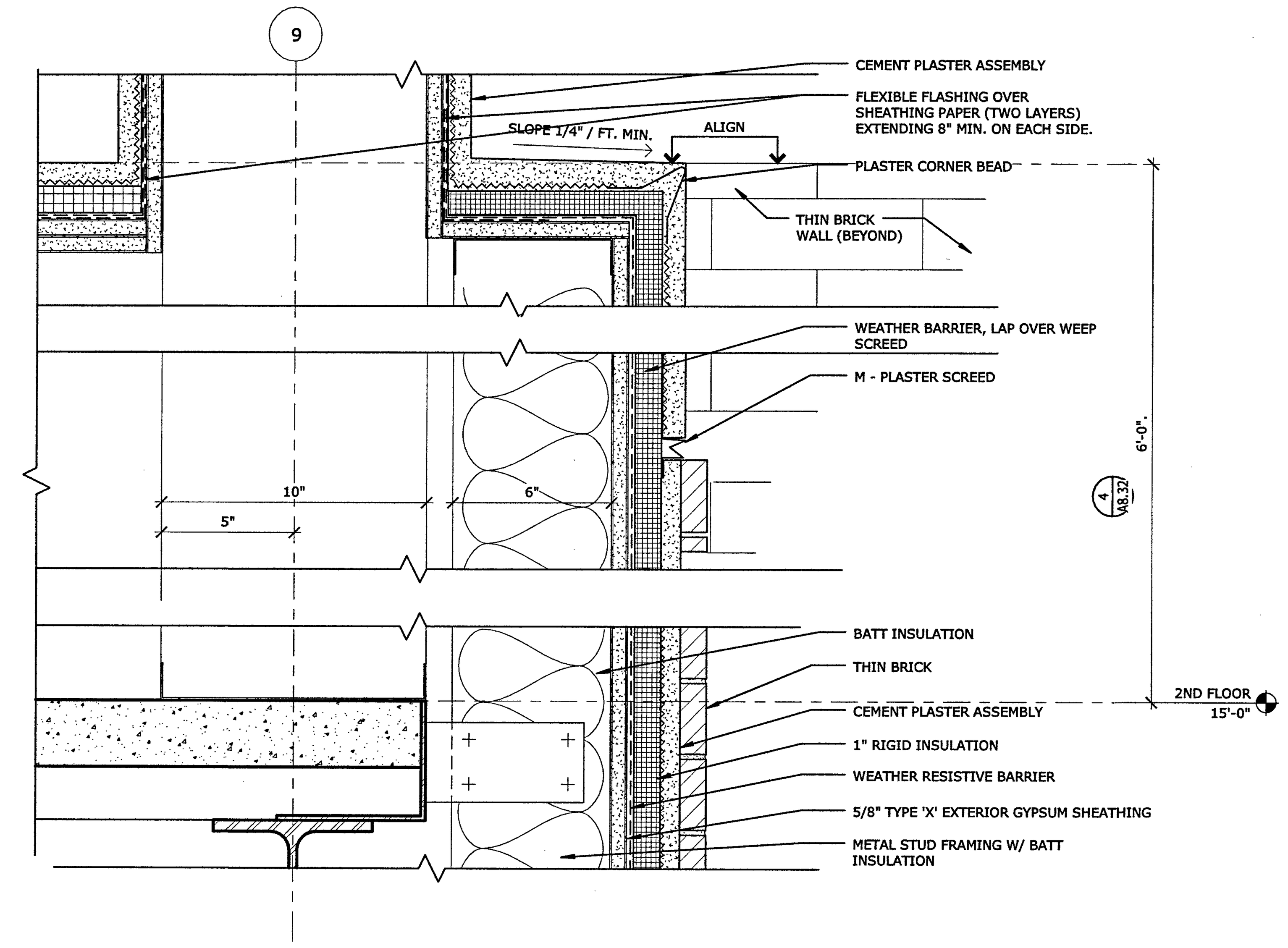
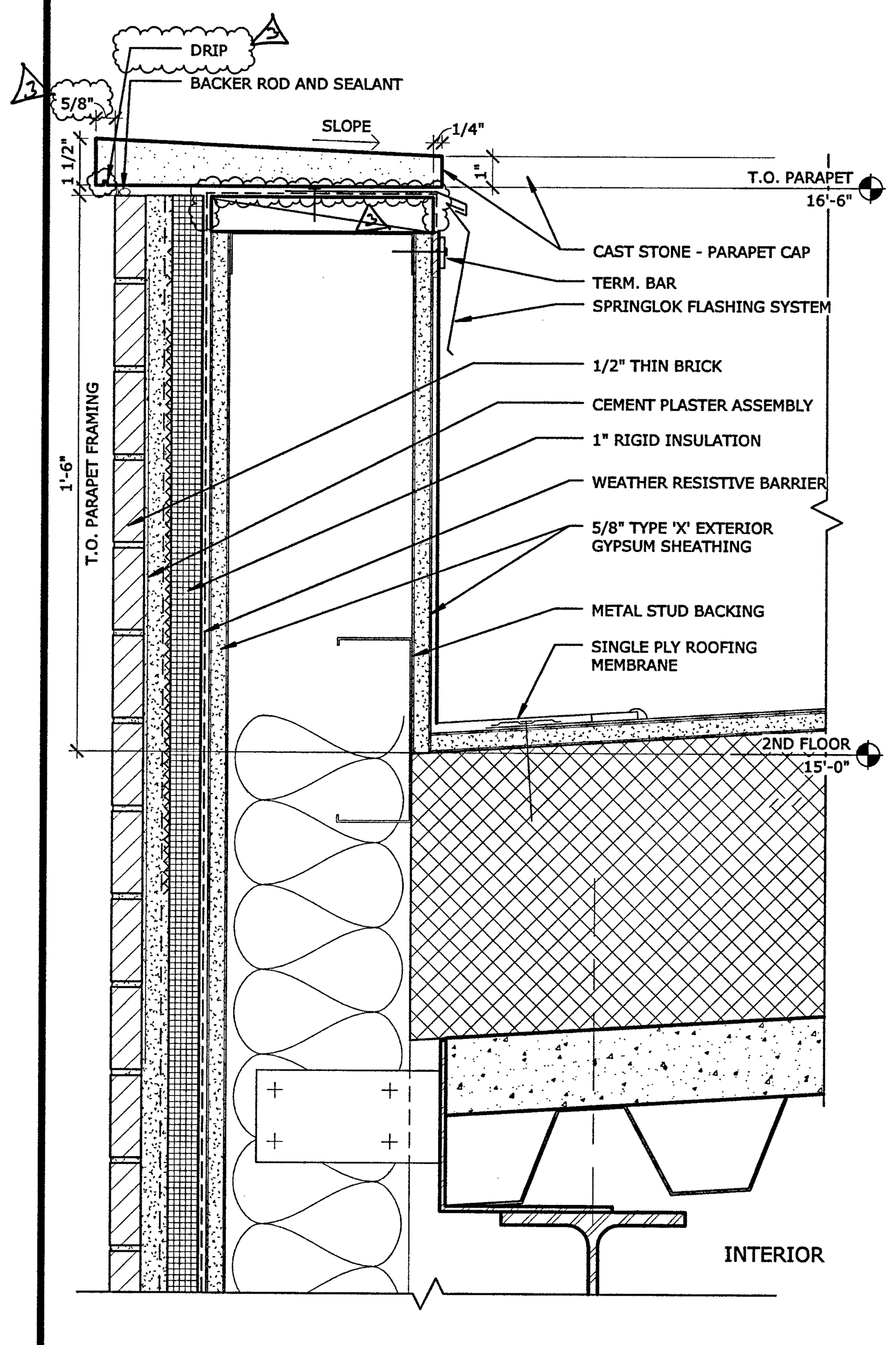
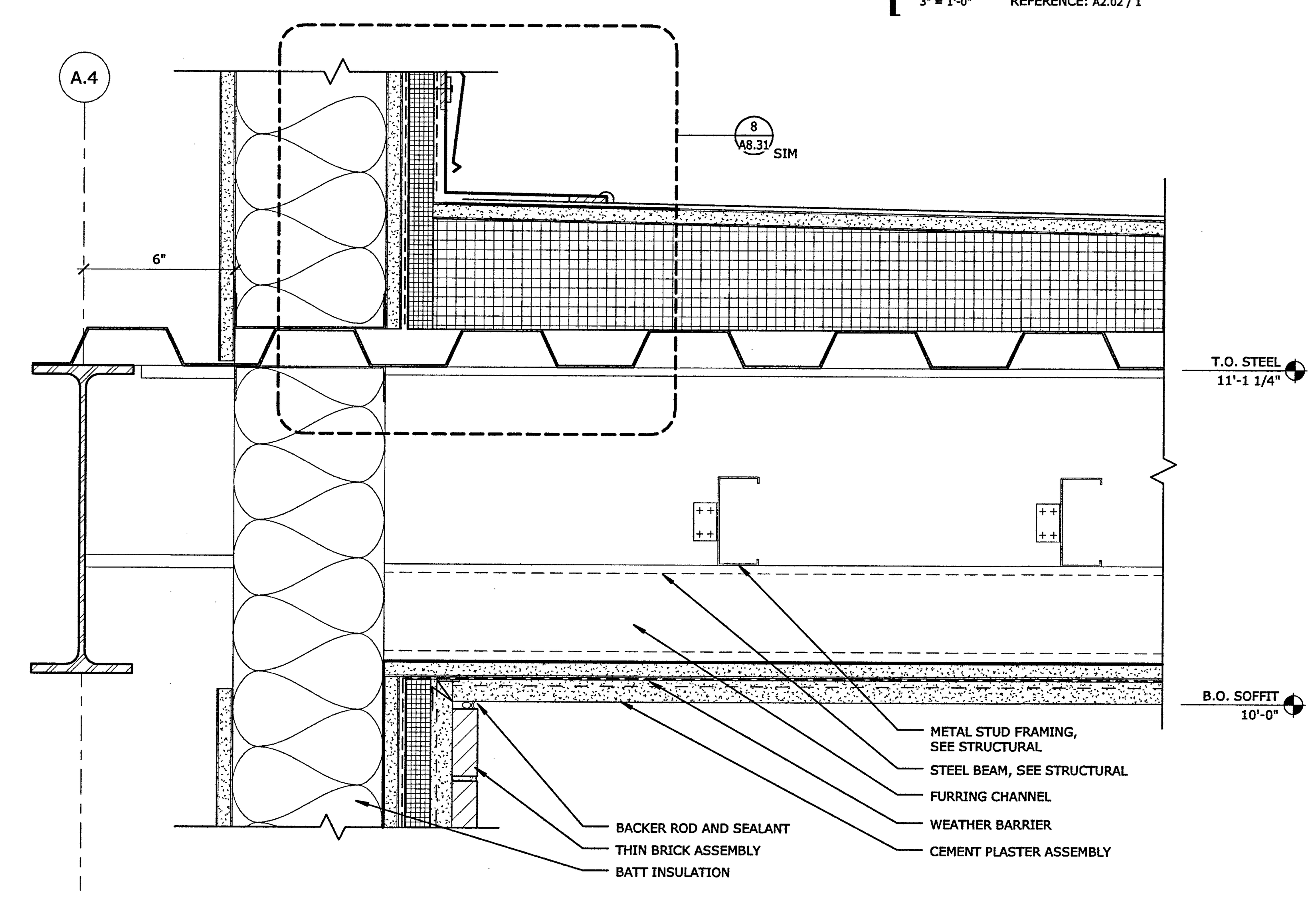


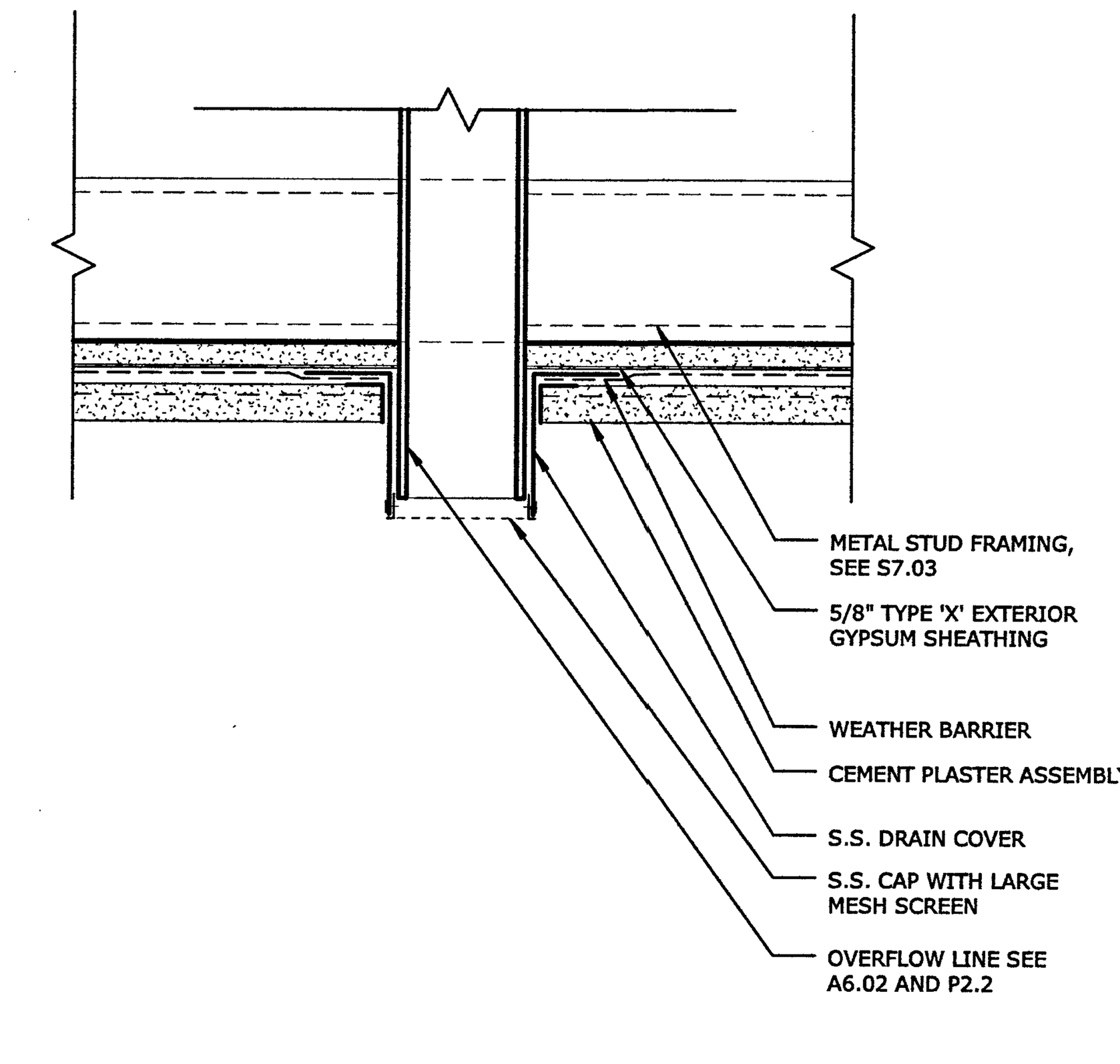
LOWER ROOF - AT ALCOVE VERTICAL FIN
3" = 1'-0" REFERENCE: A2.02 / 1
1



LOWER ROOF - AT PARAPET
3" = 1'-0" REFERENCE: A3.24 / 1
4



THIN BRICK - CEMENT PLASTER SOFFIT CANOPY
3" = 1'-0" REFERENCE: A3.24 / 1
2



OVERFLOW LINE AT SOFFIT
3" = 1'-0" REFERENCE:
3

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2 REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

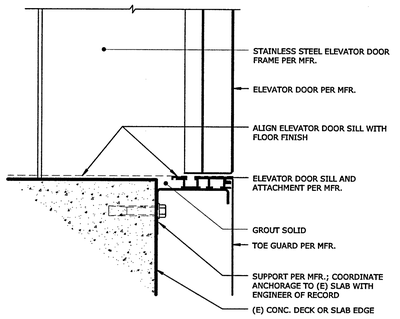
LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

EXTERIOR ROOF DETAILS

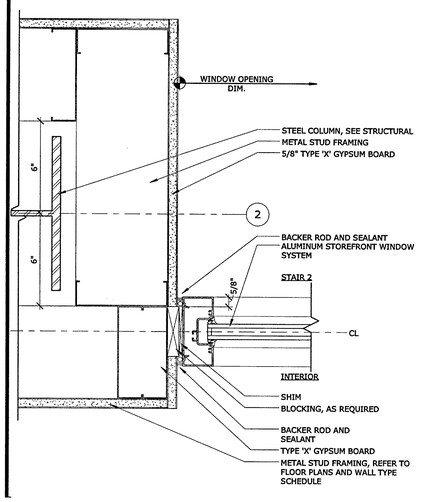
B5017.00

May 22, 2018

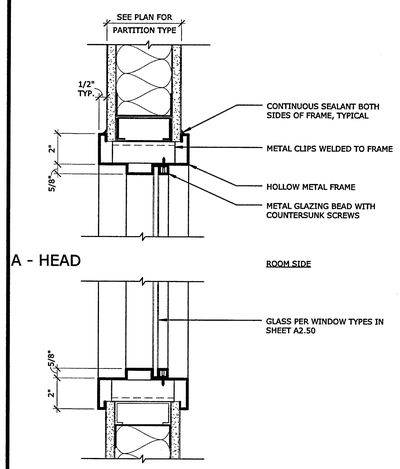
A8.32



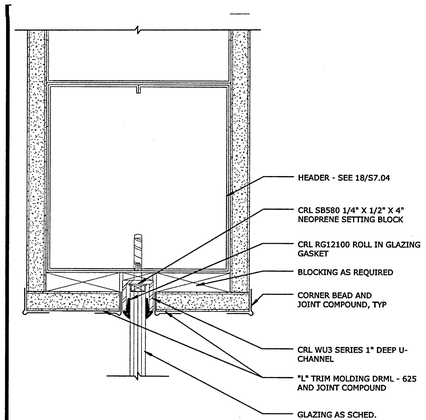
ELEVATOR DOOR SILL 13
3" = 1'-0" REFERENCE: A7.02 / 4



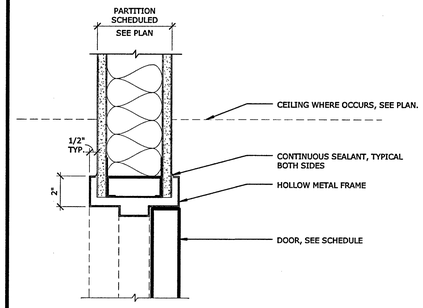
INTERIOR STOREFRONT JAMB AT GYPSUM BOARD 10
3" = 1'-0" REFERENCE: A2.50 / 3



WINDOW HEAD AND SILL - HOLLOW METAL FRAME 7
3" = 1'-0" REFERENCE:

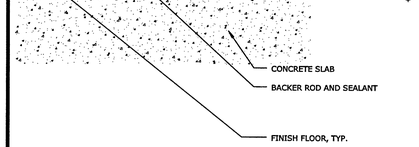


FRAMELESS GLAZING HEAD 4
6" = 1'-0" REFERENCE:

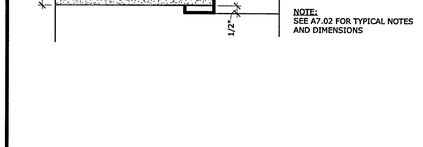


NOTE:
FOR TYPICAL DOOR OPENING FRAMING, SEE STRUCTURAL SHEET S7.01, S7.02, AND S7.03

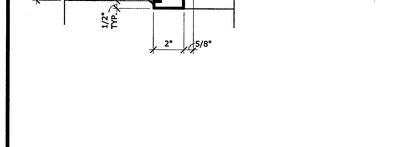
H.M. DOOR HEAD 1
3" = 1'-0" REFERENCE:



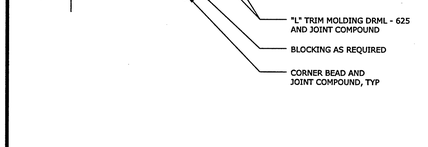
INTERIOR STOREFRONT SILL 14
3" = 1'-0" REFERENCE: A2.50 / 3



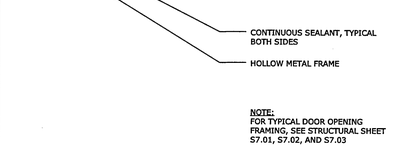
ELEVATOR DOOR JAMB 11
3" = 1'-0" REFERENCE: A7.02 / 1



WINDOW JAMB - HOLLOW METAL FRAME 8
3" = 1'-0" REFERENCE:

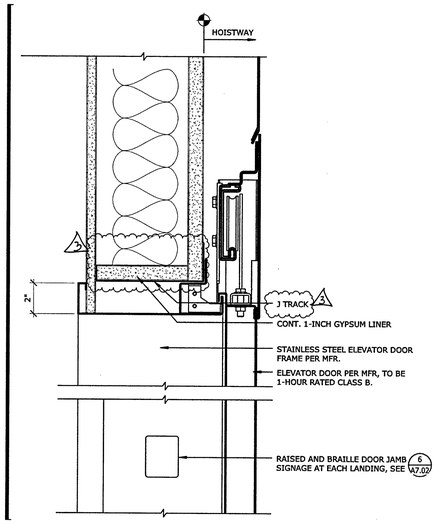


FRAMELESS GLAZING JAMB 5
6" = 1'-0" REFERENCE:

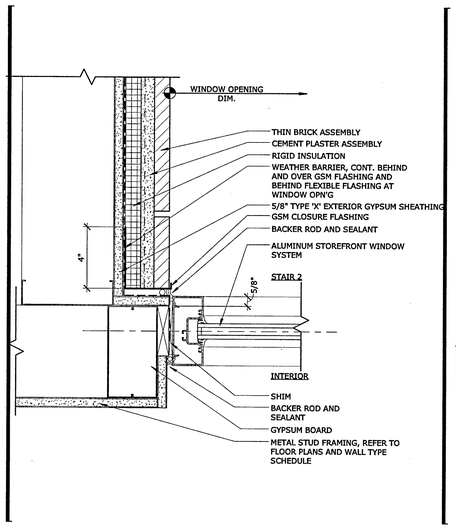


NOTE:
FOR TYPICAL DOOR OPENING FRAMING, SEE STRUCTURAL SHEET S7.01, S7.02, AND S7.03

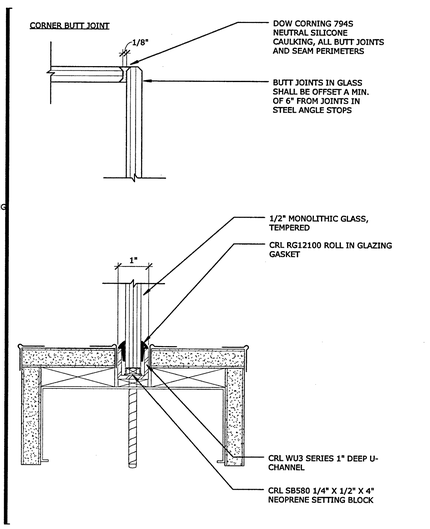
H.M. DOOR JAMB 2
3" = 1'-0" REFERENCE:



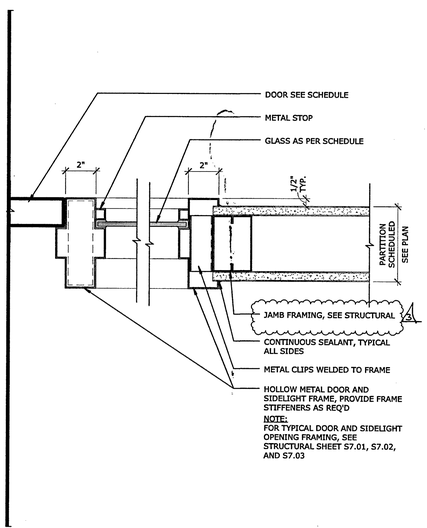
ELEVATOR DOOR HEAD 12
3" = 1'-0" REFERENCE: A7.02 / 4



INTERIOR STOREFRONT JAMB AT THIN BRICK 9
3" = 1'-0" REFERENCE: A2.50 / 3



FRAMELESS GLAZING SILL 6
6" = 1'-0" REFERENCE:



NOTE:
FOR TYPICAL DOOR AND SIDELIGHT OPENING FRAMING, SEE STRUCTURAL SHEET S7.01, S7.02, AND S7.03

H.M. SIDELIGHT JAMB 3
3" = 1'-0" REFERENCE:

Dreyfuss+ Blackford architecture
3540 Folsom Blvd
Sacramento, CA
95816-6699
T 916.453.1234
dreyfussblackford.com

FILE NO.34-C3
IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
02-116163
AC TH FLS MK SS
DATE 5-30-18
RN 3

LICENSED ARCHITECT C23210 COURTNEY ALDRICH GOLDEN REN. 08/31/19 STATE OF CALIFORNIA

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PLAN CHECK SET

	REVISION	BY	DATE
1	~~BACKCHECK 1~~		
2	~~BACKCHECK CHANGES~~		
3	REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

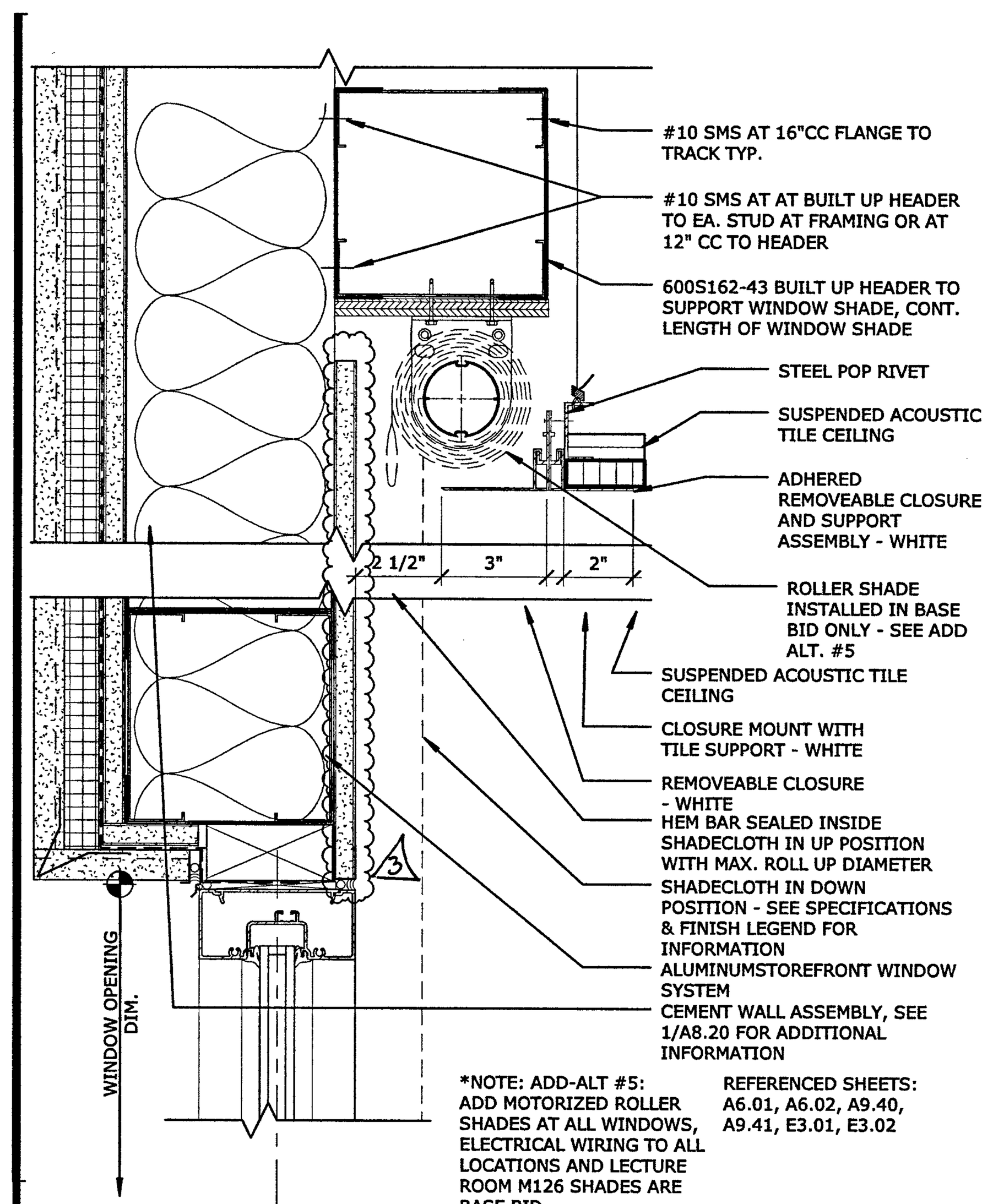
INTERIOR DOOR AND WINDOW DETAILS

B5017.00

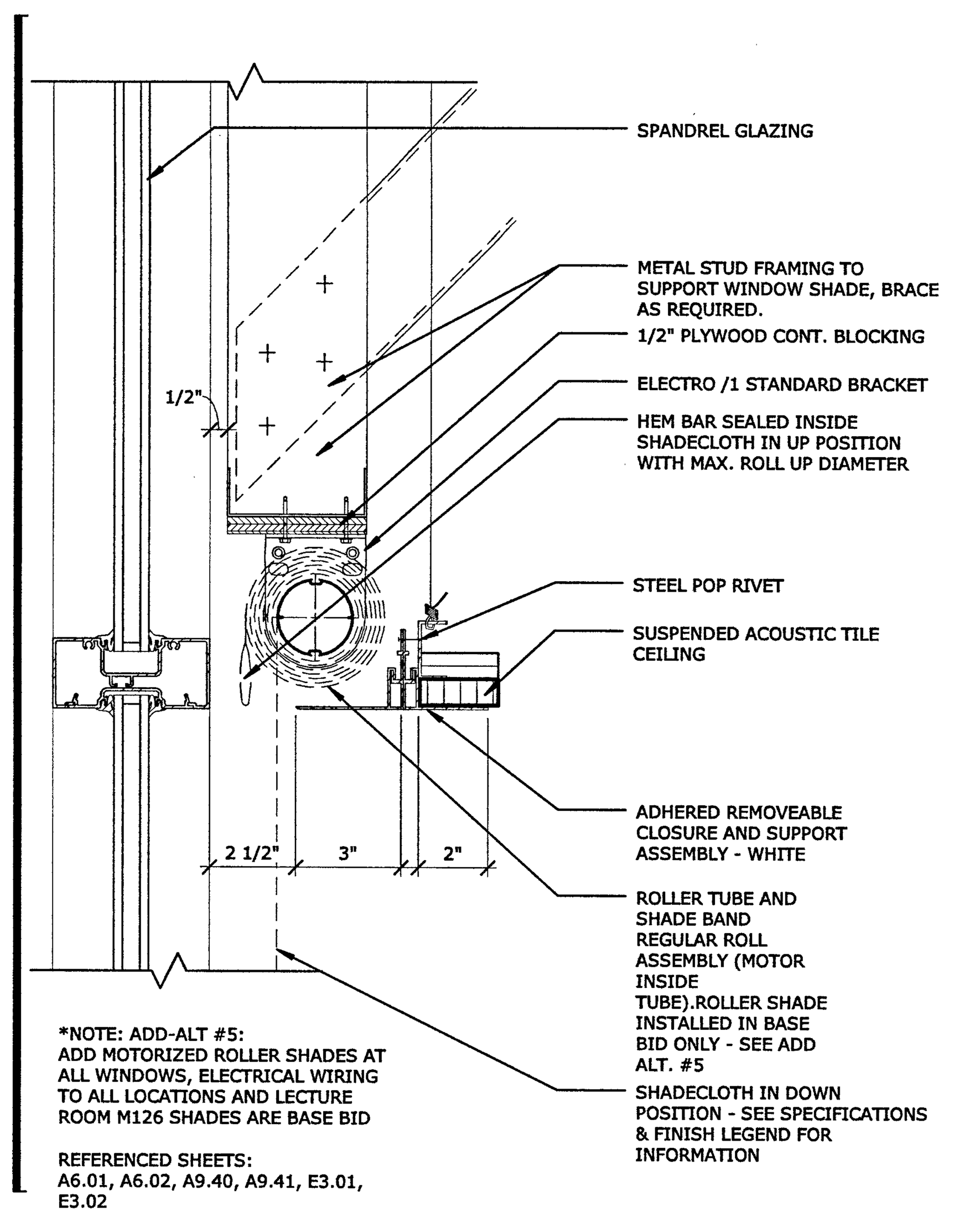
May 22, 2018

A9.10

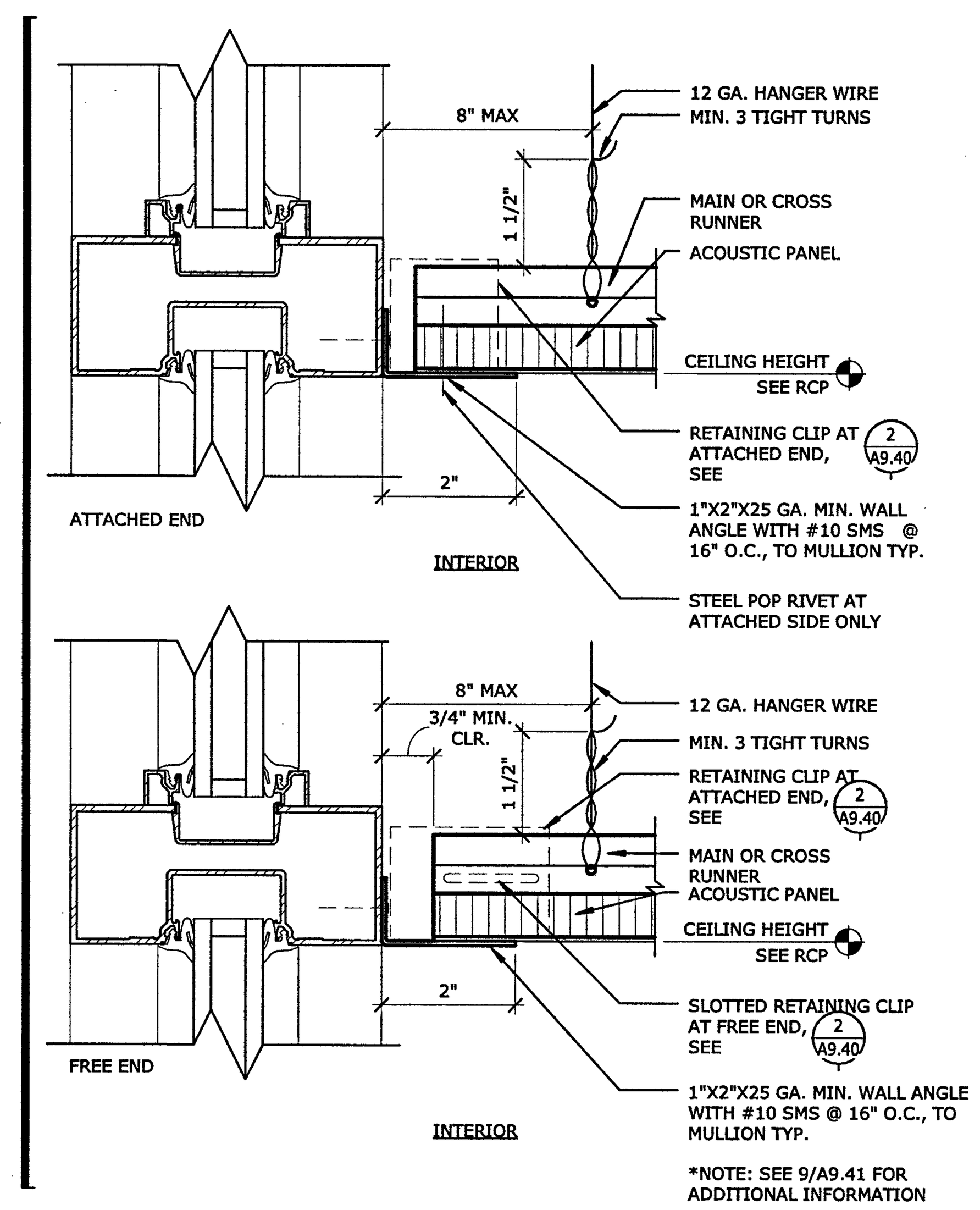
5/22/2018 10:20:35 AM C:\BIM\2016\Projects\B5017.00-LosRiosCCDMohrHall-A16-Central_glewis.rvt



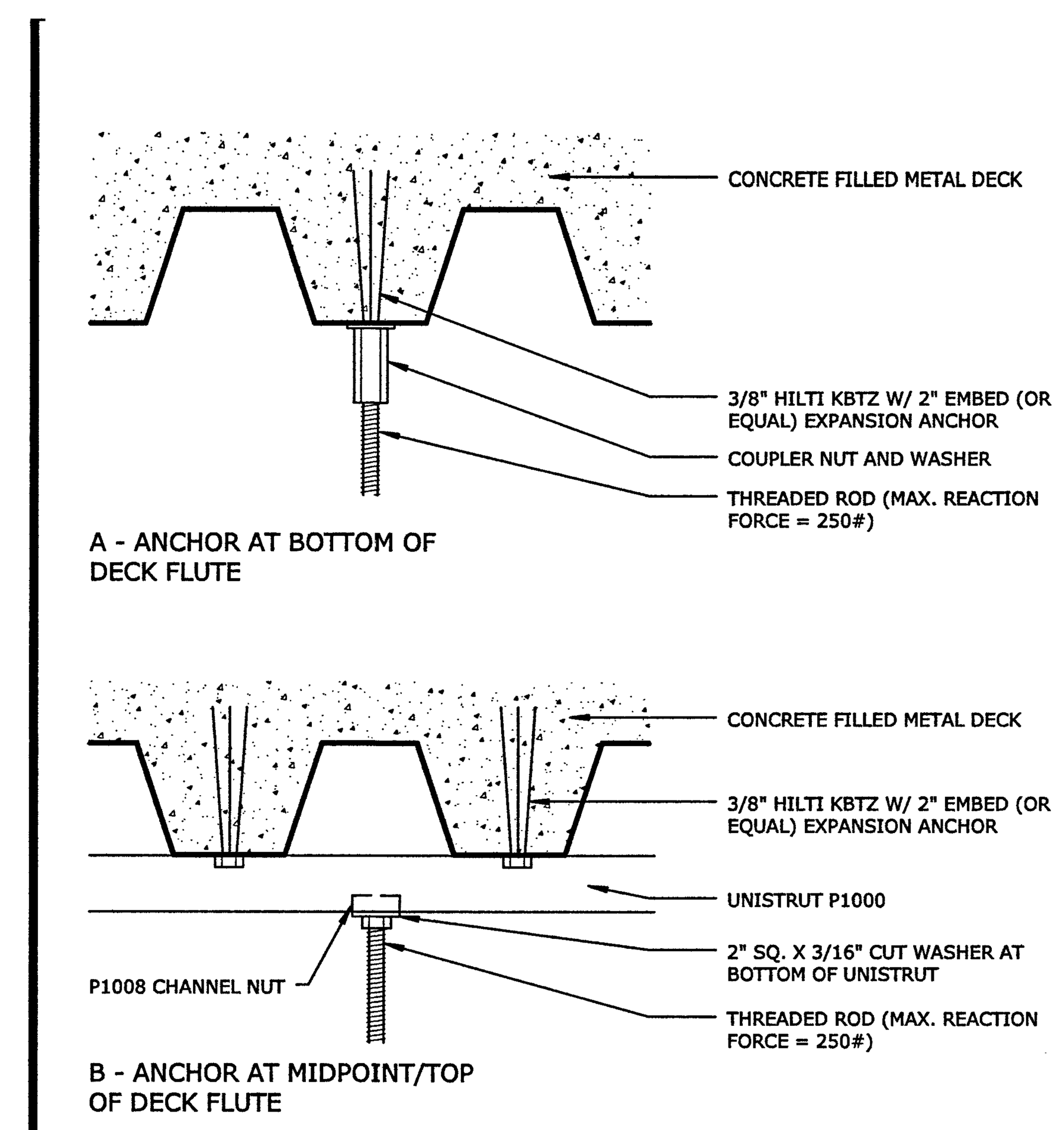
ROLLER SHADE AT WALL (13)
3" = 1'-0" REFERENCE:



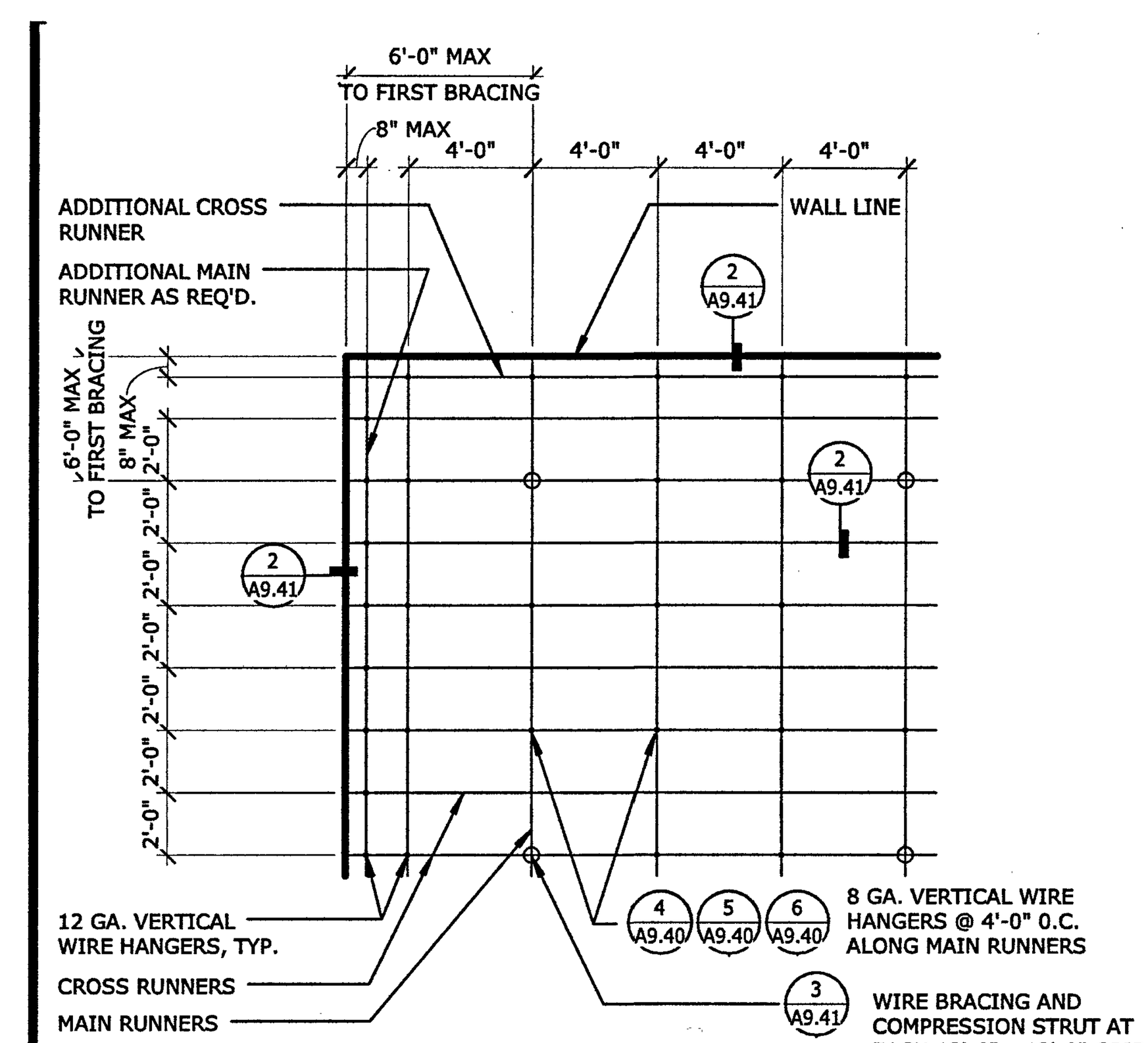
ROLLER SHADE AT INTERMEDIATE MULLION (10)
3" = 1'-0" REFERENCE: A3.20 / 2



SUSPENDED CEILING - AT MULLION (7)
6" = 1'-0" REFERENCE: A3.21 / 2



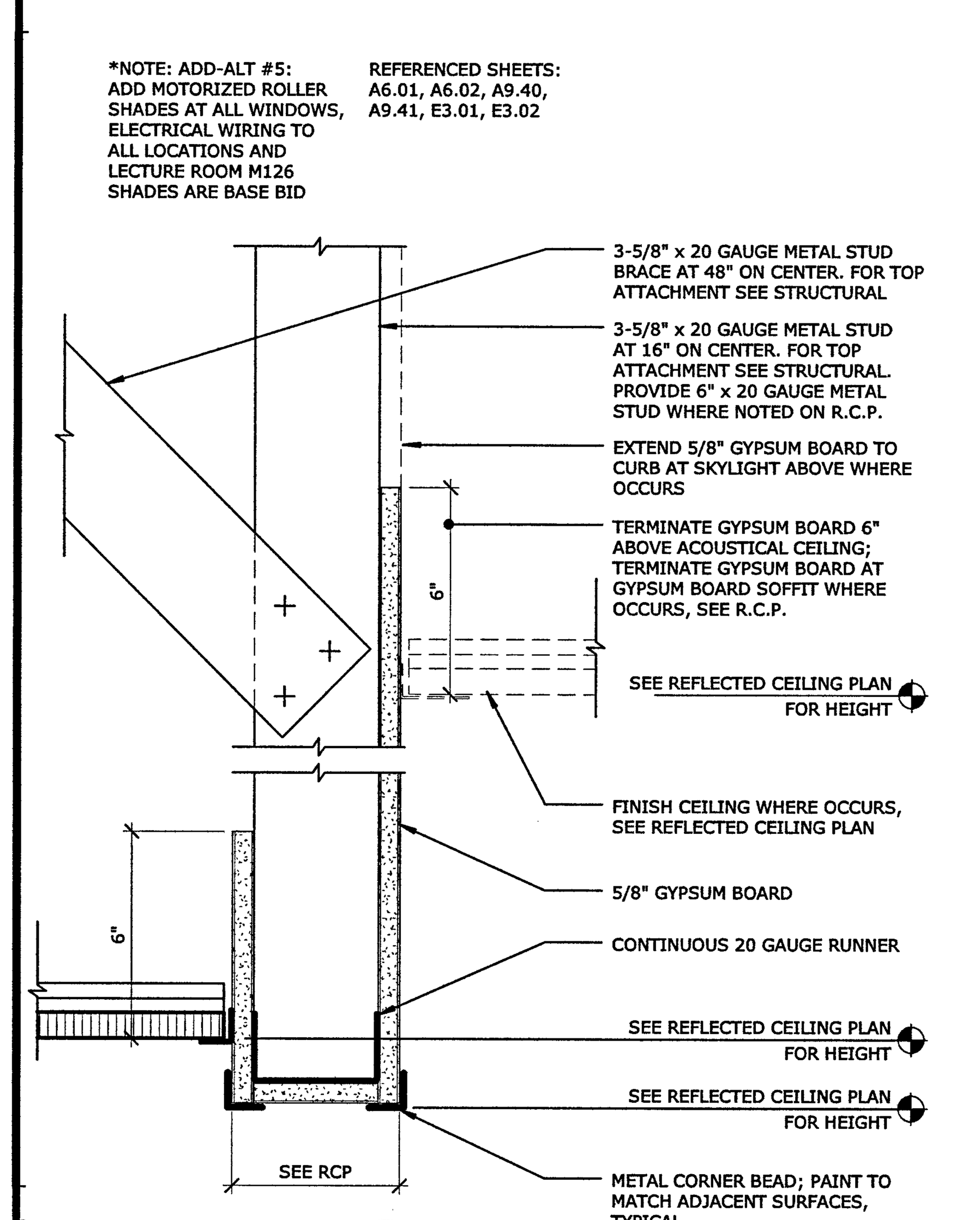
THREADED ROD ATTACHMENT AT CONCRETE FILLED METAL DECK (4)
3" = 1'-0" REFERENCE: A9.40 / 9



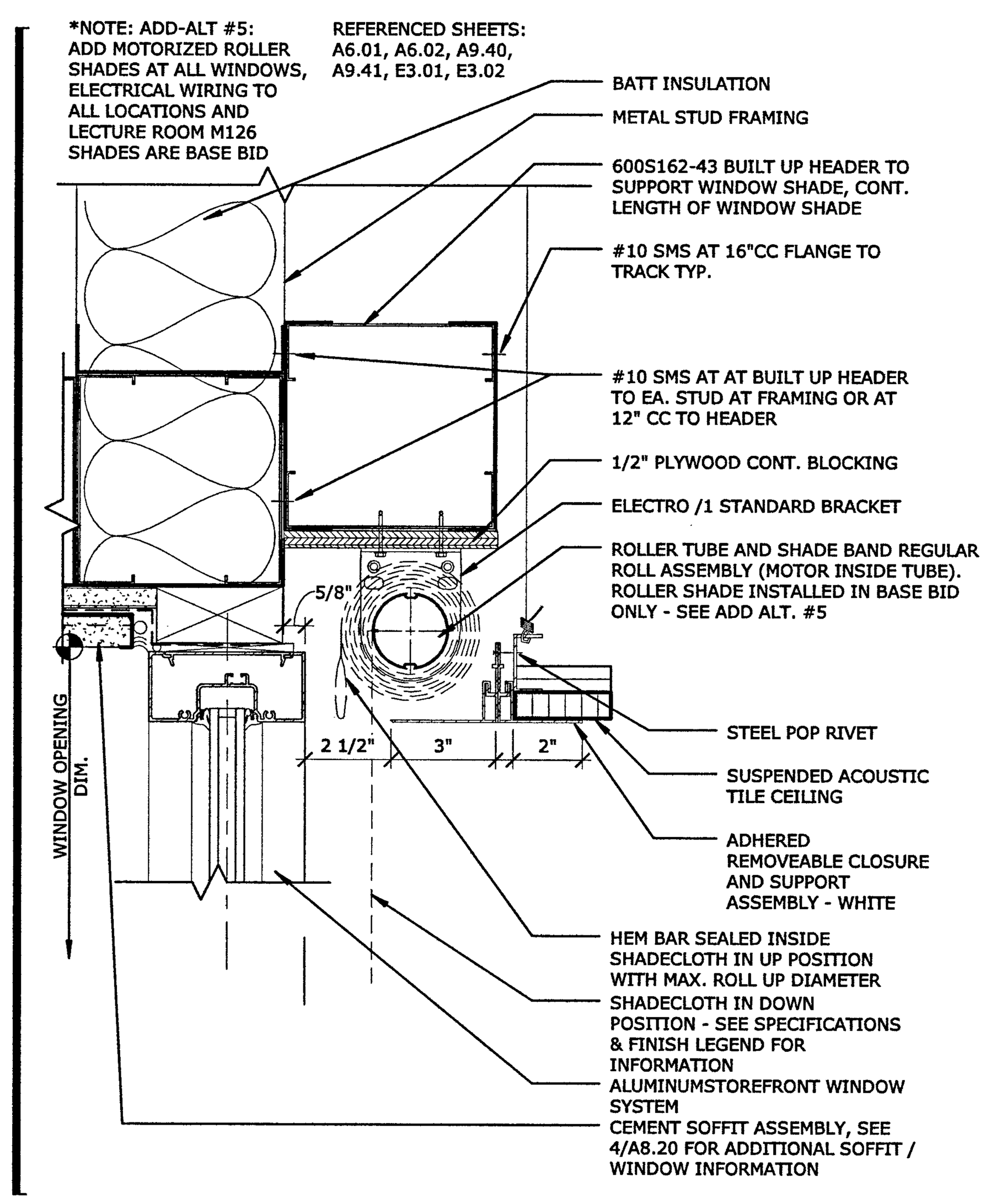
NOTES:

1. MAIN RUNNERS TO BE 1-1/2" x 1.12 LBS./FT. HOT ROLLED CHANNELS
2. CROSS RUNNERS TO BE 7/8" x 25 GA. HAT CHANNELS
3. SPLICE MAIN RUNNERS BY LAPPING AND INTERLOCKING FLANGES 12" MIN. AND TYING NEAR EACH END WITH DOUBLE LOOPS OF NO. 16 GA. WIRE
4. SPLICE CROSS RUNNERS BY LAPPING AND INTERLOCKING FLANGES 8" MIN. AND TYING NEAR EACH END WITH DOUBLE LOOPS OF NO. 16 GA. WIRE
5. PROVIDE TRAPEZE OR OTHER SUPPLEMENTARY SUPPORT MEMBERS PER NOTE 2 ON DET 1/A9.40

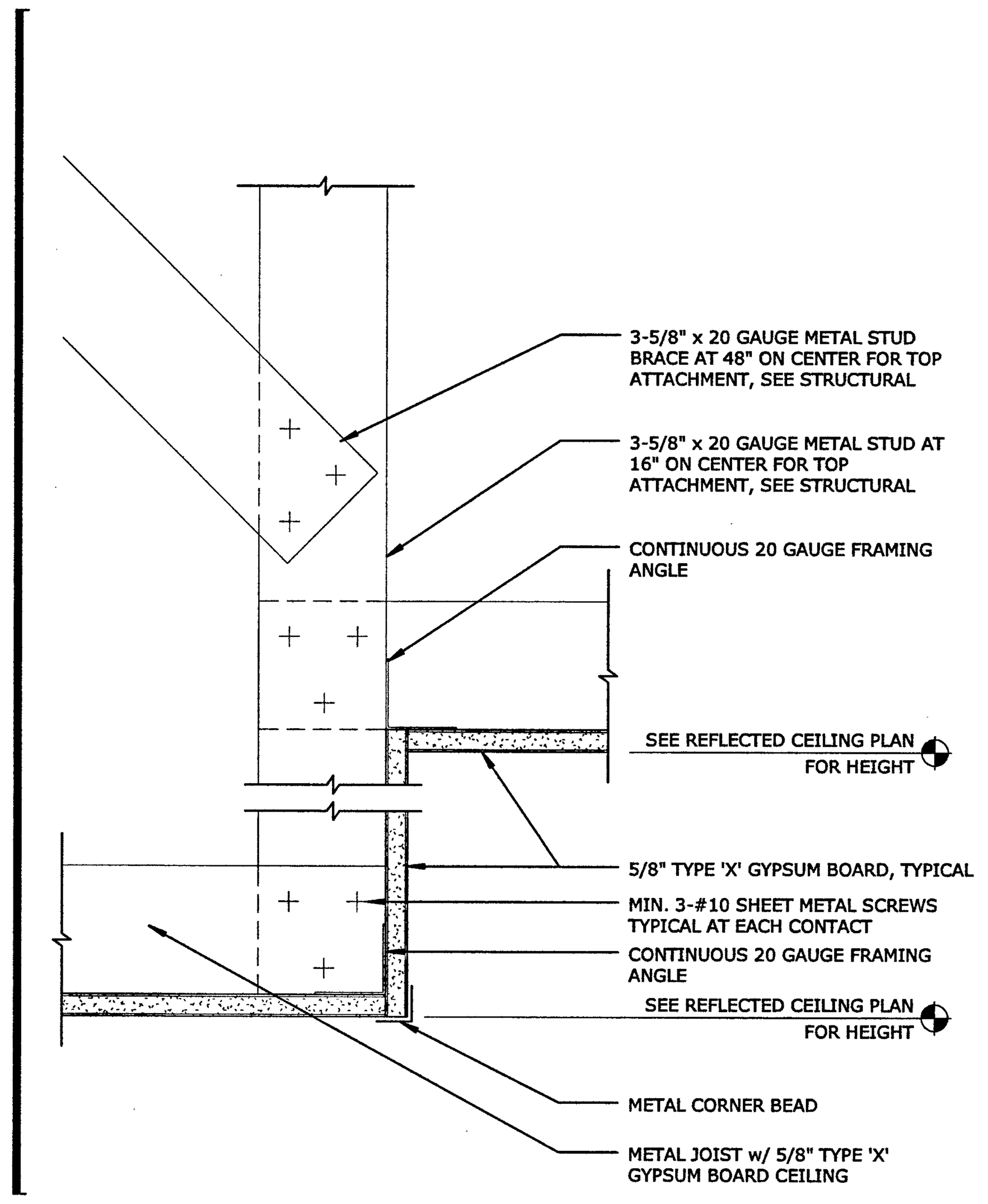
TYPICAL SUSPENDED GYPSUM BOARD CEILING (1)
3/16" = 1'-0" REFERENCE:



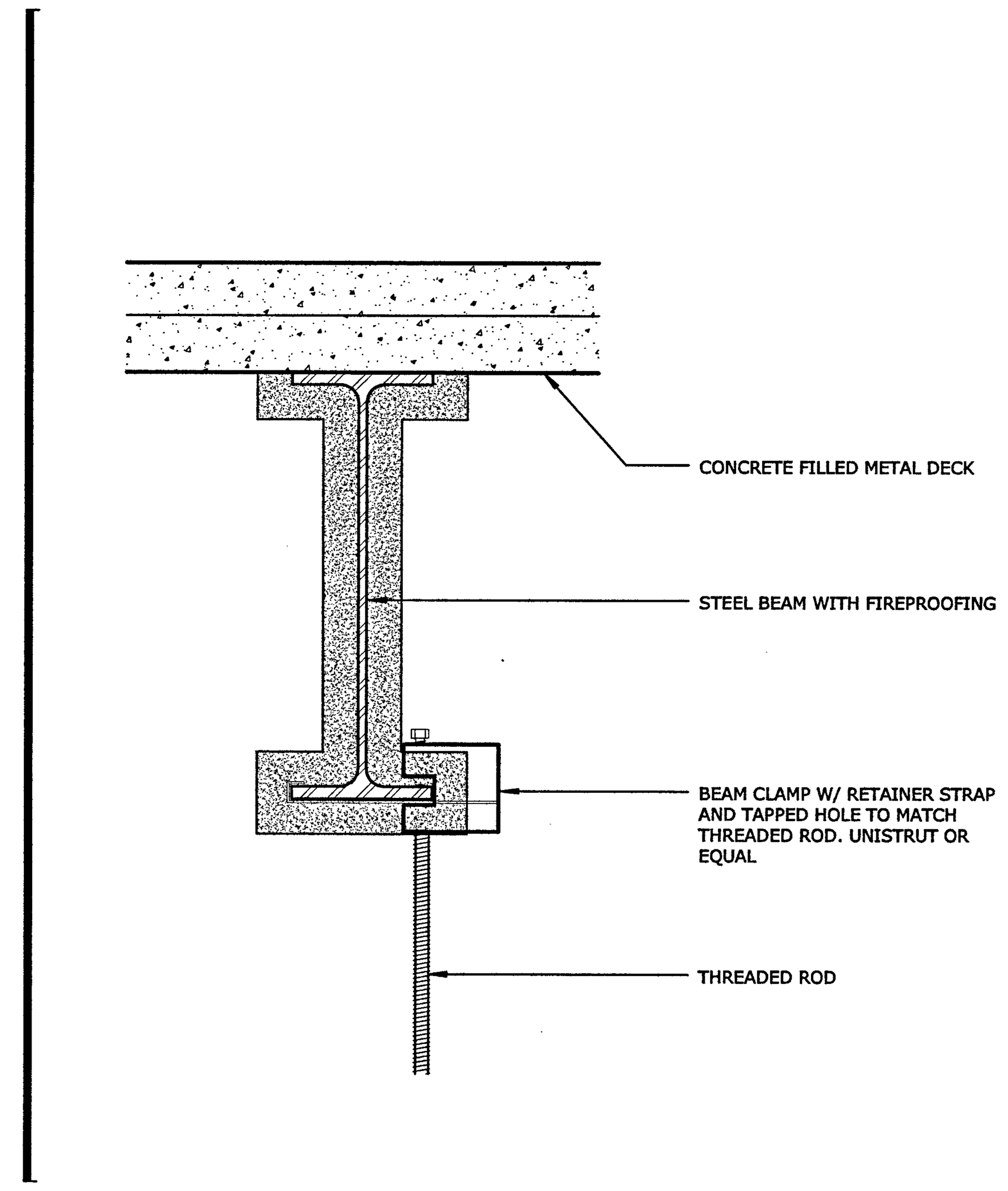
GYPSUM BOARD BULKHEAD AT SUSPENDED ACOUSTICAL CEILING (14)
3" = 1'-0" REFERENCE: A3.21 / 2



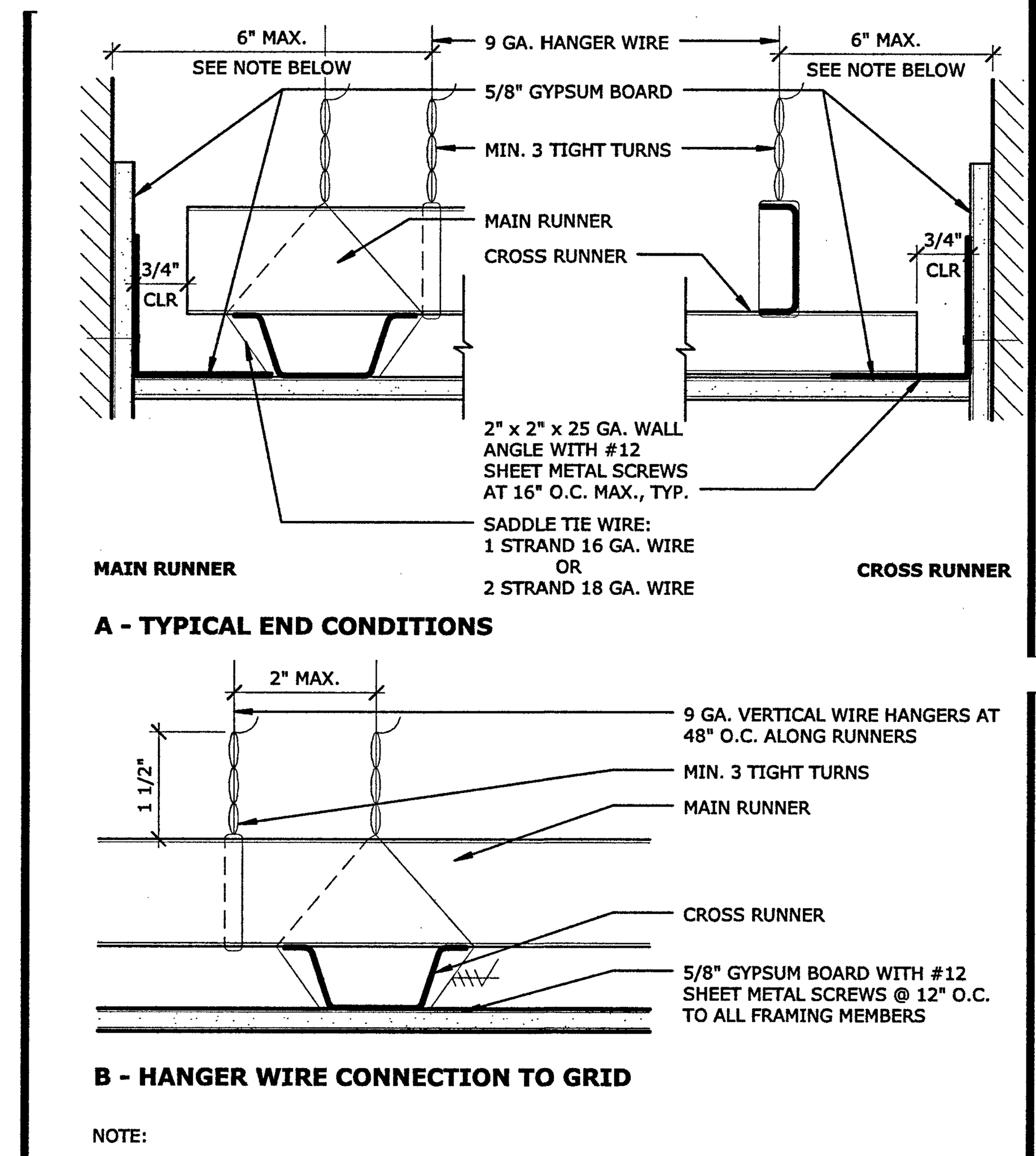
ROLLER SHADE AT WINDOW HEAD - PLASTER SOFFIT (11)
3" = 1'-0" REFERENCE: A3.22 / 1



GYPSUM BOARD SOFFIT AT GYPSUM BOARD CEILING (8)
3" = 1'-0" REFERENCE: A6.01 / 1



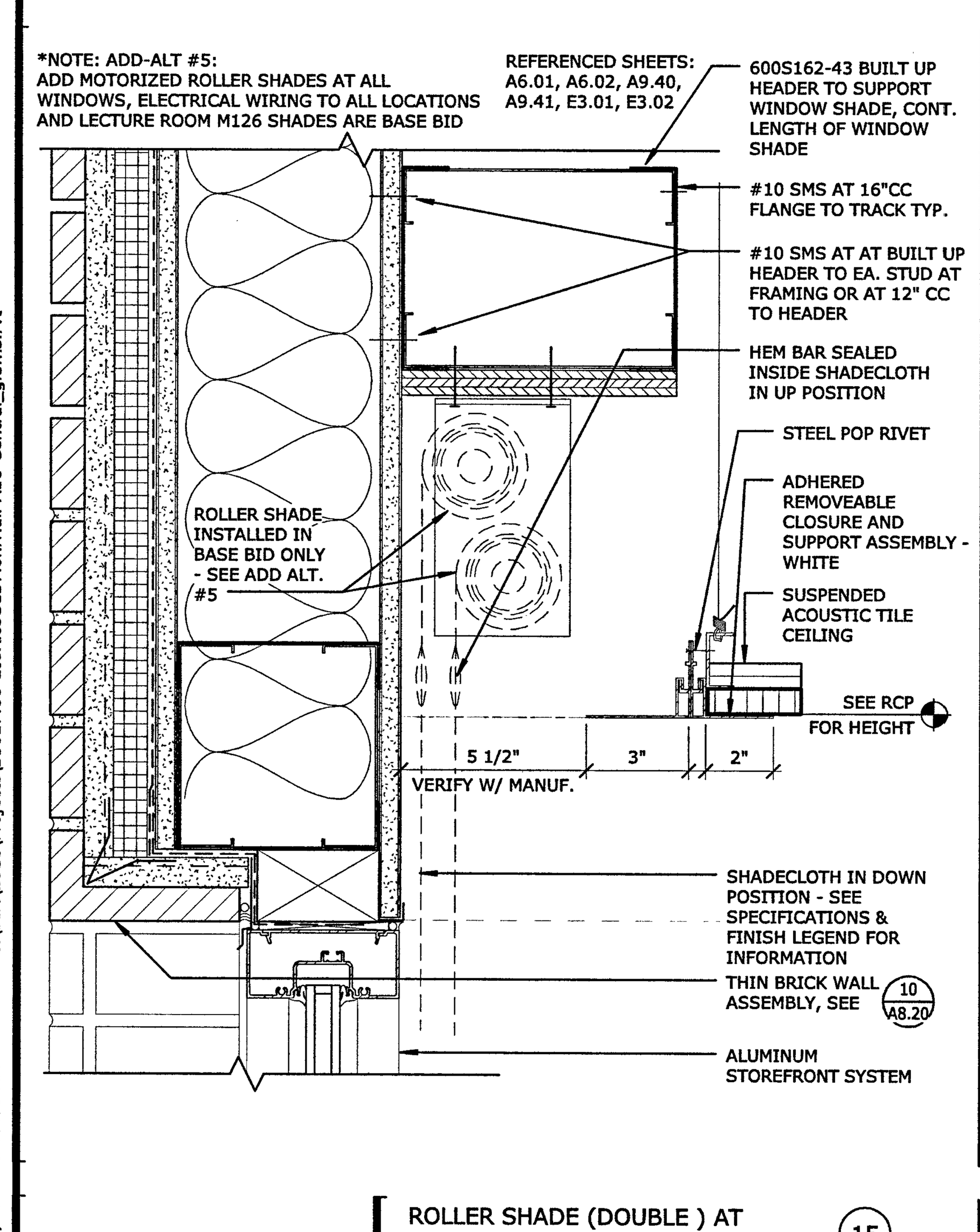
THREADED ROD ATTACHMENT AT BEAM (5)
3" = 1'-0" REFERENCE:



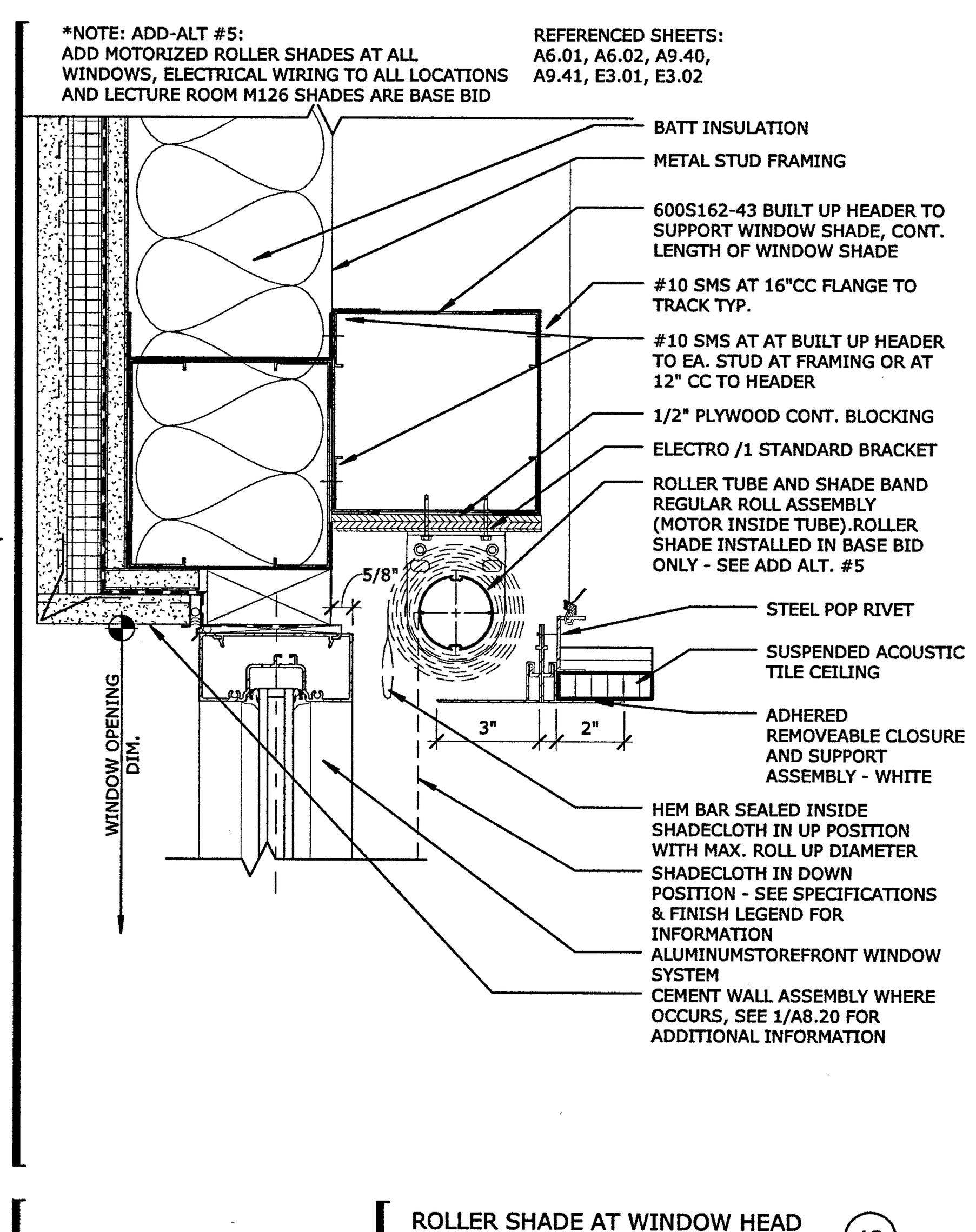
NOTE:

OR 1/4 OF THE LENGTH OF THE END RUNNER, WHICHEVER IS LESS

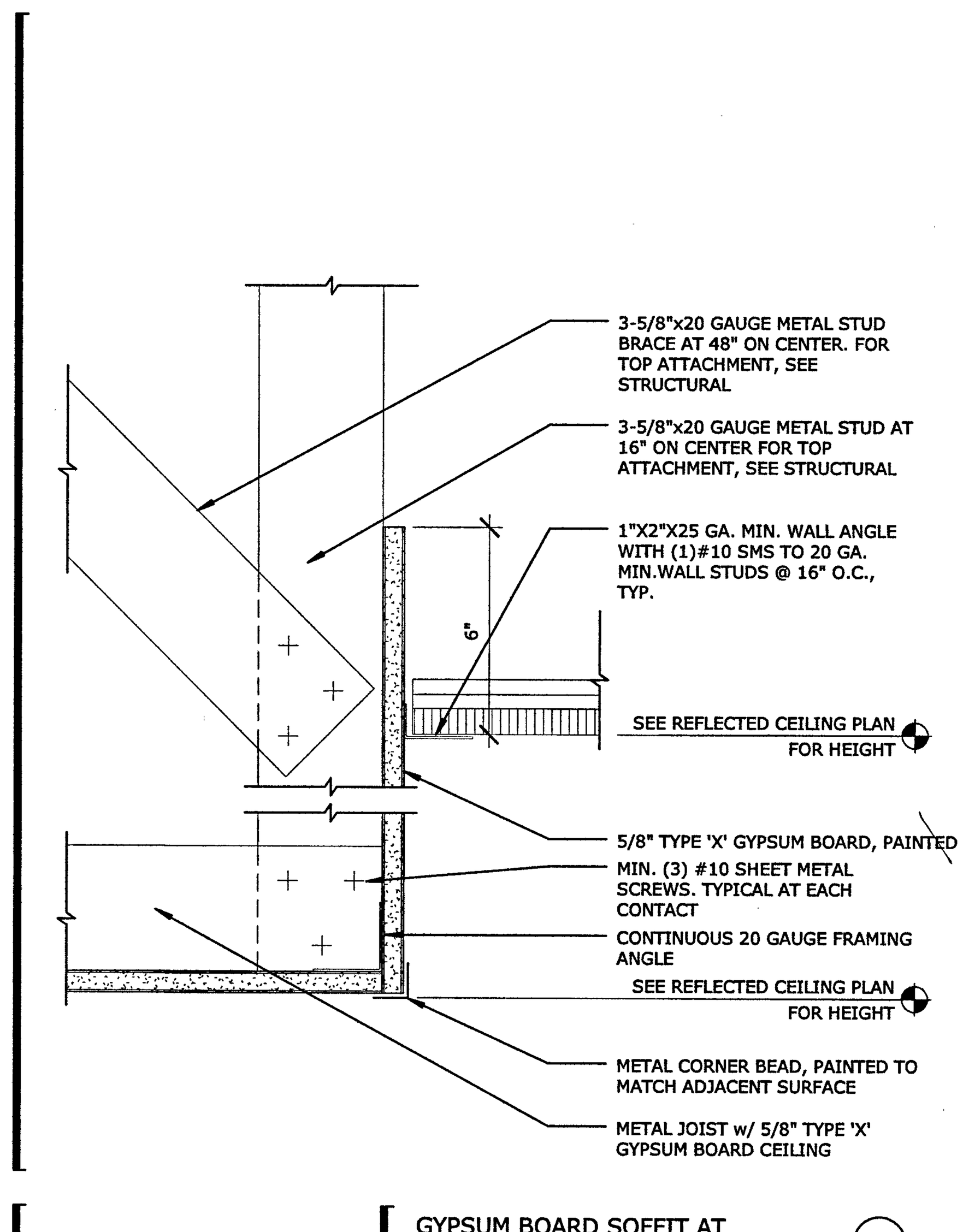
HANGER WIRE CONNECTION (GYP.) (2)
6" = 1'-0" REFERENCE: A3.22 / 1



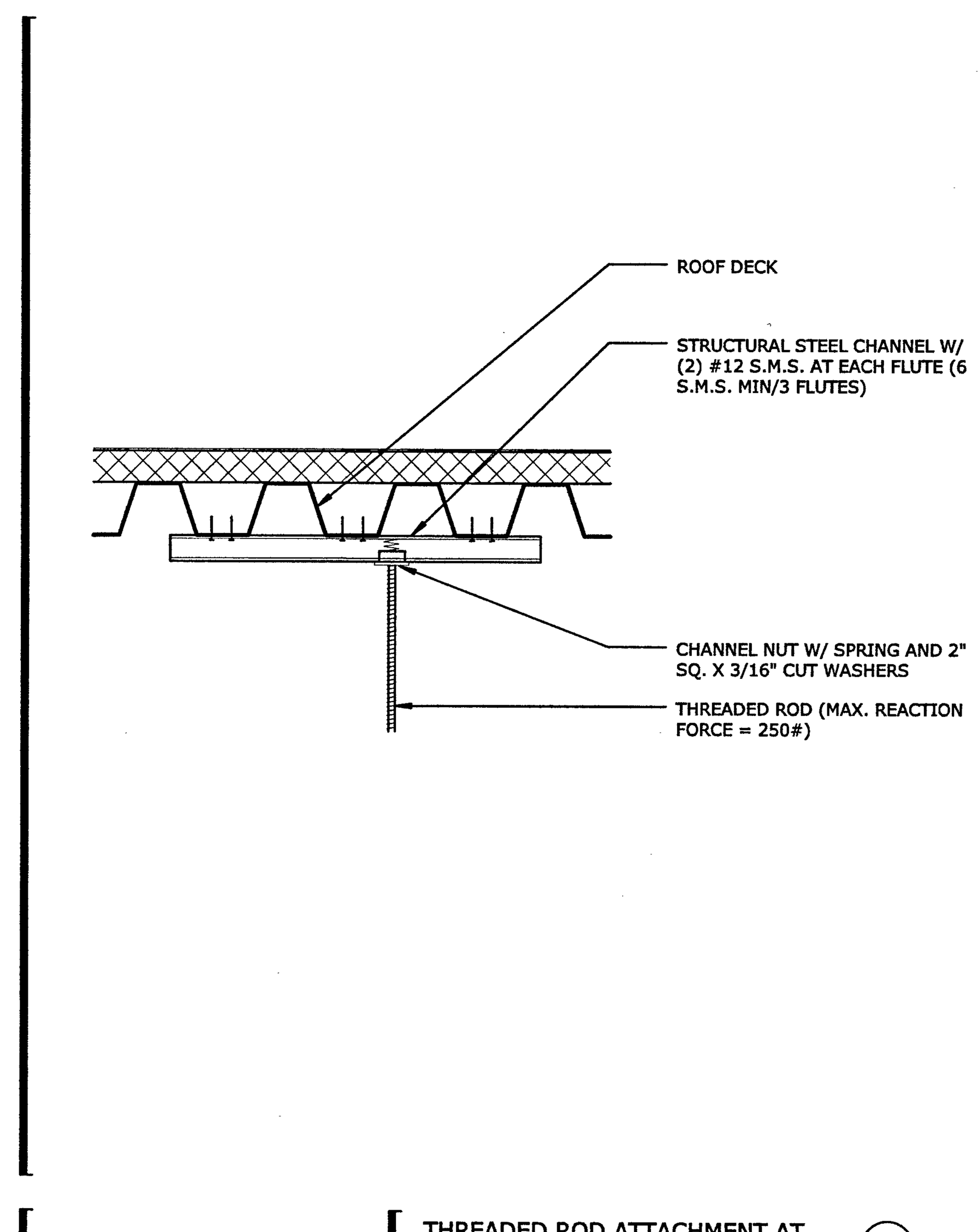
ROLLER SHADE (DOUBLE) AT LECTURE ROOM (15)
3" = 1'-0" REFERENCE: A3.21 / 2



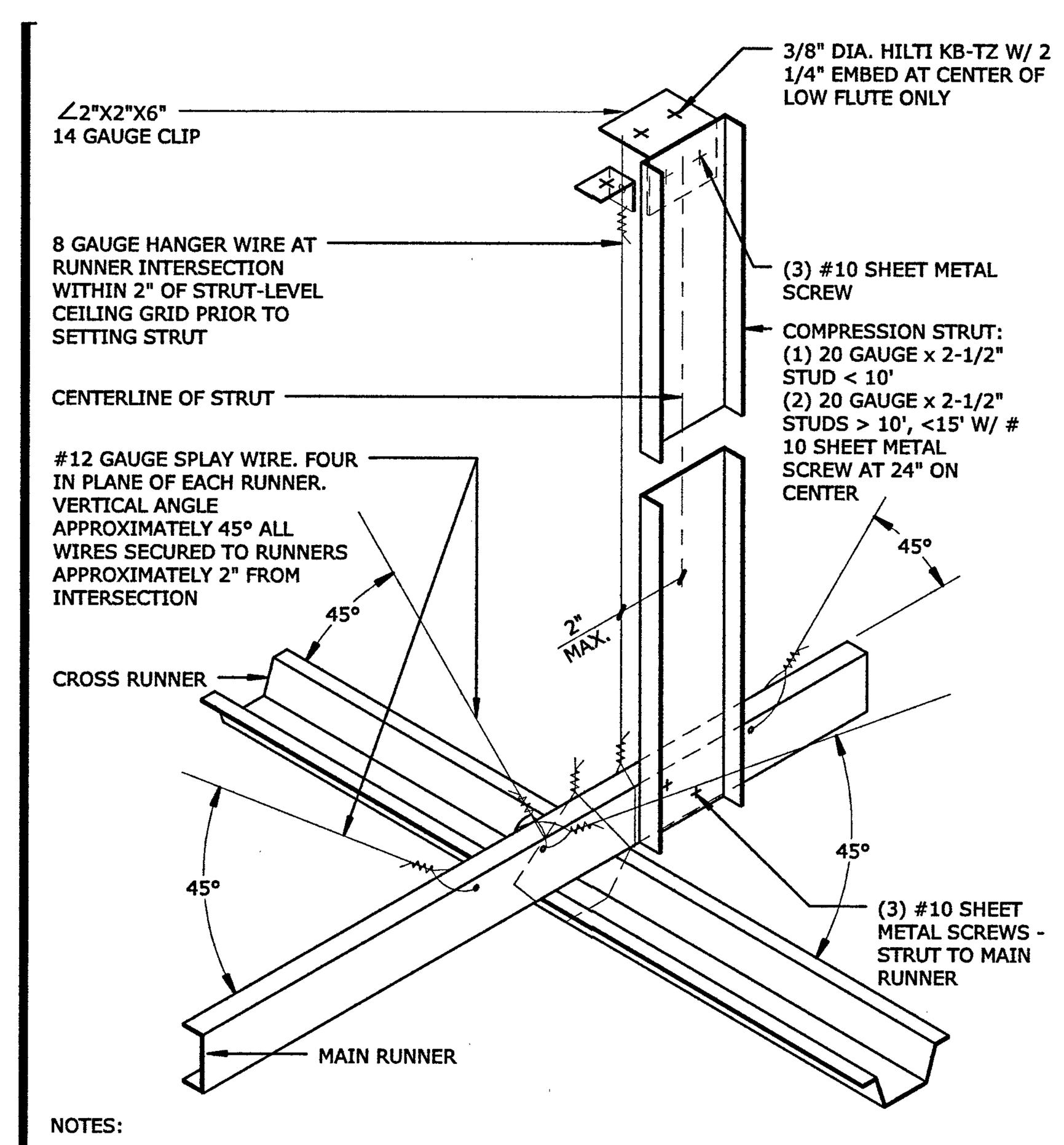
ROLLER SHADE AT WINDOW HEAD - WALL (12)
3" = 1'-0" REFERENCE: A3.22 / 3



GYPSUM BOARD SOFFIT AT SUSPENDED ACOUSTIC CEILING (9)
3" = 1'-0" REFERENCE: A3.27 / 2



THREADED ROD ATTACHMENT AT STEEL DECK (6)
1 1/2" = 1'-0" REFERENCE:



NOTES:

1. PROVIDE AT LEAST ONE SEISMIC BRACE FOR EACH 12x12 GRID OF CEILING.
2. VERTICAL WIRE HANGERS SHALL BE WRAPPED A MIN. OF 3 TIGHT TURNS WITHIN 1-1/2" OF ATTACHMENT.
3. SPLAYED SEISMIC BRACING WIRES SHALL BE WRAPPED A MIN. OF 4 TIGHT TURNS WITHIN 1-1/2" OF ATTACHMENT.

COMPRESSION STRUT - SUSPENDED GYP. BD. CEILING (3)
3" = 1'-0" REFERENCE: A9.41 / 1

Dreyfuss+ Blackford architecture
3540 Folsom Blvd
Sacramento, CA
95816-6699
T 916.453.1234
dreyfussblackford.com

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PLAN CHECK SET

	REVISION	BY	DATE
1	~~BACKCHECK 1~~		
2	~~BACKCHECK CHANGES~~		
3	REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

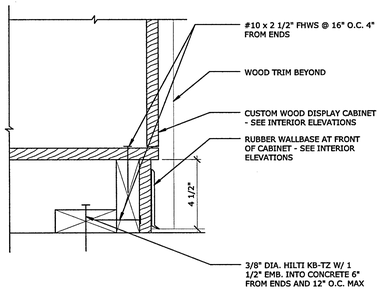
LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

INTERIOR CEILING DETAILS

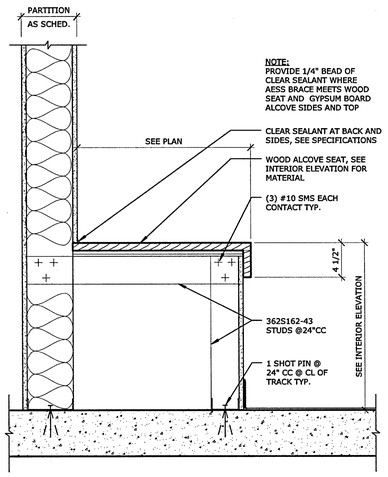
B5017.00

May 22, 2018

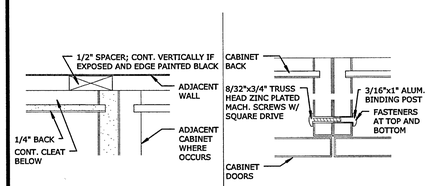
A9.41

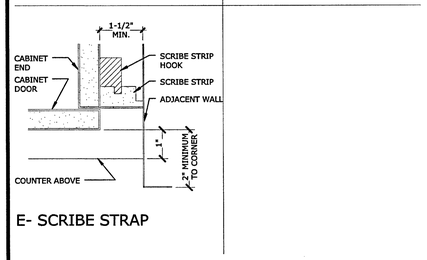


GLASS DISPLAY CASE - BASE CONDITION (13)
3" = 1'-0" REFERENCE: A9.60 / 11

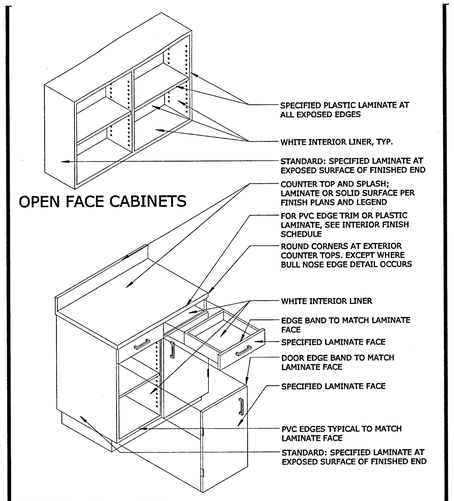


ALCOVE SEAT - SECTION (10)
1 1/2" = 1'-0" REFERENCE: A5.01 / 15

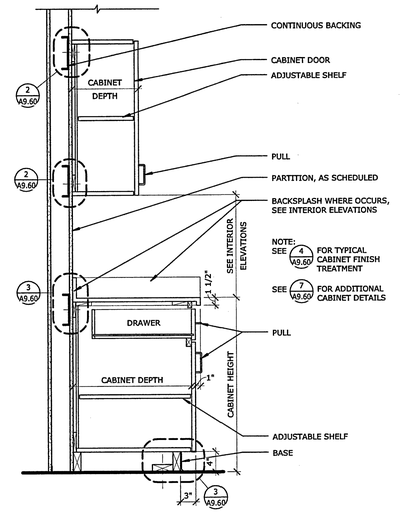




CABINET DETAILS (7)
3/16" = 1'-0" REFERENCE: A9.60 / 11



CABINET FINISH (4)
3/16" = 1'-0" REFERENCE:



TYPICAL CABINET SECTION (1)
1" = 1'-0" REFERENCE: A4.03 / 4

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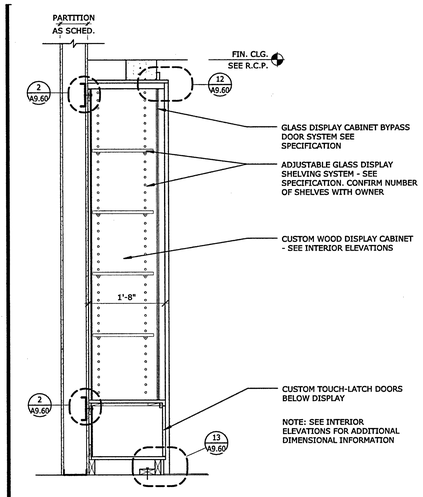
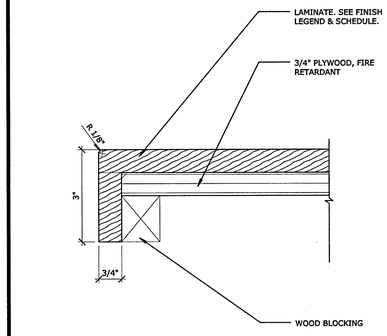
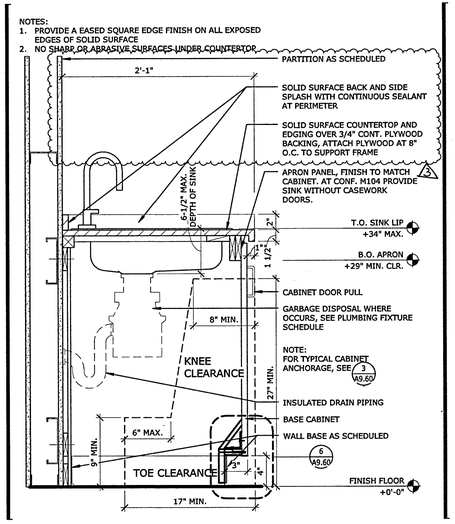
3540 Folsom Blvd
Sacramento, CA
95816-6699
T 916.453.1234
dreyfussblackford.com



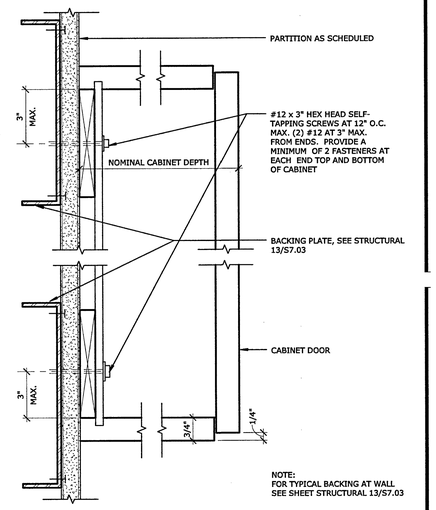
GLASS DISPLAY CASE - SECTION (11)
3/4" = 1'-0" REFERENCE: A4.02 / 6



3" COUNTER EDGE (8)
6" = 1'-0" REFERENCE:



ACCESSIBLE SINK AT CABINET (5)
1 1/2" = 1'-0" REFERENCE: A2.01 / 1



CASEWORK ANCHORAGE - WALL CABINET (2)
6" = 1'-0" REFERENCE: A9.60 / 1

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DATE 5-10-18
rev 3

LICENSED ARCHITECT
C32310
COURTNEY ALLROD GOLDEN
EXP. 08/31/19
STATE OF CALIFORNIA

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PLAN CHECK SET

REVISION	BY	DATE
~~1 BACKCHECK 1~~		
~~2 BACKCHECK CHANGES~~		
3 REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

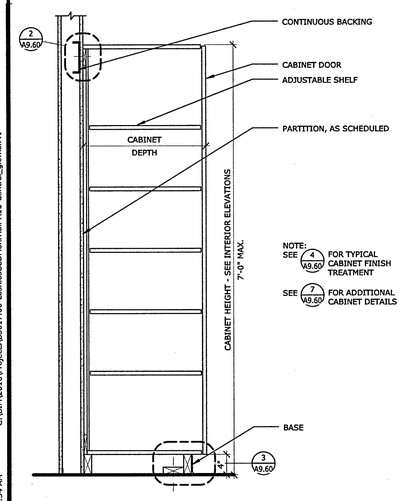
LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

MILLWORK AND CASEWORK DETAILS

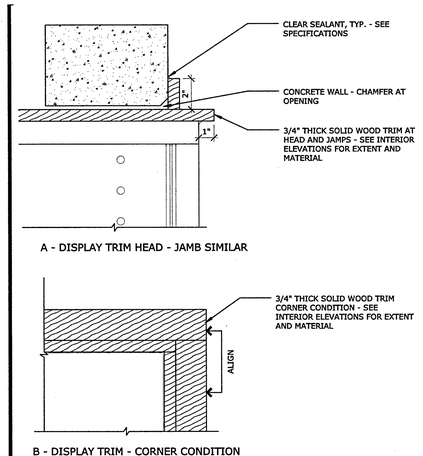
B5017.00

May 22, 2018

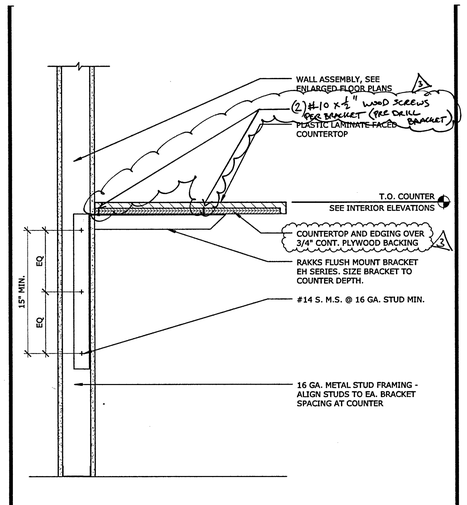
A9.60



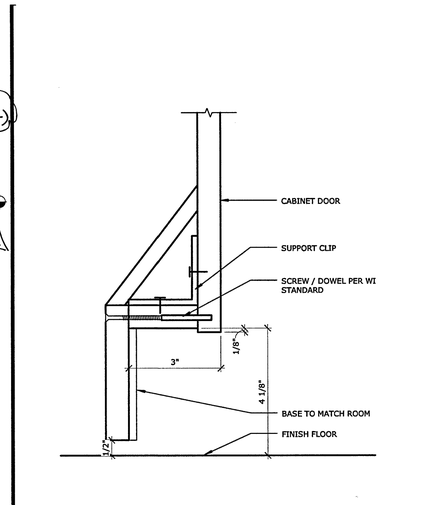
TYPICAL FULL HEIGHT CABINET SECTION (15)
1" = 1'-0" REFERENCE:



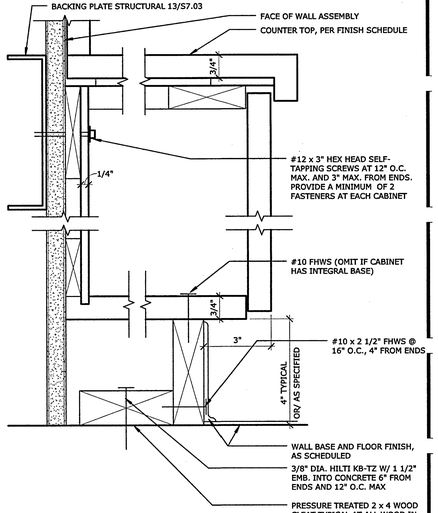
GLASS DISPLAY CASE - WOOD TRIM AT HEAD (JAMB SIM.) (12)
3" = 1'-0" REFERENCE: A4.02 / 7



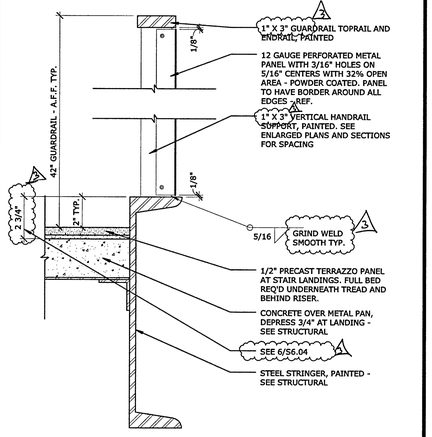
WALL HUNG COUNTER (9)
1 1/2" = 1'-0" REFERENCE: A4.02 / 4



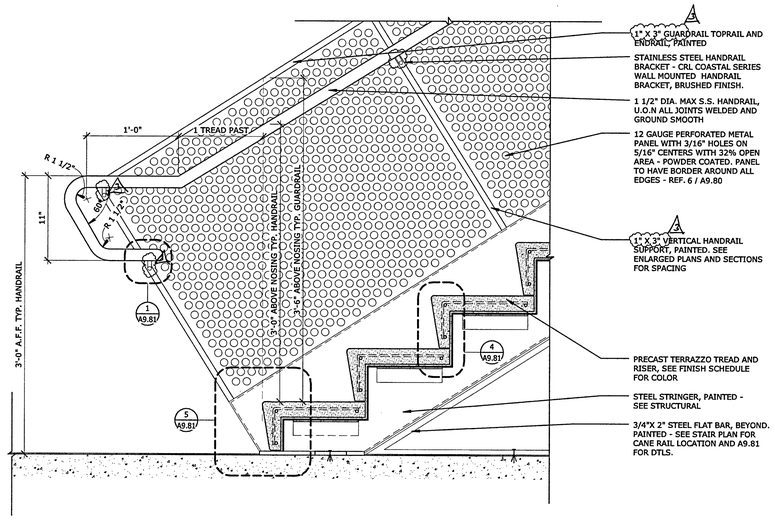
INTEGRAL TOE KICK (6)
6" = 1'-0" REFERENCE: A9.60 / 5



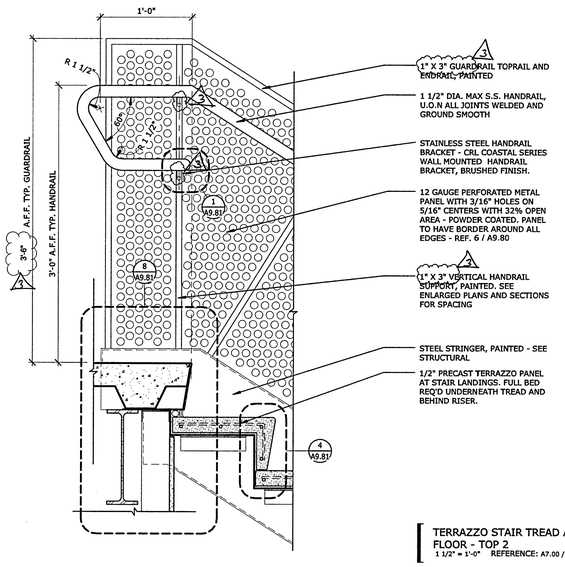
CASEWORK ANCHORAGE - BASE CABINET (3)
6" = 1'-0" REFERENCE: A9.60 / 1



TERRAZZO STAIR - INTERMEDIATE LANDING GUARDRAIL (7)
3" = 1'-0" REFERENCE: A7.00 / 1



TERRAZZO STAIR TREAD AT CONCRETE SLAB - BOTTOM 2 (4)
1 1/2" = 1'-0" REFERENCE: A7.00 / 1



TERRAZZO STAIR TREAD AT FLOOR - TOP 2 (1)
1 1/2" = 1'-0" REFERENCE: A7.00 / 1

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dreyfussblackford.com

GENERAL NOTES

1. AT INTERIOR STAIRS PROVIDE CONTRASTING COLOR STRIP AT UPPER APPROACH AND AT LOWEST TREAD IN EACH STAIR RUN, SEE DETAIL 4/A9.81 AND 2/A9.82 TYPICAL.
2. ALL EXPOSED STEEL IN THE AREA OF STAIR 1 TO BE AESS, INLCUDING BRACE FRAME. SEE STRUCTURAL SPECIFICATION 05 12 13
3. SEE A2.53 FOR STAIR 1 FLOOR FINISHES

NOTE:
1. FOR GUARDRAIL PANEL ATTACHMENT TO POST - SEE (1/A9.81)

INSIDE RAIL PLAN AT INTERMEDIATE LANDING (8)
3" = 1'-0" REFERENCE: A7.00 / 1

TERRAZZO STAIR TREAD AT INT. LANDING - BOTTOM 2 Copy 1 (5)
1 1/2" = 1'-0" REFERENCE: A7.00 / 1

TERRAZZO STAIR TREAD AT INT. LANDING - BOTTOM 2 (2)
1 1/2" = 1'-0" REFERENCE: A7.00 / 1

NOTE:
1. FOR GUARDRAIL PANEL ATTACHMENT TO POST - SEE (1/A9.81)

GUARDRAIL PANEL DETAIL (6)
1 1/2" = 1'-0" REFERENCE:

TERRAZZO STAIR TREAD AT INTERMEDIATE LANDING - TOP 2 (3)
1 1/2" = 1'-0" REFERENCE: A7.00 / 1

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COURTNEY ALICIO GOLDEN
EXP. 08/31/19
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	REVISION	BY	DATE
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3	REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

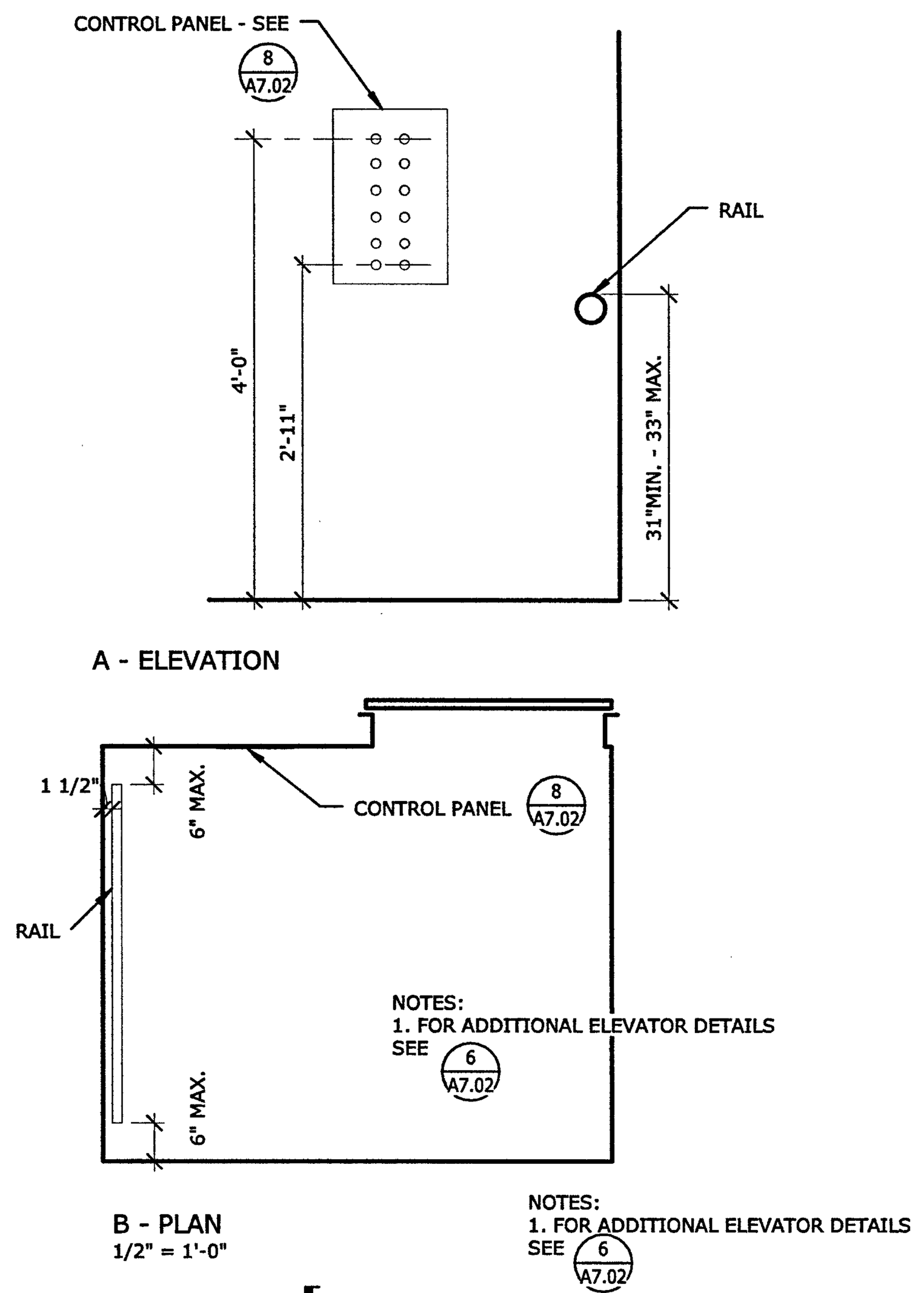
STAIR 1 AND GUARDRAIL DETAILS

B5017.00

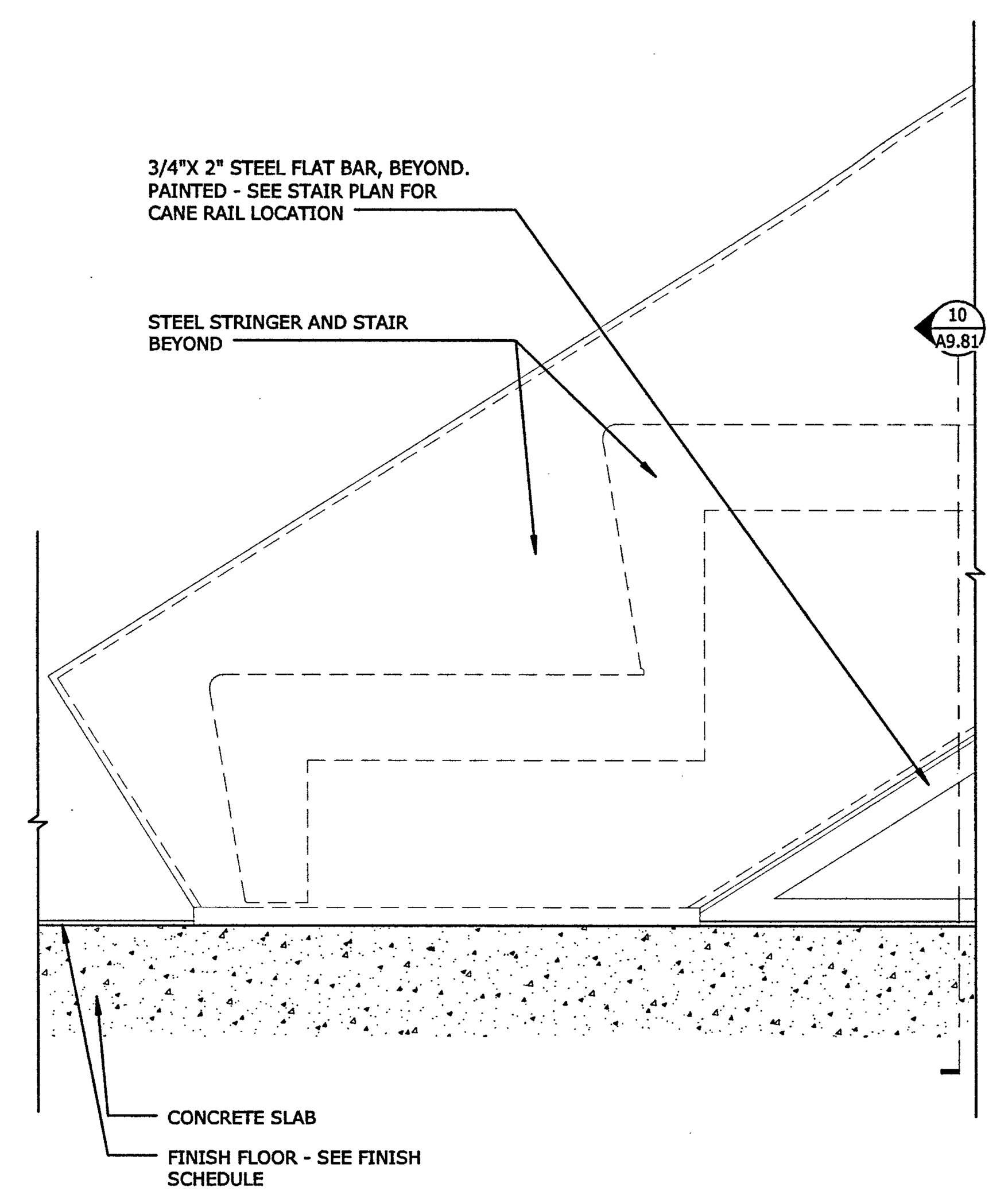
May 22, 2018

A9.80

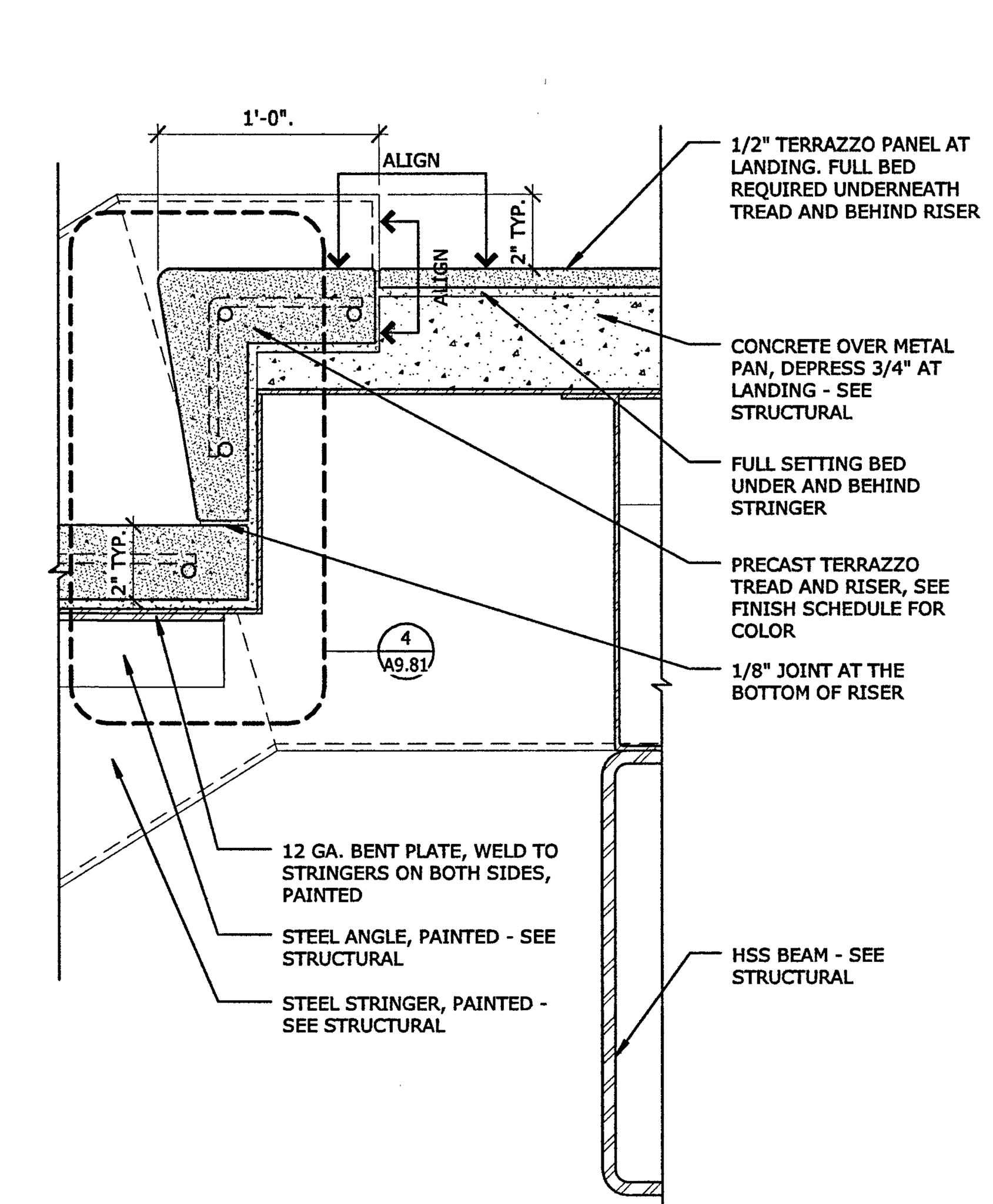
5/22/2018 10:09:39 AM C:\BIM\2016\Projects\B5017.00-LosRiosCCDMohrHall-A16-Central_gilewis.rvt



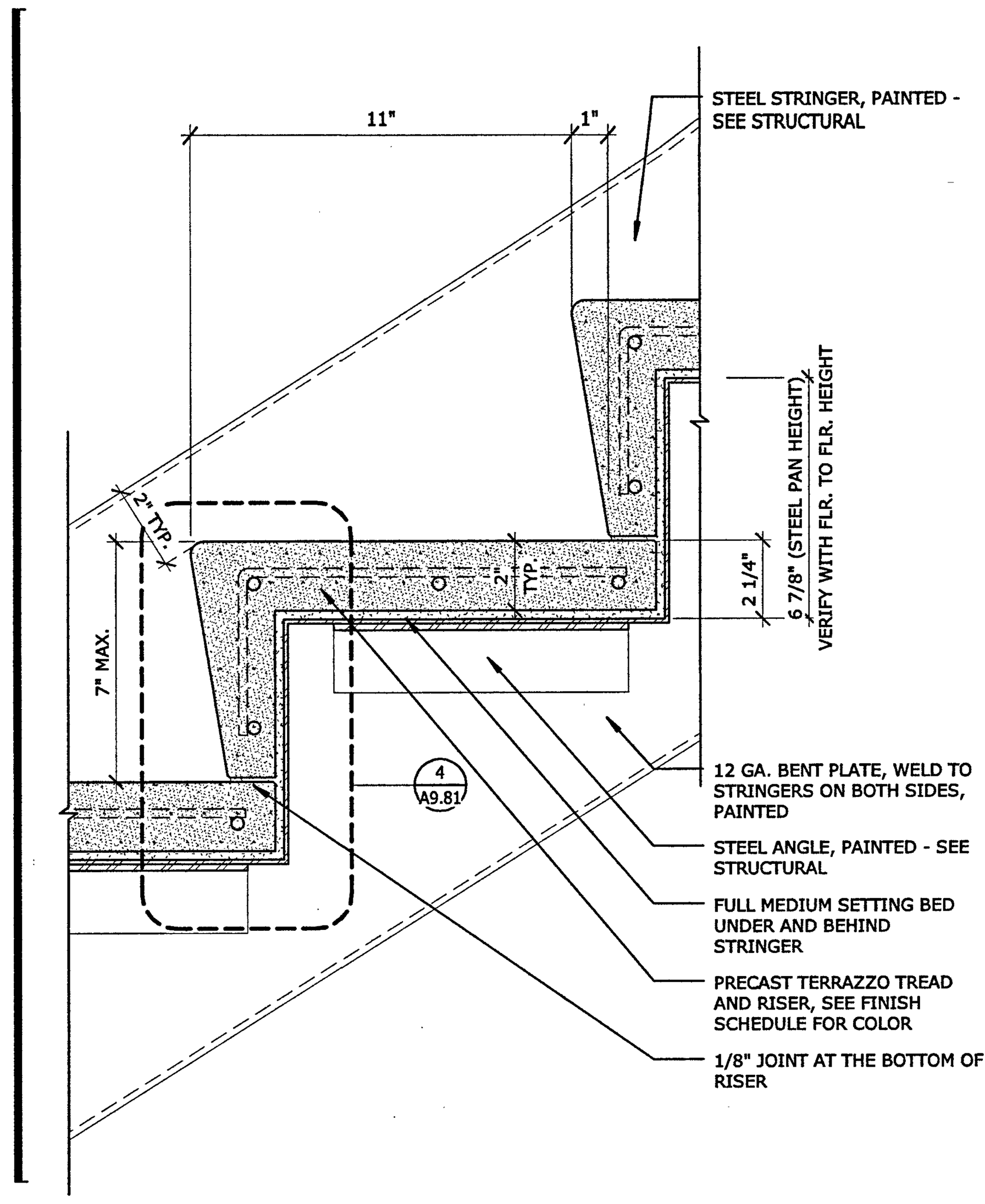
ELEVATOR CAB INSTALLATION HEIGHTS 13
3/4" = 1'-0" REFERENCE:



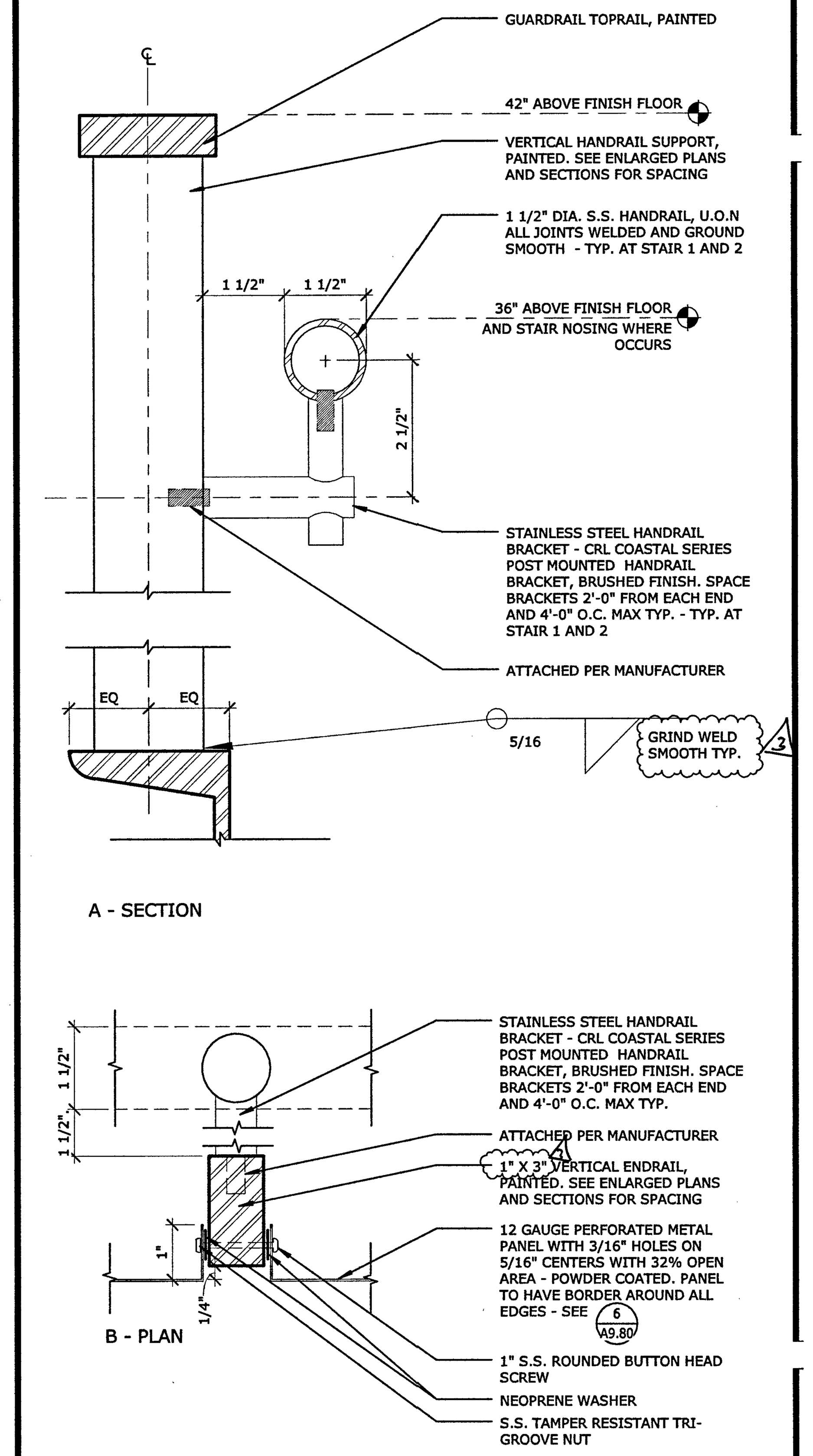
CANE DETECTION AT STAIR 1 - SECTION 1 9
3" = 1'-0" REFERENCE:



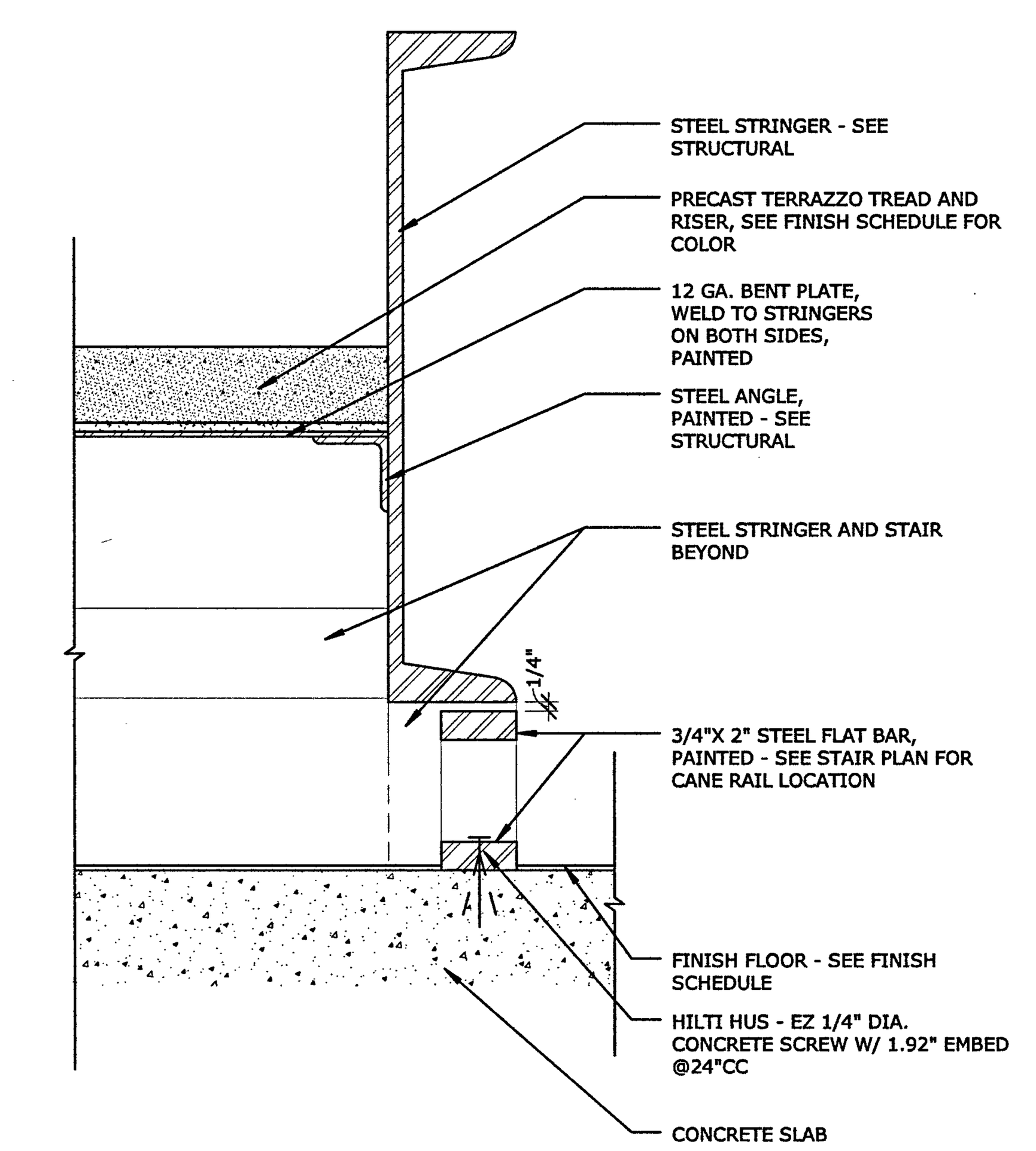
TERRAZZO STAIR TREAD AT INTERMEDIATE LANDING - TOP 6
3" = 1'-0" REFERENCE: A9.80 / 3



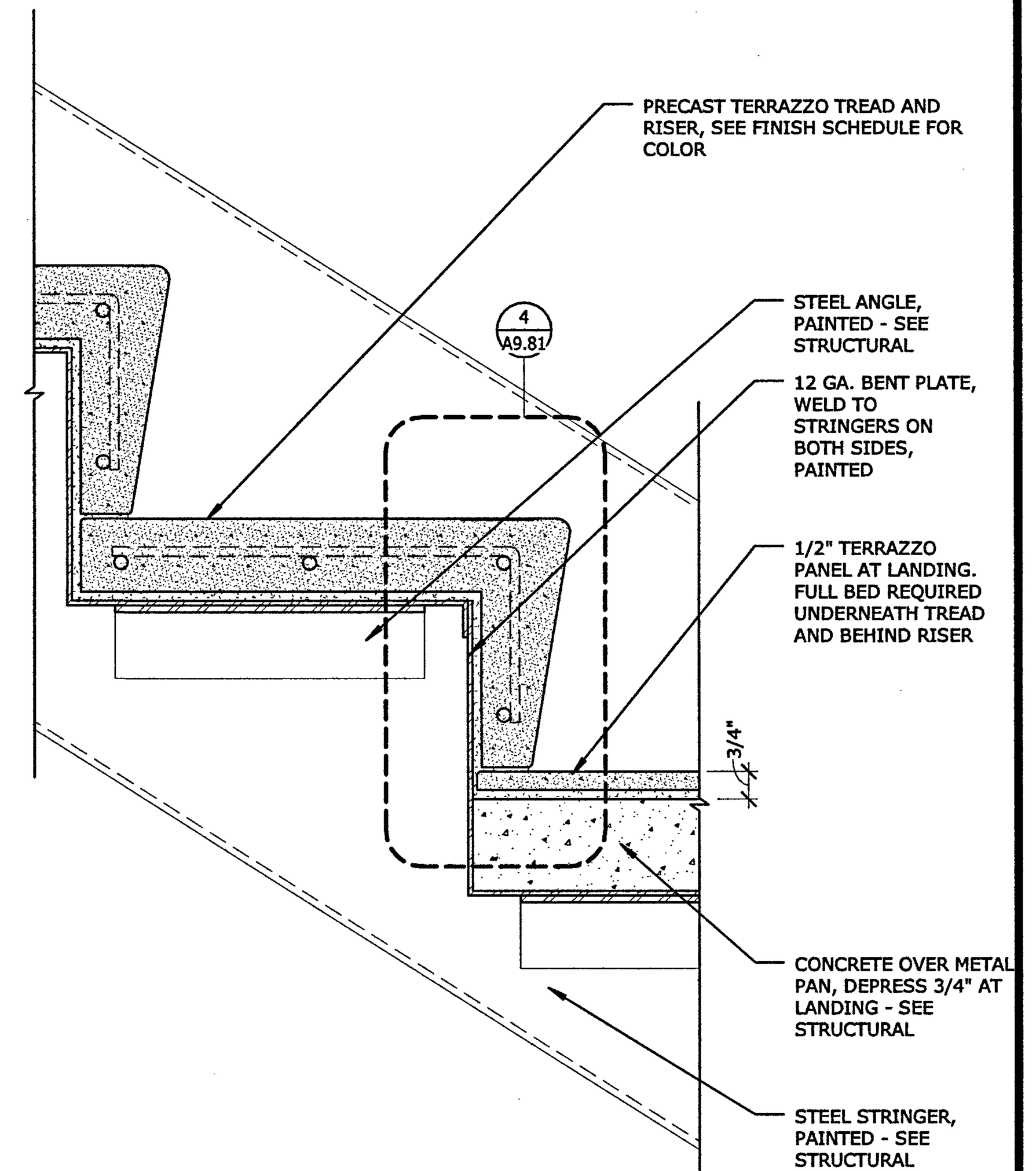
TERRAZZO STAIR TREAD TYP. 3
3" = 1'-0" REFERENCE:



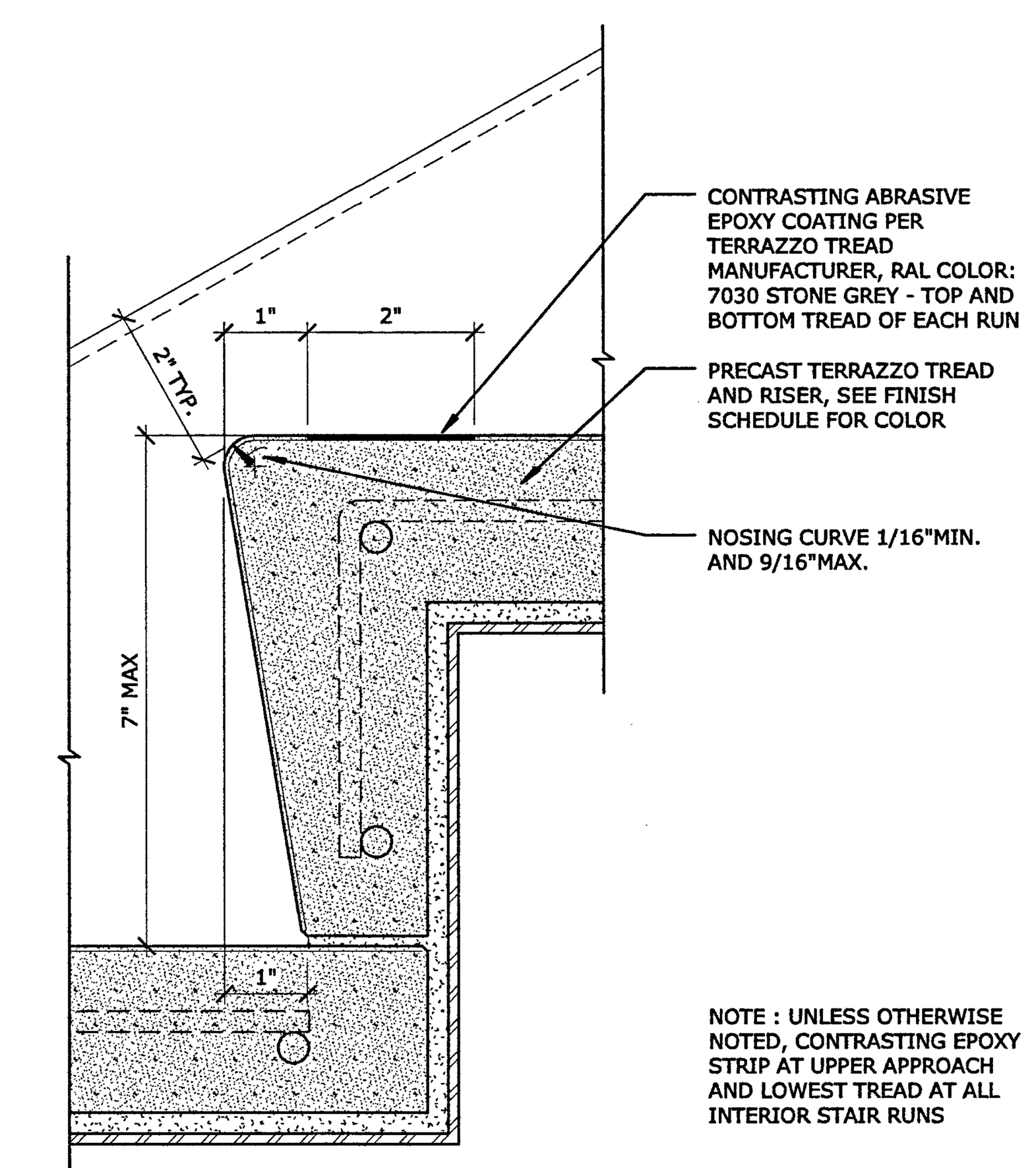
HANDRAIL ATTACHMENT - SECTION1 1
6" = 1'-0" REFERENCE: A7.00 / 1



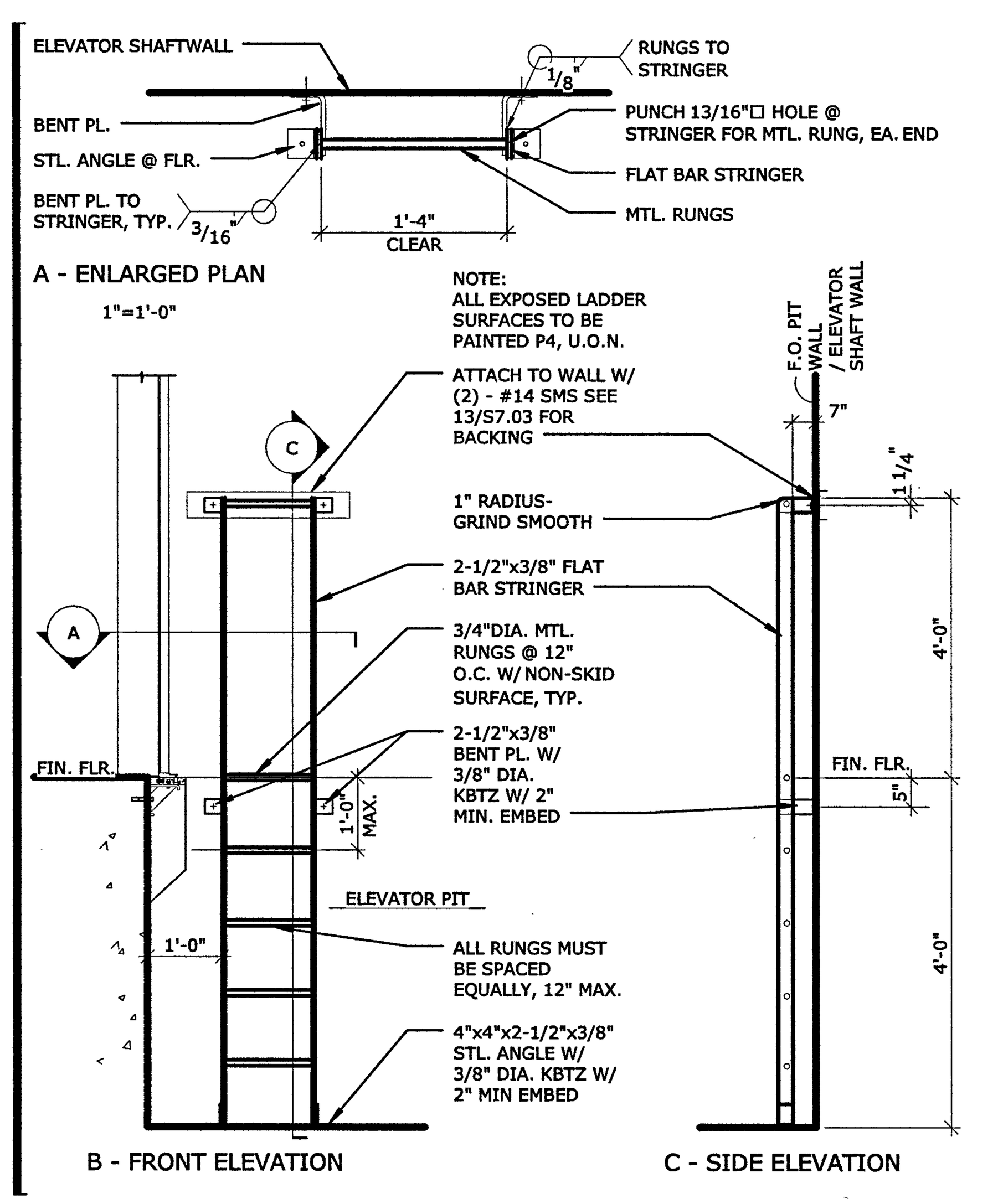
CANE DETECTION AT STAIR 1 - SECTION 2 10
3" = 1'-0" REFERENCE: A7.00 / 2



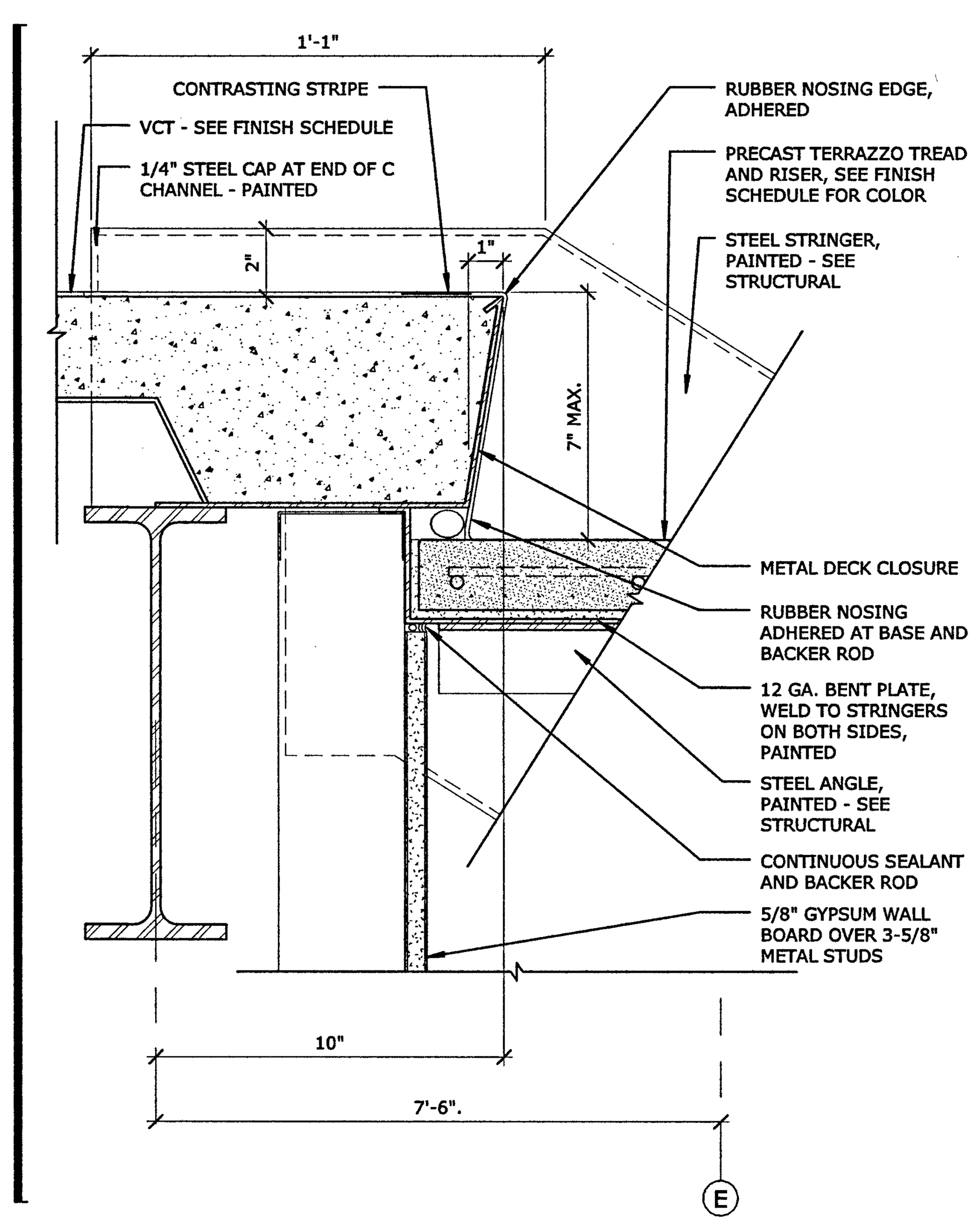
TERRAZZO STAIR TREAD AT INTERMEDIATE FLOOR - BOTTOM 7
3" = 1'-0" REFERENCE: A9.80 / 2



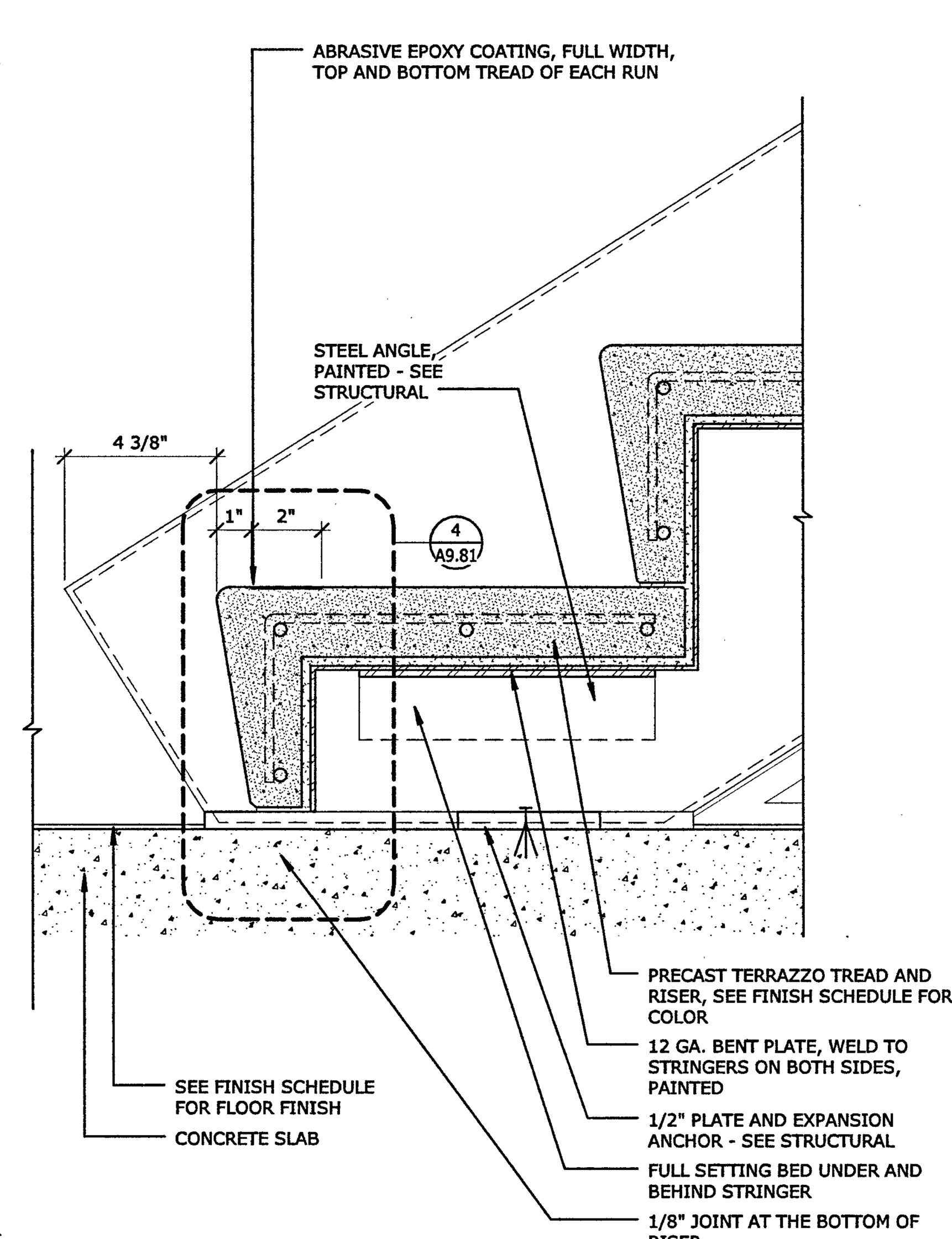
TERRAZZO STAIR TREAD NOSE STRIP1 4
6" = 1'-0" REFERENCE: A9.80 / 1



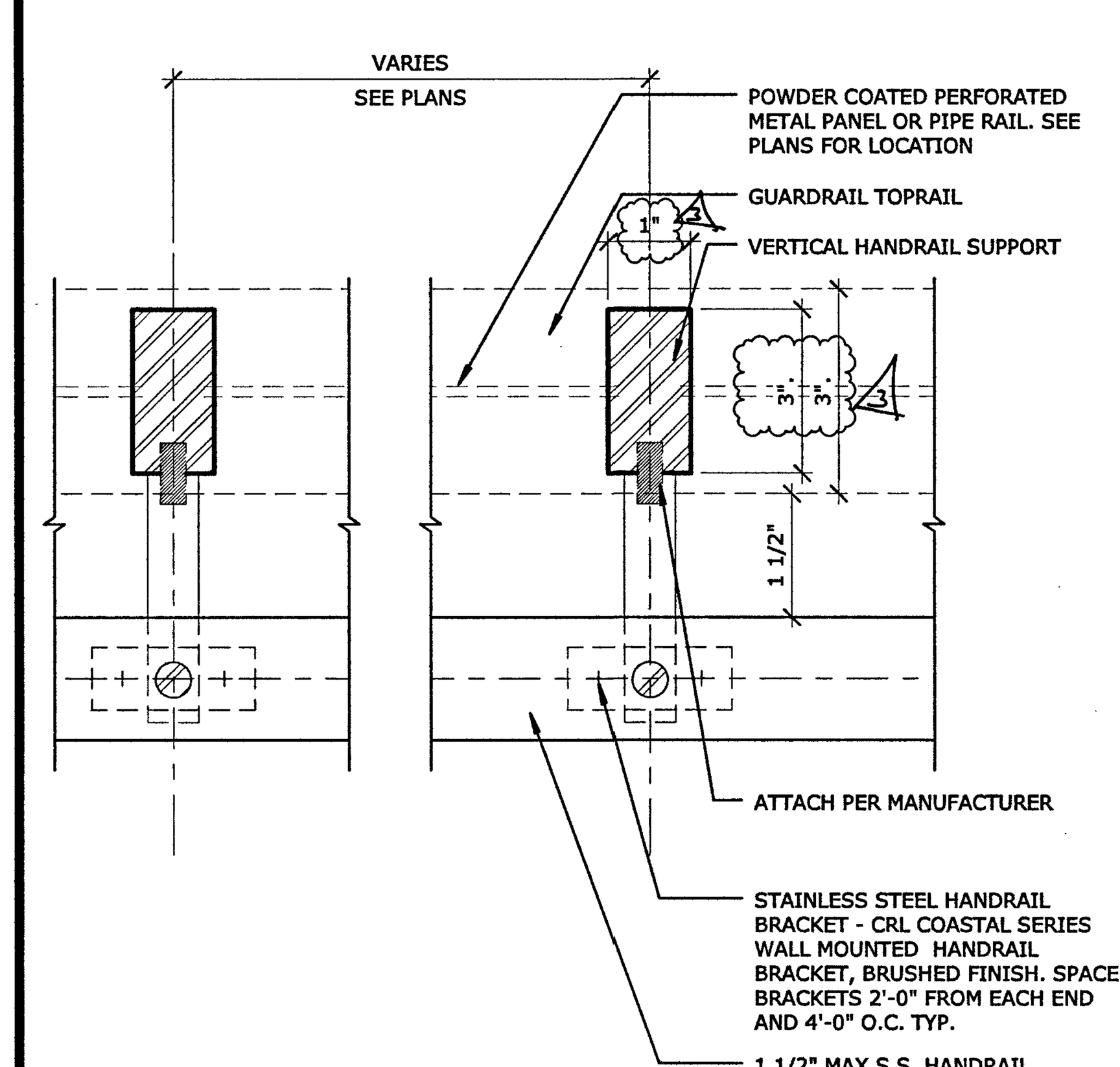
ELEVATOR PIT LADDER DETAILS 11
1/2" = 1'-0" REFERENCE: A7.02 / 1



TERRAZZO STAIR TREAD AT FLOOR - TOP 8
3" = 1'-0" REFERENCE: A9.80 / 1



TERRAZZO STAIR TREAD AT CONCRETE SLAB - BOTTOM 5
3" = 1'-0" REFERENCE: A9.80 / 4



HANDRAIL ATTACHMENT - PLAN1 2
6" = 1'-0" REFERENCE:

Dreyfuss+ Blackford architecture

3540 Folsom Blvd
Sacramento, CA
95816-6699
T 916.453.1234
dreyfussblackford.com

GENERAL NOTES

1. AT INTERIOR STAIRS PROVIDE CONTRASTING COLOR STRIP AT UPPER APPROACH AND AT LOWEST TREAD IN EACH STAIR RUN, SEE DETAIL 4/A9.81 AND 2/A9.82 TYPICAL.
2. ALL EXPOSED STEEL IN THE AREA OF STAIR 1 TO BE AESS, INLCUDING BRACE FRAME. SEE STRUCTURAL SPECIFICATION 05 12 13
3. SEE A2.53 FOR STAIR 1 FLOOR FINISHES

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2 BACKCHECK CHANGES		
3 REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

STAIR 1 AND ELEVATOR DETAILS

B5017.00

May 22, 2018

A9.81

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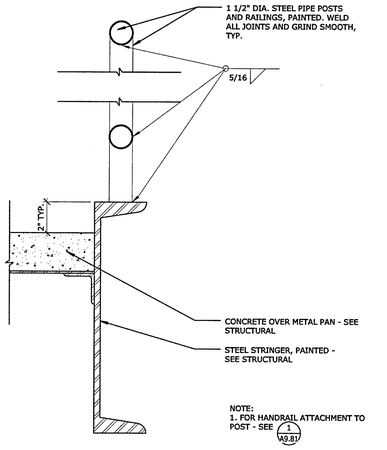
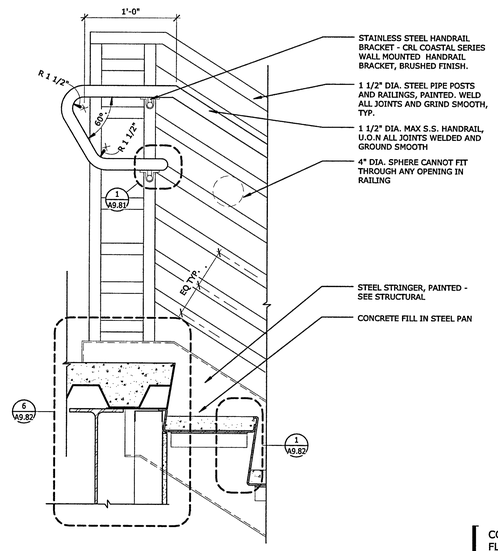
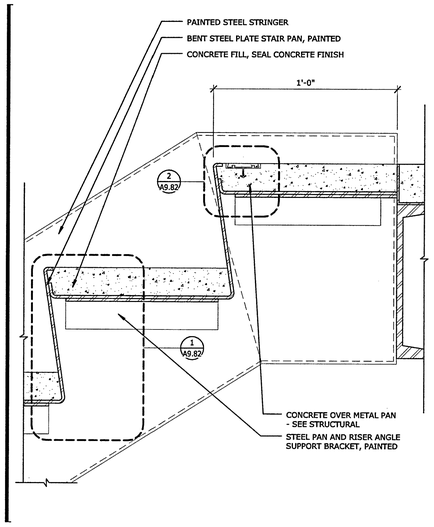


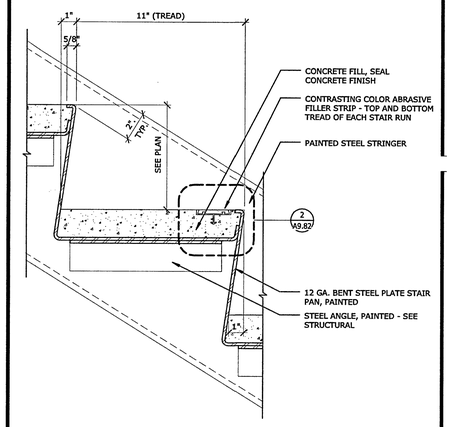
CONCRETE STAIR INTERMEDIATE LANDING GUARDRAIL 10
3" = 1'-0" REFERENCE: A7.01 / 1



CONCRETE STAIR TREAD AT FLOOR - TOP 2 7
1 1/2" = 1'-0" REFERENCE: A7.01 / 1



CONCRETE TREAD INTERMEDIATE LANDING TOP 4
3" = 1'-0" REFERENCE: A7.01 / 1



CONCRETE TREAD - FILLED1 1
3" = 1'-0" REFERENCE: A9.82 / 4

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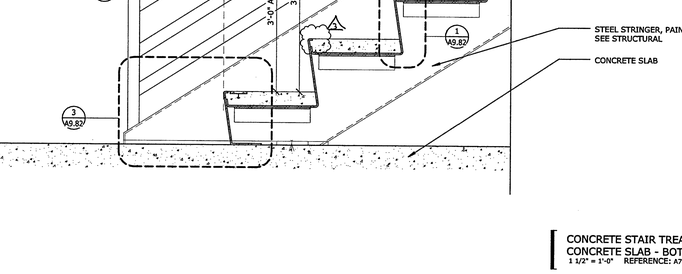
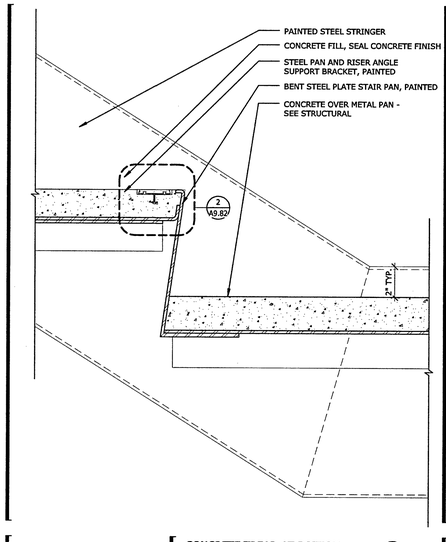
dreyfussblackford.com

GENERAL NOTES

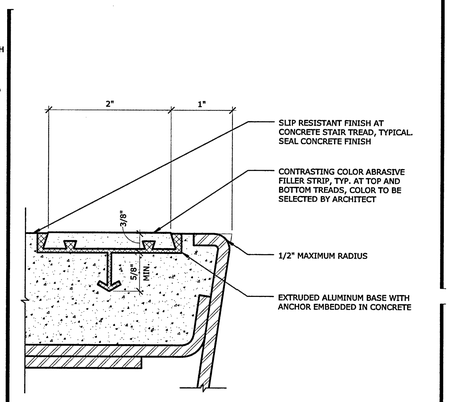
1. AT INTERIOR STAIRS PROVIDE CONTRASTING COLOR STRIP AT UPPER APPROACH AND AT LOWEST TREAD IN EACH STAIR RUN, SEE DETAIL 4/A9.81 AND 2/A9.82 TYPICAL.
2. ALL EXPOSED STEEL IN THE AREA OF STAIR 1 TO BE AESS, INCLUDING BRACE FRAME. SEE STRUCTURAL SPECIFICATION 05 12 13
3. SEE A2.53 FOR STAIR 1 FLOOR FINISHES



CONCRETE STAIR TREAD AT INT. LANDING - BOTTOM 2 8
1 1/2" = 1'-0" REFERENCE: A7.01 / 1



CONCRETE TREAD AT BOTTOM 5
3" = 1'-0" REFERENCE: A7.01 / 3



NOTE:
UNLESS OTHERWISE NOTED, CONTRASTING COLOR STRIP REQUIRED AT THE FOLLOWING LOCATIONS:

1. EXTERIOR - ALL TREADS
2. INTERIOR - TOP AND BOTTOM TREADS AT ALL STAIR RUNS.

STAIR NOSE STRIPING FOR ACCESSIBILITY 2
12" = 1'-0" REFERENCE: A9.82 / 1

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REN. 08/31/19
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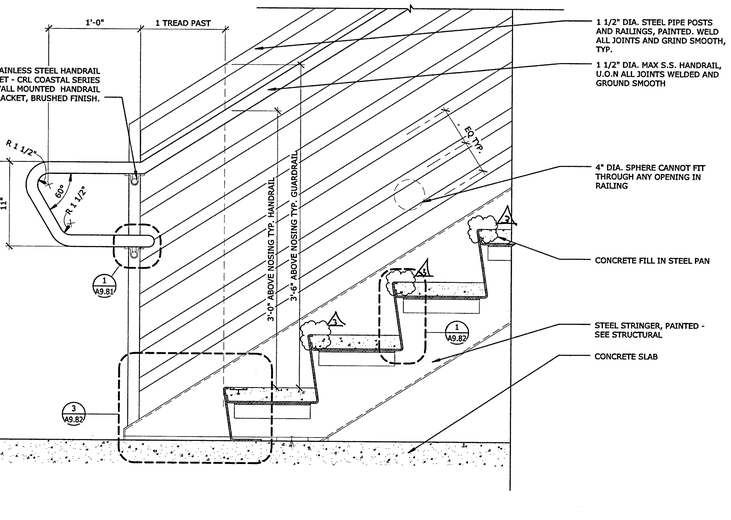
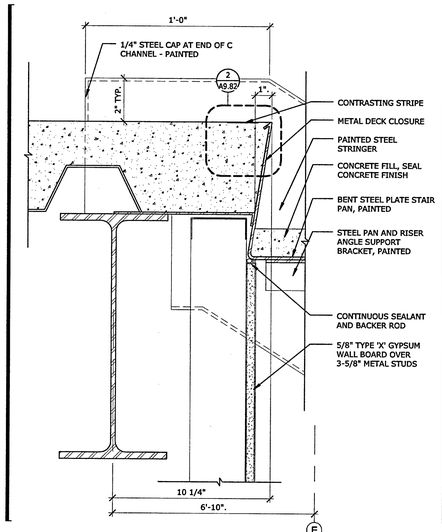
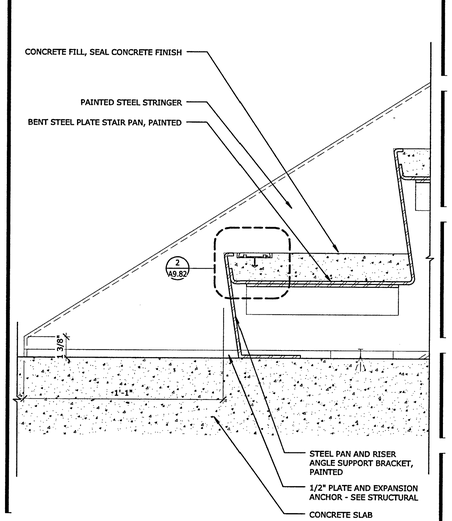
2	~~BACKCHECK CHANGES~~		
3	REVISED PLANS		



CONCRETE STAIR TREAD AT CONCRETE SLAB - BOTTOM 2 9
1 1/2" = 1'-0" REFERENCE: A7.01 / 1



CONCRETE TREAD AT TOP1 6
3" = 1'-0" REFERENCE: A9.82 / 7



CONCRETE TREAD AT FLOOR - BOTTOM1 3
3" = 1'-0" REFERENCE: A9.82 / 9

LOS RIOS COMM COLLEGE DISTRICT

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STAIR 2 DETAILS

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May 22, 2018

A9.82

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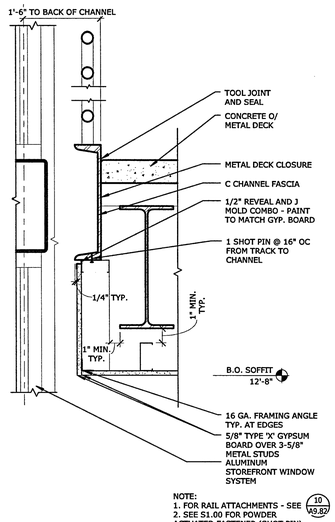
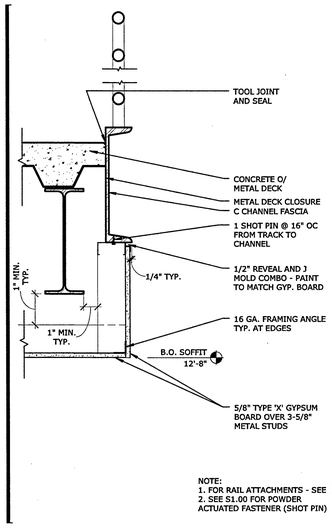


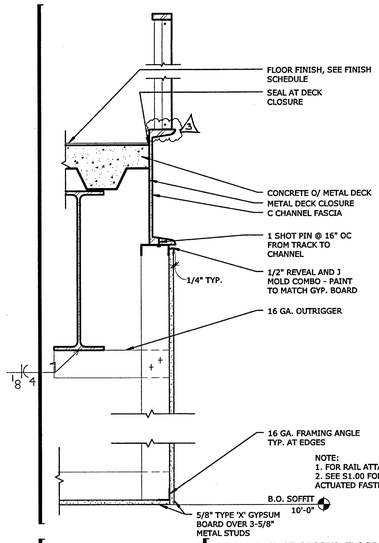
NOTE:
1. FOR RAIL ATTACHMENTS - SEE 10/A9.82
2. SEE S1.00 FOR POWDER ACTUATED FASTENER (SHOT PIN)

GUARDRAIL AT SECOND FLOOR STOREFRONT - STAIR 2 — 4
1 1/2" = 1'-0" REFERENCE: A7.01 / 1



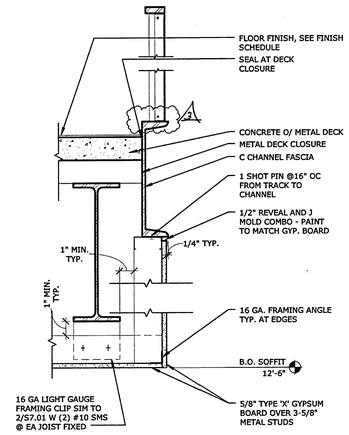
NOTE:
1. FOR RAIL ATTACHMENTS - SEE 10/A9.82
2. SEE S1.00 FOR POWDER ACTUATED FASTENER (SHOT PIN)

GUARDRAIL AT SECOND FLOOR LANDING - STAIR 2 — 3
1 1/2" = 1'-0" REFERENCE: A3.21 / 1



NOTE:
1. FOR RAIL ATTACHMENTS - SEE 1/A9.81
2. SEE S1.00 FOR POWDER ACTUATED FASTENER (SHOT PIN)

GUARDRAIL AT SECOND FLOOR CORRIDOR - STAIR 1 — 2
1 1/2" = 1'-0" REFERENCE: A7.00 / 1



NOTE:
1. FOR RAIL ATTACHMENTS - SEE 1/A9.81
2. SEE S1.00 FOR POWDER ACTUATED FASTENER (SHOT PIN)

GUARDRAIL AT SECOND FLOOR LANDING - STAIR 1 — 1
1 1/2" = 1'-0" REFERENCE: A7.00 / 1

Dreyfuss+ Blackford
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dreyfussblackford.com

GENERAL NOTES

1. AT INTERIOR STAIRS PROVIDE CONTRASTING COLOR STRIP AT UPPER APPROACH AND AT LOWEST TREAD IN EACH STAIR RUN, SEE DETAIL 4/A9.81 AND 2/A9.82 TYPICAL.
2. ALL EXPOSED STEEL IN THE AREA OF STAIR 1 TO BE AESS, INLCUDING BRACE FRAME. SEE STRUCTURAL SPECIFICATION 05 12 13
3. SEE A2.53 FOR STAIR 1 FLOOR FINISHES

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3	BACKCHECK CHANGES REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

STAIR 1 AND 2 SOFFIT DETAILS

B5017.00

May 22, 2018

A9.83

PLUMBING EQUIPMENT SCHEDULE

SYMBOL	DESCRIPTION
EWH 1-2	**ELECTRIC WATER HEATER-2:** "AO SMITH", MODEL DEN-40 ELECTRIC WATER HEATER. TOTAL STORAGE CAPACITY OF 40 GALLONS AND 31 GALLONS PER HOUR RECOVERY AT 80 F RISE. OUTPUT TEMPERATURE SHALL BE SET AT A MAXIMUM OF 120 F. PHYSICAL DATA : 45 1/8" TALL x 20 1/2" DIAMETER TOTAL FULL WEIGHT : 530 LBS. ELECTRICAL DATA: 208V/3 PH./60HZ, (2) 6 KW (SIMULTANEOUS UPPER/LOWER ELEMENT WATTAGE [12 KW TOTAL]) LOCATED : FIRST FLOOR MECHANICAL RM. M122 – SEE SHEET P2.1 SECOND FLOOR JANITOR RM. M210 – SEE SHEET P2.2 DETAIL: SEE 1/P5.2
CP 1-2	**CIRCULATING PUMP-1 & 2:** "BELL & GOSSETT" MODEL NBF-9U/LW, 41 WATTS, 0.40 FLA, 2800 RPM, 115v/1ø/60Hz MOTOR, LEAD-FREE ALL BRONZE CONSTRUCTION, 1.5 GPM @ 4.0 FT/HD, 1/2" UNION CONNECTIONS. TOTAL WEIGHT : 9.3 LBS. LOCATED : FIRST FLR. MECH. RM. M122 & SECOND FLR. JANITOR RM. M210 – SEE SHEET P2.1 & P2.2 DETAIL: SEE 2/P5.1 CONTROL DIAGRAM: SEE 2/M6.2
TMV 1-2	**THERMOSTATIC MIXING VALVE 1 & 2:** THERMOSTATIC MIXING VALVE: "LEONARD" MODEL XL-82-LF-BDT ECO-MIX, LEAD FREE MASTER MIXING VALVE. 1-1/4" HOT AND COLD WATER INLETS, 1" TEMPERED WATER OUTLET ADJUST TEMPERED WATER TEMPERATURE TO SUPPLY 85-90 DEGREE WATER TO LAVATORIES. LOCATED : FIRST FLR. MECH. RM. M122 & SECOND FLR. JANITOR RM. M210 – SEE SHEET P2.1 & P2.2 DETAIL: SEE 4/P5.1
ET 1-2	**EXPANSION TANK-1 & 2:** "AMTROL", MODEL ST-5 EXPANSION TANK, 0.9 GALLONS MAXIMUM ACCEPTANCE VOLUME, TOTAL VOLUME OF 2.0 GALLONS (MAXIMUM RELIEF VALVE SETTING MUST BE 100 PSIG) CONTRACTOR SHALL CHARGE TANK PRESSURE EQUAL TO SYSTEM PRESSURE. PHYSICAL DATA: 8" DIAMETER x 13" TALL TOTAL FULL WEIGHT: 25 LBS. LOCATED : FIRST FLR. MECH. RM. M122 & SECOND FLR. JANITOR RM. M210 – SEE SHEET P2.1 & P2.2 DETAIL: SEE 8/P5.2

PLUMBING GENERAL NOTES

1. DRAWINGS SHALL BE CONSIDERED DIAGRAMMATIC ONLY. CONTRACTOR SHALL FIELD VERIFY EXACT LOCATIONS, SIZES, AND ELEVATIONS OF ALL ITEMS SHOWN AS EXISTING PRIOR TO DEMOLITION OR THE INSTALLATION OF ANY NEW WORK.
2. SANITARY VENT LINES SHALL TERMINATE AT A MINIMUM DISTANCE OF 10 FEET FROM HVAC UNIT OUTSIDE AIR INTAKES.
3. THE DRAWINGS ARE NOT INTENDED TO SHOW EVERY OFFSET OR FITTING OR EVERY STRUCTURAL DIFFICULTY THAT MAY BE ENCOUNTERED DURING INSTALLATION OF THE WORK. LOCATION OF ALL ITEMS NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE ONLY. EXACT LOCATIONS NECESSARY TO SECURE BEST CONDITIONS AND RESULTS MUST BE DETERMINED AT THE JOB SITE AND SHALL HAVE THE APPROVAL OF THE ARCHITECT BEFORE BEING INSTALLED.
4. ALL VALVES SHOWN SHALL BE FULL LINE SIZE UNLESS OTHERWISE NOTED.
5. CLOSELY COORDINATE ALL WORK WITH OTHER TRADES PRIOR TO TRENCHING OR INSTALLATION OF NEW. IDENTIFY SIZE AND LOCATIONS OF ALL PENETRATIONS THROUGH FOUNDATIONS, WALLS OR ROOFS PRIOR TO FABRICATION OF ANY SYSTEMS OR ORDERING MATERIALS AFFECTED BY POSSIBLE COORDINATION CONFLICTS.
6. OFFSET ALL RISERS AND DROPS TO AVOID PENETRATIONS AT TOP PLATES.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY REVISIONS, TRANSITIONS, OFFSETS, ETC., TO AVOID DUCTWORK, PIPING, EQUIPMENT OR STRUCTURE AND TO MAKE A COMPLETE AND FUNCTIONING SYSTEM.
8. INSTALL ALL WORK TO CLEAR ARCHITECTURAL, STRUCTURAL MEMBERS AND MECHANICAL SYSTEMS. ADJUST PIPING AS NECESSARY. NO ITEM SUCH AS PIPE, ETC., SHALL BE IN CONTACT WITH ANY EQUIPMENT. INSTALL ALL PIPING AS HIGH AS POSSIBLE OR AS SPECIFIED ON DRAWINGS TO MAINTAIN MAXIMUM ACCESSIBILITY.
9. ALL NEW SANITARY WASTE PIPING SHOWN SHALL BE SLOPED AT 1/4" PER FOOT MINIMUM UNLESS OTHERWISE NOTED ON PLANS. WHERE SLOPES LESS THAN 1/4" PER FOOT ARE INDICATED, CONTRACTOR SHALL SLOPE NEW PIPING UNIFORMLY BETWEEN UPPER TERMINAL OF PIPE AND THE POINT OF CONNECTION TO THE SITE PIPING (AS INDICATED ON CIVIL PLANS) TO ACHIEVE THE MAXIMUM SLOPE POSSIBLE, BUT IN NO CASE SHALL THE PIPING BE SLOPED AT LESS THAN THE MINIMUM SLOPE INDICATED.
10. PENETRATION OF PIPES, CONDUITS, ETC., IN WALLS AND/OR FLOORS REQUIRING PROTECTED OPENINGS SHALL BE FIRE STOPPED. MATERIAL SHALL BE A TESTED ASSEMBLY APPROVED BY THE STATE FIRE MARSHAL.
11. CONTRACTOR SHALL REFER TO ARCHITECTURAL DRAWINGS FOR CUTTING THRU STRUCTURAL SYSTEM. CONTRACTOR SHALL RECEIVE WRITTEN APPROVAL FROM THE ARCHITECT BEFORE MAKING PENETRATIONS THAT ARE NOT DETAILED ON THE CONSTRUCTION DOCUMENTS.
12. REFER TO SPECIFICATIONS FOR CURRENT CODES & STANDARDS.
13. HVAC UNITS ARE SHOWN FOR THE COORDINATION OF UTILITIES ONLY. FOR CONTINUATION REFER TO HVAC PLANS, 'M' SHEETS.
14. NATURAL GAS CONNECTIONS TO EQUIPMENT SHALL INCLUDE A LINE SIZE UNION, GAS SHUT-OFF VALVE AND A MINIMUM 6" LONG DIRT LEG WITH AN ACCESSIBLE/REMOVABLE CAP.
15. CONDENSATE DRAIN LINE CONNECTIONS TO EQUIPMENT SHALL INCLUDE A LINE SIZE UNION, 4" DEEP VENTED 'P'-TRAP AND A PLUGGED TEE (CLEANOUT) AT ALL OFFSETS. SEE DETAIL SHEET P5.1.

PLUMBING LEGEND

SYMBOL	ABBREVIATION	DESCRIPTION
	(ABC)	ABOVE CEILING
	(AFF)	ABOVE FINISHED FLOOR
	(AFG)	ABOVE FINISHED GRADE
	(AF , BF)	ABOVE FLOOR , BELOW FLOOR
		BRANCH – TOP CONNECTION
		BRANCH – BOTTOM CONNECTION
or		BRANCH – SIDE CONNECTION
	~~COP~~	~~CAP ON END OF PIPE~~
	CO	CLEANOUT (3)
	CW	COLD WATER
CD	CD	CONDENSATE DRAIN LINE
ø ф		DIAMETER , SQUARE (FEET)
	FS	FLOOR SINK
	FD	FLOOR DRAIN
FV , FT		FLUSH VALVE , FLUSH TANK
(FA) , (TA)		FROM ABOVE , TO ABOVE
(FB) , (TB)		FROM BELOW , TO BELOW
	GV	GATE VALVE
	GPM	GALLONS PER MINUTE
Ø	CO	CLEANOUT
	HB	HOSE BIBB
	HW	HOT WATER PIPING
	HWR	HOT WATER RETURN PIPING
	(NTS)	NOT TO SCALE
	OH	OVERHEAD
	POC	POINT OF CONNECTION
	(R) , (D)	RISE , DROP
		RISER DOWN (ELBOW)
		RISER UP (ELBOW)
	S, W	SOIL, WASTE OR SANITARY SEWER
	TP	TRAP PRIMER VALVE
TP		TRAP PRIMER PIPING
	(TYP)	TYPICAL
	V	VENT PIPING
V , VR , VTR		VENT , VENT RISER , VENT THRU ROOF
	WCO	WALL CLEANOUT
	WHA	WATER HAMMER ARRESTER
AV , AVR , AVTR		ACID VENT , ACID VENT RISER , ACID VENT THRU ROOF
AW		ACID WASTE PIPING
G		LOW PRESSURE NATURAL GAS PIPING (10" WC.)
MPG		MEDIUM PRESSURE GAS PIPING (2 PSI)
RWL	RWL	RAIN WATER LEADER
OFL	OFL	OVER FLOW LEADER

DOMESTIC COLD WATER CALCULATIONS

DESIGN CRITERIA

TOTAL ESTIMATED DEMAND (GPM) FROM FIXTURE CALC SHEET:	76
WATER METER SIZE REQUIRED, BASED ON THE ABOVE DEMAND:	2 1/2"
1. PRESSURE @ STREET MAIN (STATIC PRESSURE – INFORMATION FROM THE LOCAL WATER PURVEYOR):	59
2. PRESSURE LOSS THRU METER (NOTE: LOSSES MAY VARY FROM 2PSI UP TO 5 PSI – VERIFY METER TYPE AND LOSSES WITH THE LOCAL WATER PURVEYOR.)	3
3. PRESSURE LOSS THRU OTHER DEVICES (I.E. BFP) (NOTE: LOSSES MAY VARY FROM 8 PSI UP TO 15 PSI – VERIFY BFP TYPE AND LOSSES WITH THE LOCAL WATER PURVEYOR	10
4. PRESSURE LOSS DUE TO ELEVATION CHANGE. [18] FEET x .434	7.812
5. TOTAL PRESSURE LOSS (ADD LINES 2, 3 & 4)	20.81
6. PRESSURE REQUIRED AT HIGHEST FIXTURE	25
7. PRESSURE AVAILABLE FOR FRICTION LOSS	14.19
8. TOTAL DEVELOPED LENGTH OF PIPE RUN	100

$$\frac{\text{FROM LINE 7} = 14.19 \text{ PSI} \times 100}{\text{FROM LINE 8} = 100}$$ [14.19] PSI/100 FEET.

DOMESTIC WATER PIPE SIZE SCHEDULE

PIPE SIZES CALCULATED ARE BASED ON THE 2016 CPC - APPENDIX A

SIZE: TYPE L COPPER		CW MAX FLOW		CW FIXTURE UNIT VALUES		CW MAX FLOW		HWFU
NOMINAL DIAMETER	INTERNAL DIAMETER	GPM	FPS	FLUSH TANK	FLUSH VALVE	GPM	FPS	HOT WATER
3/4"	0.785	4.0	2.6	3	0	4.0	4.1	3
1"	1.025	8.0	3.1	8	0	8.0	4.9	8
1 1/4"	1.265	13.9	3.5	18	8	13.9	5.6	18
1 1/2"	1.505	21.9	4.0	32	12	21.9	6.0	32
2"	1.985	45.4	4.7	107	42	45.4	6.0	107
2 1/2"	2.465	80.2	5.4	275	148	80.2	6.0	275

MEP COMPONENT ANCHORAGE NOTE

ALL MECHANICAL, PLUMBING, AND ELECTRICAL COMPONENTS SHALL BE ANCHORED AND INSTALLED PER THE DETAILS ON THE DSA APPROVED CONSTRUCTION DOCUMENTS. WHERE NO DETAIL IS INDICATED, THE FOLLOWING COMPONENTS SHALL BE ANCHORED OR BRACED TO MEET THE FORCE AND DISPLACEMENT REQUIREMENTS PRESCRIBED IN THE 2016 CBC, SECTIONS 1616A.1.18 THROUGH 1616A.1.26 AND ASCE 7-10 CHAPTER 13, 26 AND 30.

1. ALL PERMANENT EQUIPMENT AND COMPONENTS.
2. TEMPORARY OR MOVABLE EQUIPMENT THAT IS PERMANENTLY ATTACHED (e.g. HARD WIRED) TO THE BUILDING UTILITY SERVICES SUCH AS ELECTRICITY, GAS OR WATER.
3. MOVABLE EQUIPMENT WHICH IS STATIONED IN ONE PLACE FOR MORE THAN 8 HOURS AND HEAVIER THAN 400 POUNDS OR HAS A CENTER OF MASS LOCATED 4 FEET OR MORE ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT ARE REQUIRED TO BE ANCHORED WITH TEMPORARY ATTACHMENTS.

THE FOLLOWING MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE POSITIVELY ATTACHED TO THE STRUCTURE, BUT THE ATTACHMENT NEED NOT BE DETAILED ON THE PLANS. THESE COMPONENTS SHALL HAVE FLEXIBLE CONNECTIONS PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING, AND CONDUIT.

A. COMPONENTS WEIGHING LESS THAN 400 POUNDS AND HAVE A CENTER OF MASS LOCATED 4 FEET OR LESS ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT.
B. COMPONENTS WEIGHING LESS THAN 20 POUNDS, OR IN THE CASE OF DISTRIBUTION SYSTEMS, LESS THAN 5 POUNDS PER FOOT, WHICH ARE SUSPENDED FROM A ROOF OR FLOOR OR HUNG FROM A WALL.

FOR THOSE ELEMENTS THAT DO NOT REQUIRE DETAILS ON THE APPROVED DRAWINGS, THE INSTALLATION SHALL BE SUBJECT TO THE APPROVAL OF THE DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE OR STRUCTURAL ENGINEER DELEGATED RESPONSIBILITY AND THE DSA DISTRICT STRUCTURAL ENGINEER. THE PROJECT INSPECTOR WILL VERIFY THAT ALL COMPONENTS AND EQUIPMENT HAVE BEEN ANCHORED IN ACCORDANCE WITH ABOVE REQUIREMENTS.

PIPING, DUCTWORK & ELECTRICAL DISTRIBUTION SYSTEM BRACING NOTE

PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEMS SHALL BE BRACED TO COMPLY WITH THE FORCES AND DISPLACEMENTS PRESCRIBED IN ASCE 7-10 SECTION 13.3 AS DEFINED IN ASCE 7-10 SECTION 13.6.5.6, 13.6.7, 13.6.8, AND 2016 CBC, SECTIONS 1616A.1.23, 1616A.1.24, 1616A.1.25 AND 1616A.1.26.

THE METHOD OF SHOWING BRACING AND ATTACHMENTS TO THE STRUCTURE FOR THE IDENTIFIED DISTRIBUTION SYSTEM ARE AS NOTED BELOW. WHEN BRACING AND ATTACHMENTS ARE BASED ON PREAPPROVED INSTALLATION GUIDE (e.g., SMACNA OR OSHPD OPM). COPIES OF THE BRACING SYSTEM INSTALLATION GUIDE OR MANUAL SHALL BE AVAILABLE ON THE JOBSITE PRIOR TO THE START OF AND DURING THE HANGING AND BRACING OF THE DISTRIBUTION SYSTEMS. THE STRUCTURAL ENGINEER OF RECORD SHALL VERIFY THE ADEQUACY OF THE STRUCTURE TO SUPPORT THE HANGER AND BRACE LOADS.

MECHANICAL PIPING (MP), MECHANICAL DUCTS (MD), PLUMBING PIPING (PP), ELECTRICAL DISTRIBUTION SYSTEMS (E):

MP☐ MD☐ PP☐ E☐	OPTION 1: DETAILED ON THE APPROVED DRAWINGS WITH PROJECT SPECIFIC NOTES AND DETAILS
MP☐ MD☐ PP☒ E☐	OPTION 2: SHALL COMPLY WITH THE APPLICABLE OSHPD PRE-APPROVED (OPM #) #0043-13.
MP☐ MD☐ PP☐	OPTION 3: SHALL COMPLY WITH THE SMACNA SEISMIC RESTRAINT MANUAL. OSHPD EDITION (2009), INCLUDING ANY ADDENDA. FASTENERS AND OTHER ATTACHMENTS NOT SPECIFICALLY IDENTIFIED IN THE SMACNA SEISMIC RESTRAINT MANUAL, OSHPD EDITION, ARE DETAILED ON THE APPROVED DRAWINGS WITH PROJECT SPECIFIC NOTES AND DETAILS. THE DETAILS SHALL ACCOUNT FOR THE APPLICABLE SEISMIC HAZARD LEVEL _____ AND CONNECTION LEVEL _____ FOR THE PROJECT AND CONDITIONS.

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CAPITAL ENGINEERING CONSULTANTS, INC.
RANCHO CORDOVA, CALIFORNIA
TD – RCC/MJR/JCH — 151112.00
PM – DESIGN TEAM — PROJECT NO.

REGISTERED PROFESSIONAL ENGINEER
THOMAS A. DUVAL
M 22836
EXPIRES 9/30/18
MECHANICAL
STATE OF CALIFORNIA
DATE SIGNED: 05/21/18

FILE NO.34-C3 Rev 3

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
02-116163
AC TM FLS [initials] SS [initials]
DATE 5-30-18

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~~2~~	~~BACKCHECK CHANGES~~		
3	REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

PLUMBING LEGEND, SCHEDULE & NOTES

NORTH

B5017.00
NO SCALE
May 22, 2018

P0.1

PLUMBING FIXTURE SPECIFICATION & CONNECTION SCHEDULE

ADA	SYMBOL	FIXTURE	FIXTURE MANUFACTURER AND MODEL No.	FAUCET OR VALVE MANUFACTURER AND MODEL No.	TRIM MANUFACTURER AND MODEL No.	REMARKS	VENT	WASTE		COLD WATER		HOT WATER	
								BRANCH	OUTLET	BRANCH	OUTLET	BRANCH	OUTLET
	WC-1	WATER CLOSET WALL MOUNTED FLUSH VALVE STANDARD/ADA COMPLIANT	"SLOAN" MODEL ST-2459, WALL HUNG WATER CLOSET, VITREOUS CHINA, ELONGATED, SIPHON JET ACTION, 1.28 GPF WITH 1-1/2" TOP SPUD.	"SLOAN" ROYAL, MODEL 111-1.1-DFSM, LOW WATER CONSUMPTION, ADA COMPLIANT, 1.6/1.1 GPF, SIDE MOUNT BATTERY POWERED SENSOR OPERATED CHROME PLATED FLUSHOMETER.	SEAT: "CHURCH" MODEL 255SSC OR "BEMIS" MODEL 315SSCT. PROVIDE WITH SELF- SUSTAINING CONCEALED CHECK HINGES, ONE PIECE STAINLESS STEEL POST HINGES, WHITE COLOR. CARRIER: "J.R. SMITH" 100 OR 200 SERIES OR "ZURN" Z1203 AND Z1204 SERIES PROVIDE REAR SUPPORT LUG AND ANCHOR FOOT ASSEMBLY.	MOUNT AT HEIGHT INDICATED ON ARCHITECTURAL DRAWINGS. WHERE USED FOR ADA ACCESSIBLE WATER CLOSETS, THE FLUSH VALVE HANDLE SHALL BE MOUNTED ON THE WIDE SIDE OF THE WC ENCLOSURE.	2"	4"	4"	1-1/4"	1"	–	–
	UR-1	URINAL WALL MOUNTED FLUSH VALVE ADA COMPLIANT	"SLOAN" MODEL WEUS-1000.1420-0.125 SFSM WALL HUNG, VITREOUS CHINA, WASHOUT. 3/4" TOP SPUD, 2" THREADED OUTLET, .125 GPF	"SLOAN" ROYAL, MODEL 186-0.125-SFSM LOW WATER CONSUMPTION, ADA COMPLIANT, 0.125 GPF, SIDE MOUNT BATTERY POWERED SENSOR OPERATED CHROME PLATED FLUSHOMETER.	CARRIER: "J.R. SMITH" 637 SERIES	MOUNT AT HEIGHT INDICATED ON ARCHITECTURAL DRAWINGS.	1-1/2"	2"	2"	1"	3/4"	–	–
	L-1	LAVATORY WALL MOUNTED HOT AND COLD WATER ADA COMPLIANT	"KOHLER" SOHO, MODEL MODEL K-2054, ADA COMPLIANT, WALL-MOUNT LAVATORY DRILLED FOR CONCEALED ARM CARRIER WITH OVERFLOW AND 4" CENTERS. 20" x 18"	"CHICAGO FAUCET" MODEL EQ-A12A-12ABCP, ADA COMPLIANT, DECK MOUNTED, 4" FIXED CENTERS, TEMPERED WATER ELECTRONIC BATTERY OPERATED SINK FAUCET WITH INFRARED DETECTION AND BELOW DECK MECHANICAL MIXING VALVE. WITH E2805 VANDAL RESISTANT OUTLET FOR CALGREEN COMPLIANT .20 GALLONS PER CYCLE.	PROVIDE WITH ADA COMPLIANT. LAVATORY GRID DRAIN WITH 1-1/4" OFFSET TAILPIECE, INTEGRAL PERFORATED GRID, CHROME FINISH. MOUNT P-TRAP FLUSH TO WALL. CARRIER: "J R SMITH" 0700 OR EQUAL	MOUNT AT HEIGHT INDICATED ON ARCHITECTURAL DRAWINGS. PROVIDE CONCEALED ARMS AND FLOOR SUPPORT, WITH FEET OF SUPPORT SECURELY ANCHORED TO FLOOR. IN ADDITION ANCHOR TOP OF SUPPORT TO WALL CONSTRUCTION.	1-1/2"	2"	1-1/2"	3/4"	1/2"	3/4"	1/2"
	S-1	SINK COUNTER MOUNTED HOT AND COLD WATER	"ELKAY" MODEL ELUHAD1916, 18-1/2" FRONT TO BACK, 21-1/2" WIDE x 5-1/2" DEPTH OVERALL. 18 GAUGE, TYPE 304 STAINLESS STEEL, UNDER COUNTER MOUNTED SINK, REAR DRAIN LOCATION.	"CHICAGO" ECAST MODEL 50-317ABCP GOOSENECK FAUCET, 1.5 GPM VANDAL RESISTANT LAMINAR FLOW AERATOR AND RIGID/SWING FAUCET.	"ELKAY" MODEL LKAD174LO, OFFSET STRAINER DRAIN AND P-TRAP. INSTALL P-TRAP FLUSH TO WALL.		1-1/2"	2"	1-1/2"	3/4"	1/2"	3/4"	1/2"
	KS-1	KITCHEN SINK COUNTER MOUNTED HOT AND COLD WATER TWO COMPARTMENT	"ELKAY" MODEL LRADQ33-19-60, 19" FRONT TO BACK, 33" WIDE x 6" DEPTH OVERALL. 18 GAUGE STAINLESS STEEL, TWO COMPARTMENT WITH LEDGE BACK, SELF-RIM. PROVIDE FAUCET HOLES ON 8" CENTERS. PROVIDE REAR DRAIN LOCATION FOR BOTH COMPARTMENTS.	"CHICAGO" ECAST MODEL 1100-E35-317ABCP (VVAVVP), WITH INDEXED WRIST BLADE HANDLES, 8" LONG SWIVEL SPOUT AND 1.5 GPM VANDAL RESISTANT LAMINAR FLOW AERATOR.	"ELKAY" MODEL LKAD35, OFFSET CRUMB CUP STRAINER WITH REMOVABLE BASKET AND P-TRAP FOR EACH C COMPARTMENT. INSTALL P-TRAP FLUSH TO WALL.	DISPOSER: "IN-SINK-ERATOR" EVOLUTION ESSENTIAL, CONTINUOUS FEED, 3/4 HP, CAPACITOR START. INSTALL DISPOSER IN RIGHT HAND COMPARTMENT. PROVIDE WALL SWITCH FOR OPERATION OF DISPOSER AND PROVIDE FULL 6 YEAR PARTS AND SERVICE WARRANTY FOR DISPOSER.	1-1/2"	2"	1-1/2"	3/4"	1/2"	3/4"	1/2"
	SS-1	SERVICE SINK FLOOR MOUNTED HOT AND COLD WATER JANITORS	"ACORN" TSH-24-SSC, TERRAZZO-WARE, 24"x24"x12" DEEP FLOOR MOUNTED, TERRAZZO, WITH STAINLESS STEEL CAP ON ALL FOUR TOP SURFACES. UNIT SHALL INCLUDE MODEL KH36 HOSE WITH WALL HANGER, KMH MOP HANGER WITH 3 SPRING LOADED GRIPS ON A STAINLESS STEEL BRACKET.	"CHICAGO" MODEL 897-CP WALL MOUNTED POLISHED CHROME FAUCET WITH VACUUM BREAKER, ADJUSTABLE TOP BRACE AND 3/4" MALE THREADED HOSE OUTLET.		AS PART OF ROUGH-IN FOR FAUCET, PROVIDE SUITABLE BLOCKING FOR TOP BRACE. PROVIDE CAP WITH FLANGE ON SIDES ADJACENT TO WALLS.	2"	3"	3"	3/4"	3/4"	3/4"	3/4"
	DF-1	DRINKING FOUNTAIN w/ BOTTLE FILLING STATION WALL MOUNTED STD/ACCESSIBLE DUAL HEIGHT	"ELKAY", WALL MOUNTED, HI-LO, DRINKING FOUNTAIN, WITH EZH20 BOTTLE FILLING STATION MODEL EZWS-EDFPBM117K. WALL MOUNTED STAINLESS STEEL.	INTEGRAL	WITH P-TRAP	115V/1 Ph. – FOR POWER REFER TO DIVISION 26 PLANS & SPECIFICATIONS. UNIT SHALL BE PROVIDED WITH TOP & BOTTOM ACCESS PANELS.	1-1/2"	2"	1-1/2"	3/4"	1/2"	–	–
	DF-2	DRINKING FOUNTAIN WALL MOUNTED STD/ACCESSIBLE DUAL HEIGHT	"ELKAY", WALL MOUNTED, HI-LO, DRINKING FOUNTAIN, MODEL EDFPBM117C, VANDAL RESISTANT BUBBLERS, HEAVY DUTY, 18 GAUGE, 300 SERIES STAINLESS STEEL.	INTEGRAL	WITH P-TRAP	UNIT SHALL BE PROVIDED WITH STAINLESS STEEL BACKING PLATE & MODEL ML100 IN-WALL SUPPORT LEGS. AND BOTTOM ACCESS PANEL.	1-1/2"	2"	1-1/2"	3/4"	1/2"	–	–
	HB	HOSE BIBB	"ACORN" MODEL 8121CR-LF – EXTERIOR WALL MOUNTED. "ACORN" MODEL 8126-LF – ROOF MOUNTED. "ACORN" MODEL 8121-LF – INTERIOR WALL MOUNTED.				–	–	–	3/4"	3/4"	–	–
	WH	WALL HYDRANT	RECESSED WALL HYDRANT ACORN MODEL M8104-E500, MIFAB MODEL MHY-55, WOODFORD MODEL B24.	RECESSED WALL HOSE BOX WITH DOOR AND VACUUM BREAKER. BOX IS ONE PIECE CAST CONSTRUCTION WITH BUILT-IN LIP. WALL FLANGE IS CAST ALUMINUM WITH PRIME COAT FINISH SECURED WITH VANDAL RESISTANT SCREWS. DOOR AND FRAME ARE OF CAST ALUMINUM ALLOY WITH CYLINDER KEYED LOCK. VALVE SHALL BE CARTRIDGE TYPE WITH VANDAL RESISTANT LOCK SHIELD LOOSE KEY HANDLE AND SCREWDRIVE STOP.			–	–	–	3/4"	3/4"	–	–
	RIM	REFRIGERATOR ICE MAKER	"GUY GRAY" MODEL SSIB2AB LEAD FREE ICE MAKER HOOK-UP, WITH 1/2" FIP INLET AND 1/4" COMPRESSION OUTLET.	INTEGRAL	INTEGRAL	PROVIDE 20 GAUGE BOX AND 18 GAUGE STAINLESS STEEL FACE PLATE.	–	–	–	1/2"	1/4"	–	–
	TP	TRAP PRIMER	"MIFAB" MODEL M-500 SERIES	PROVIDE BALL VALVE AT EACH TP LOCATION.	MOUNT TRAP PRIMER IN SHEET METAL BOX WITH "KARP" OR EQUAL ACCESS DOOR. REFER TO DETAIL – SHEET P5.1 PROVIDE UL APPROVED FIRE WRAP AROUND SHEET METAL BOX AND A FIRE RATED ACCESS DOOR WHEN INSTALLED IN A FIRE RATED ASSEMBLY. FOR CONTINUATION REFER TO SPECIFICATIONS SECTION 22 00 50.	INSTALL PER MANUFACTURER'S INSTRUCTIONS. PROVIDE DISTRIBUTION UNIT WITH FEEDER PIPING FOR A MAX. OF FOUR TRAPS WHEN NEEDED.	–	–	–	–	–	–	–
	FD	FLOOR DRAIN	GENERAL SERVICE FD – ZURN MODEL ZN-415, OR EQUAL, DURA-COATED CAST IRON BODY WITH BOTTOM OUTLET AND HEEL PROOF, POLISHED NICKEL BRONZE TOP.		TYPE "B" STRAINER FOR EXPOSED CONCRETE TYPE "S" STRAINER FOR TILE FLOOR TYPE "SL STRAINER FOR COMPOSITION FLOOR	PROVIDE FLASHING RING AND CLAMP AT FLOORS WITH WATER RESISTANT MEMBRANE. SET TOP OF DRAIN SLIGHTLY BELOW FLOOR TO INSURE DRAINAGE. INSTALL VENTED P-TRAP. WHERE TRAP PRIMERS ARE INDICATED PROVIDE PROPER CONNECTION TO P-TRAP.	2"	3"	3"	–	–	–	–
	FS	FLOOR SINK	MECHANICAL SPACES – ZURN MODEL ZN-1901-KC-2, OR EQUAL, 12 INCH x 12 INCH x 8 INCH DEEP, A.R.E. INTERIOR WITH NICKEL BRONZE RIM, HALF GRATE AND DOME STRAINER.	PROVIDE SEEPAGE PAN AND CLAMPING COLLAR.			2"	3"	3"	–	–	–	–
	RD/OFD	ROOF DRAIN OVERFLOW	COMBINATION ROOF DRAIN AND OVER FLOW 3"ø AND 4"ø PIPE SIZE MAX. – J.R. SMITH MODEL SQ-1-1481, ZURN MODEL Z165 OR EQUAL. 5"ø AND 6" ø – J.R. SMITH MODEL SQ-1-3282, ZURN MODEL Z164 OR EQUAL.	SECURE DECK PLATE TO ROOF. PROVIDE 6" HIGH CAST IRON VANDAL PROOF DOME TYPE STRAINER INLET AND CLAMPING COLLARS FOR PRIMARY AND OVERFLOW.			–	3"	3"	–	–	–	–
	DW	DISHWASHER	"ZURN", MODEL CD3P SPEEDFLEX OR "WATTS" MODEL 765-666 AIR GAP FITTING IN SINK LEDGE	INTEGRAL	PROVIDE HW STOP VALVE	ROUGH-IN AND CONNECT HOT WATER AND 2" VENTED P-TRAP	–	–	–	–	–	–	1/2"

NOTES:

1. WATER SUPPLIES AND STOPS (REFER TO SPECIFICATION SECTION OR 22 40 00)
   - A. PROVIDE 85 PERCENT IPS RED BRASS PIPE, SECURELY ANCHORED TO BUILDING CONSTRUCTION, FOR EACH CONNECTION TO FAUCETS, STOPS, HOSE BIBBS, ETC. EACH FIXTURE, EXCEPT HOSE BIBBS, SHALL HAVE A STOP VALVE INSTALLED ON WATER SUPPLY LINES TO PERMIT REPAIRS WITHOUT SHUTTING OFF WATER MAINS.
   - B. PROVIDE ALL WATER SUPPLIES TO FIXTURES WITH COMPRESSION SHUT-OFF STOPS WITH IPS INLETS WITH THREADED BRASS NIPPLES AT PIPE CONNECTION AND LOCK SHIELD LOOSE KEY. PROVIDE COMBINATION FIXTURES WITH COMPRESSION STOP AND IPS INLET ON EACH WATER SUPPLY FITTING. PROVIDE LOOSE KEY HANDLE FOR EACH STOP.
   - C. PROVIDE 1/2 INCH RISER TUBES WITH REDUCING COUPLING FOR ALL FIXTURES, UNLESS OTHERWISE NOTED.
2. PIPE, PLUMBING FITTINGS, FIXTURES, SOLDER AND FLUX SHALL COMPLY WITH LEAD FREE REQUIREMENTS OF THE CALIFORNIA HEALTH AND SAFETY CODE SECTION 116875. PROVIDE PRODUCTS LISTED AND LABELED AS COMPLYING WITH NSF 61, ANNEX G, OR PROVIDE OTHER EVIDENCE OF COMPLIANCE WITH THE CALIFORNIA HEALTH AND SAFETY CODE SECTION 116875. PROVIDE PRODUCT SUBMITTAL INFORMATION PROVING COMPLIANCE WITH LEAD FREE REQUIREMENTS.

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RANCHO CORDOVA, CALIFORNIA
TD – RCC/MJR/JCH 151112.00
PM – DESIGN TEAM PROJECT NO.

REGISTERED PROFESSIONAL ENGINEER
THOMAS A. DUVAL
M 22836
EXPIRES 9/30/18
MECHANICAL
STATE OF CALIFORNIA
DATE SIGNED: 05/21/18

FILE NO.34-C3
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DIV. OF THE STATE ARCHITECT
02-116163
AC TM FLS 9/2 SS 18
DATE 5-30-18
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~~2~~	~~BACKCHECK CHANGES~~		
3	REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

PLUMBING FIXTURE SPECIFICATION & CONNECTION SCHEDULE

NORTH

B5017.00
NO SCALE
May 22, 2018

P0.2

SYMBOLS LIST

POWER DISTRIBUTION

	SWITCHBOARD, DISTRIBUTION BOARD, SUBSTATION OR MOTOR CONTROL CENTER, FLOOR MOUNTED.
	PANELBOARD, 277/480V, SURFACE MOUNTED ON WALL.
	PANELBOARD, 277/480V, FLUSH MOUNTED IN WALL.
	PANELBOARD, 120/208V, SURFACE MOUNTED ON WALL.
	PANELBOARD, 120/208V, FLUSH MOUNTED IN WALL.
	DRY-TYPE STEP-DOWN TRANSFORMER, FLOOR MOUNTED 3Ø,480-120/208V, UON.
	ELECTRIC MOTOR, NIEC. MAKE POWER CONNECTIONS ONLY AS NOTED ON PLANS.
F	INDOOR EXHAUST FAN MOTOR, SINGLE PHASE. MAKE POWER CONNECTIONS TO INCLUDE JUNCTION BOX MOUNTED MANUAL MOTOR STARTER AND DISCONNECT ADJACENT TO FAN WITH 2 #12 CONDUCTORS PLUS GROUND IN 1/2" FLEXIBLE CONDUIT BETWEEN STARTER AND MOTOR.
V	INDOOR FAN POWERED VAV BOX MOTOR, SINGLE PHASE, MOUNTED FROM STRUCTURE ABOVE, NIEC. MAKE POWER CONNECTIONS TO INCLUDE JUNCTION BOX MOUNTED MANUAL MOTOR STARTER AND DISCONNECT ADJACENT TO VAV BOX WITH 2 #12 CONDUCTORS PLUS GROUND IN 1/2" FLEXIBLE CONDUIT BETWEEN STARTER AND MOTOR.
P	PULLBOX OR HANDHOLE, SIZE AND TYPE AS NOTED ON PLANS.
A AF	SAFETY DISCONNECT SWITCH, 3 POLE, UON. ADJACENT NUMBER INDICATES FUSE SIZE WHEN APPLICABLE. LABELING CONVENTION AS FOLLOWS:

A:	30A, NON-FUSED	AF:	30A, FUSED
B:	60A, NON-FUSED	BF:	60A, FUSED
C:	100A, NON-FUSED	CF:	100A, FUSED
D:	200A, NON-FUSED	DF:	200A, FUSED
E:	400A, NON-FUSED	EF:	400A, FUSED
F:	600A, NON-FUSED	FF:	600A, FUSED
G:	800A, NON-FUSED	GF:	800A, FUSED

1	MAGNETIC MOTOR STARTER. ADJACENT NUMBER INDICATES NEMA SIZE OF STARTER.
1	COMBINATION MAGNETIC MOTOR STARTER/SAFETY DISCONNECT SWITCH. ADJACENT NUMBER INDICATES NEMA SIZE OF STARTER.
	PACKAGE MOTOR CONTROLLER OR STARTER FURNISHED AND INSTALLED UNDER ANOTHER DIVISION WITH EQUIPMENT CONTROLLED. PROVIDE SINGLE-POINT POWER SERVICE CONNECTION UNDER THIS DIVISION AS NOTED ON PLANS.
VFD	VARIABLE FREQUENCY DRIVE FURNISHED AND INSTALLED UNDER ANOTHER DIVISION. PROVIDE POWER SERVICE CONNECTION UNDER THIS DIVISION AS NOTED ON PLANS.
VFD	VARIABLE FREQUENCY DRIVE WITH INTEGRAL DISCONNECT FURNISHED AND INSTALLED UNDER ANOTHER DIVISION. PROVIDE POWER SERVICE CONNECTION UNDER THIS DIVISION AS NOTED ON PLANS.
	DRIVEN GROUND ROD.
	DRIVEN GROUND ROD IN GROUND WELL WITH COVER.
	ELECTRICAL VEHICLE CHARGING STATION, WALL MOUNTED.
	ELECTRICAL VEHICLE CHARGING STATION, PEDESTAL MOUNTED.
2,4,6	BRANCH CIRCUIT POWER DISTRIBUTION BOX OF MANUFACTURED WIRING SYSTEM WITH MODULAR CONNECTORS FOR INTERFACE TO BRANCH CIRCUIT MODULAR CABLE SETS AND CABLE OR CONDUIT HOMERUN. BOX MOUNTED FROM STRUCTURE ABOVE IN ACCESSIBLE CEILING SPACE. ADJACENT NUMBERS INDICATE CIRCUITS AVAILABLE AT BOX.
2,4,6	DEVICE BRANCH CIRCUIT POWER DISTRIBUTION BOX FOR INTERFACE BETWEEN MULTI-CIRCUIT HOMERUN AND MC CABLE BRANCH CIRCUITING. MINIMUM BOX SIZE IS 10"X10"X4" DEEP. BOX MOUNTED FROM STRUCTURE ABOVE IN ACCESSIBLE CEILING SPACE. ADJACENT NUMBERS INDICATE CIRCUITS AVAILABLE AT BOX.
▼	INDICATES TERMINATION POINT FOR POWER CABLE & BUS.
	BOLTED PRESSURE OR HIGH PRESSURE CONTACT SWITCH.
	FUSED SWITCH.
	MEDIUM-VOLTAGE LOAD INTERRUPTER SWITCH.
	GROUP MOUNTED MOLDED CASE CIRCUIT BREAKER.
	INDIVIDUALLY FIXED MOUNTED INSULATED-CASE OR POWER CIRCUIT BREAKER.
	INDIVIDUALLY DRAW-OUT MOUNTED INSULATED-CASE OR POWER CIRCUIT BREAKER.
52	MEDIUM-VOLTAGE, INDIVIDUALLY DRAW-OUT MOUNTED VACUUM CIRCUIT BREAKER.
G	INDICATES INTEGRAL GROUND FAULT RELAY WHEN ASSOCIATED WITH CIRCUIT BREAKER.
C	INDICATES COMMUNICATION NETWORK WIRING WHEN ASSOCIATED WITH CIRCUIT BREAKER.
EO	INDICATES ELECTRICALLY OPERATED WHEN ASSOCIATED WITH CIRCUIT BREAKER.
ST	INDICATES SHUNT TRIP WHEN ASSOCIATED WITH OVERCURRENT PROTECTION DEVICES.
K 1	INDICATES KIRK-KEY INTERLOCK WHEN ASSOCIATED WITH OVERCURRENT PROTECTION DEVICES. ADJACENT NUMBER CORRESPONDS WITH DEVICE INTERLOCK.
GFR	GROUND FAULT RELAY WITH SHUNT TRIP.
GFA	GROUND FAULT ALARM, NO SHUNT TRIP.
M	UTILITY METER.
	TRANSFORMER.
	CONNECTION TO GROUND.
	CURRENT TRANSFORMERS.
	POTENTIAL TRANSFORMERS.
	AUTOMATIC OR MANUAL TRANSFER SWITCH.
NORM. EM.	AUTOMATIC TRANSFER/BY-PASS ISOLATION SWITCH.
G	EMERGENCY GENERATOR.
	BATTERIES.
	NEUTRAL SERVICE DISCONNECT LINK.
SPD	SURGE PROTECTION DEVICE, 'SPD'.
C	CONTROL CONTACTOR.
	NORMALLY OPEN CONTACT.
	NORMALLY CLOSED CONTACT.
DMU	DIGITAL METERING UNIT.
GND	GROUND BUS.
WHM	WATT HOUR METER.
NEU	NEUTRAL BUS.

WIRING DEVICES

J	JUNCTION BOX, WALL MOUNTED, +18" UON.
J	JUNCTION BOX, MOUNTED IN FLUSH FLOOR BOX.
J	JUNCTION BOX, MOUNTED FLUSH IN CEILING.
J	JUNCTION BOX, SURFACE OR PENDANT MOUNTED TO STRUCTURE IN ACCESSIBLE CEILING SPACE.
J	JUNCTION BOX, MOUNTED ON CONDUIT STANCHION FLOOR PENETRATION, +12" UON.
	SINGLE-PLEX CONVENIENCE RECEPTACLE DEVICE, WALL MOUNTED, +18" UON.
	DUPLEX CONVENIENCE RECEPTACLE DEVICE, WALL MOUNTED, +18" UON.
	DOUBLE DUPLEX CONVENIENCE RECEPTACLE DEVICE, WALL MOUNTED, +18" UON.
	DENOTES WALL MOUNTED OVER COUNTER, 6" ABOVE BACK SPLASH UON.
G	'G' DENOTES GROUND FAULT CURRENT INTERRUPTER (GFCI), 'A' DENOTES ARC FAULT CURRENT INTERRUPTER (AFCI).
	SHADING DENOTES SPLIT WIRED DEVICE.
	SHADING DENOTES DEVICE CONNECTED TO EMERGENCY POWER CIRCUIT.
	SHADING DENOTES DEVICE WITH ISOLATED GROUND.
	SHADING DENOTES SPECIALTY DEVICE, TYPE AS NOTED ON PLANS.
	DUPLEX CONVENIENCE RECEPTACLE DEVICE, MOUNTED IN FLUSH FLOOR BOX.
	DOUBLE DUPLEX CONVENIENCE RECEPTACLE DEVICE, MOUNTED IN FLUSH FLOOR BOX.
	DUPLEX CONVENIENCE RECEPTACLE DEVICE, MOUNTED IN FIRE-RATED POKE-THRU FLOOR FITTING.
	DOUBLE DUPLEX CONVENIENCE RECEPTACLE DEVICE, MOUNTED IN FIRE-RATED POKE-THRU FLOOR FITTING.
	DUPLEX CONVENIENCE RECEPTACLE DEVICE, MOUNTED FLUSH IN CEILING.
	DOUBLE DUPLEX CONVENIENCE RECEPTACLE DEVICE, MOUNTED FLUSH IN CEILING.
	DUPLEX CONVENIENCE RECEPTACLE DEVICE, MOUNTED ON CONDUIT STANCHION FLOOR PENETRATION, +12" UON.
	DUPLEX CONVENIENCE RECEPTACLE DEVICE, MOUNTED IN FLOOR MONUMENT.
	COMBINATION POWER/TELECOMMUNICATION DEVICE, MOUNTED IN FLUSH FLOOR BOX. TYPE AS NOTED ON PLANS OR IN SPECIFICATIONS.
	DUPLEX CONVENIENCE RECEPTACLE DEVICE, CORD OR REEL HUNG FROM STRUCTURE ABOVE. TYPE AS NOTED ON PLANS.
P	ELECTRIFIED FURNITURE PARTITION POWER FEED, WALL MOUNTED, +18" UON. CONSISTS OF 4 11/16" SQ. X 2 1/8" DEEP JUNCTION BOX, SINGLE GANG RING, AND STAINLESS STEEL COVER PLATE WITH KO TO ACCEPT FURNITURE WHIP.
P T	ELECTRIFIED FURNITURE PARTITION COMBINATION POWER/TELECOMMUNICATION FEEDS, MOUNTED IN FLUSH FLOOR BOX WITH KO'S IN COVER TO ACCEPT FURNITURE WHIPS
P	ELECTRIFIED FURNITURE PARTITION POWER FEED, MOUNTED IN FIRE-RATED POKE-THRU FLOOR FITTING WITH KO IN COVER TO ACCEPT FURNITURE WHIP.
	POWER/TELECOMMUNICATION POLE, MOUNTED TO EXTEND FROM FLOOR TO CEILING. TYPE AS NOTED ON PLANS.
S	SINGLE-POLE, SINGLE-THROW SWITCH, WALL MOUNTED, +42" UON.
S^3	THREE-WAY SWITCH, WALL MOUNTED, +42" UON.
S^4	FOUR-WAY SWITCH, WALL MOUNTED, +42" UON.
S^K	KEY-OPERATED, SINGLE-POLE, SINGLE-THROW SWITCH, WALL MOUNTED, +42" UON.
S^P	PILOT LIGHT, SINGLE-POLE, SINGLE-THROW SWITCH, WALL MOUNTED, +42" UON.
S^T	MANUAL MOTOR STARTER SWITCH WITH THERMAL OVERLOAD ELEMENT, MOUNTED ADJACENT TO MOTOR.
S^M	MANUAL MOTOR STARTER/DISCONNECT SWITCH, MOUNTED ADJACENT TO MOTOR.
S^F	SWITCH FURNISHED UNDER ANOTHER DIVISION, BUT INSTALLED AND WIRED UNDER THIS DIVISION, WALL MOUNTED, +42" UON.
S^D	WALLBOX DIMMER SWITCH, +42" UON. SIZED PER CONNECTED LOAD ON PLANS AND FURNISHED FOR LAMP SOURCE SERVED. PROVIDED FOR DERATING WHEN INSTALLED GANGED LOCATIONS.
S^{TC}	SINGLE-POLE, TIMER CONTROLLED SWITCH, WALL MOUNTED, +42" UON.
S^{EP}	SINGLE-POLE, SINGLE-THROW, EXPLOSION PROOF SWITCH, WALL MOUNTED, +42" UON.
S	LINE-VOLTAGE MULTIPLE GANG SWITCHING STATION, WALL MOUNTED, 42" UON. REFER TO PLANS FOR DEVICE QUANTITIES AND TYPES.
L	LOW-VOLTAGE LIGHTING CONTROL SWITCHING STATION, WALL MOUNTED, +42" UON. REFER TO PLANS AND SCHEDULES FOR DEVICE QUANTITIES AND RELAYS CONTROLLED
M	LIGHTING CONTROL OCCUPANCY SENSOR WITH DUAL LEVEL SWITCHING, WALL MOUNTED, + 42" UON.
M1	LIGHTING CONTROL OCCUPANCY SENSOR WITH SINGLE LEVEL SWITCHING, WALL MOUNTED, +42" UON.
M	LIGHTING CONTROL OCCUPANCY SENSOR, CEILING MOUNTED FOR AREA COVERAGE.
D	PRESET SCENE CONTROL LIGHTING STATION WITH DIMMING CAPABILITIES, WALL MOUNTED, + 42" UON. REFER TO PLANS AND SCHEDULES FOR CONTROL.
ETD	EGRESS LIGHTING TRANSFER DEVICE
	CONTROL STATION, WALL MOUNTED, +42" UON.
PC	PHOTOELECTRIC CELL
DS	DAYLIGHT SENSOR
PLC	PLUGLOAD CONTROL DEVICE
NET	LIGHTING CONTROL NETWORK INTERFACE DEVICE
HVAC	INTERFACE DEVICE FOR CONTROL OF HVAC BY LIGHTING CONTROL
RMD RMS	REMOTE DIMMING OR SWITCHING MODULE, NUMBER OF ZONES AS INDICATED

RACEWAYS

	CONDUIT RUN EXPOSED ON WALL OR CEILING.
	CONDUIT RUN CONCEALED IN SLAB, UNDER SLAB OR UNDERGROUND.
	CONDUIT RUN CONCEALED IN WALL OR ABOVE CEILING.
	CONDUIT HOMERUN, CONTINUOUS RUN TO PANEL OR EQUIPMENT CABINET.
	CONDUIT..
	FLEXIBLE METALLIC CONDUIT.
	CONDUIT TURNED UP
	CONDUIT TURNED DOWN.
	CONDUIT CAPPED OR STUBBED WITH INSULATED BUSHINGS.
	CONDUIT SLEEVE, WITH INSULATING BUSHINGS.
	CROSSMARKS ON BRANCH CIRCUIT CONDUIT RUNS INDICATE THE QUANTITY OF CONDUCTORS AS FOLLOWS (GROUND CONDUCTORS ARE NOT NOTED, BUT SHOULD BE INCLUDED IN EVERY CONDUIT WITH POWER CONDUCTORS): 1. NO CROSSMARKS INDICATES TWO #12 AWG CONDUCTORS, UON. 2. THREE TO SIX CROSSMARKS INDICATES THE QUANTITY OF #12 AWG CONDUCTORS, UON. 3. SEVEN OR MORE CROSSMARKS INDICATES THE QUANTITY OF #10 AWG CONDUCTORS, UON.
	MULTI-OUTLET TWO PIECE SURFACE RACEWAY; TYPE, DEVICE SPACING AND MOUNTING AS NOTED ON PLANS.
	TWO PIECE SURFACE METAL RACEWAY, MOUNTED AS NOTED IN PLANS.
	CABLE TRAY, CABLE RUNWAY OR LADDER RACK SUSPENDED FROM STRUCTURE ABOVE. REFER TO PLANS FOR SIZE AND MOUNTING.
	FLOOR DUCT

LIGHTING

	LIGHT FIXTURE, RECESSED IN CEILING.
	LIGHT FIXTURE, SURFACE OR PENDANT MOUNTED.
	LIGHT FIXTURE, WALL MOUNTED.
	STRIPLIGHT FIXTURE, SURFACE OR PENDANT MOUNTED.
	STRIP LIGHT FIXTURE, SURFACE MOUNTED IN ARCHITECTURAL CEILING COVE.
	STRIP LIGHT FIXTURE, SURFACE MOUNTED VERTICALLY ON WALL OR IN COVE.
	DOWNLIGHT FIXTURE, RECESSED IN CEILING.
	DOWNLIGHT/INDUSTRIAL FIXTURE, SURFACE OR PENDANT MOUNTED.
	SINGLE DIRECTIONAL, WALLWASH LIGHT FIXTURE, RECESSED IN CEILING.
	DUAL DIRECTIONAL, WALLWASH LIGHT FIXTURE, RECESSED IN CEILING.
	SINGLE DIRECTIONAL, WALLWASH LIGHT FIXTURE, SURFACE OR PENDANT MOUNTED.
	DUAL DIRECTIONAL, WALLWASH LIGHT FIXTURE, SURFACE OR PENDANT MOUNTED.
	ADJUSTABLE ACCENT LIGHT FIXTURE, RECESSED IN CEILING.
	ADJUSTABLE ACCENT LIGHT FIXTURE, SURFACE OR PENDANT MOUNTED.
	LINEAR WALLWASH LIGHT FIXTURE, RECESSED IN CEILING.
	LINEAR WALLWASH LIGHT FIXTURE, SURFACE OR PENDANT MOUNTED.
	LINEAR, MULTI-HEAD, ADJUSTABLE ACCENT LIGHT FIXTURES, RECESSED IN CEILING.
	SCONCE LIGHT FIXTURE, WALL MOUNTED.
	DECORATIVE CHANDELIER OR BOWL TYPE FIXTURE, PENDANT MOUNTED.
J	LINEAR TRACK SYSTEM WITH PLUG-IN ADJUSTABLE LIGHT FIXTURE HEADS. TRACK SHALL BE EITHER RECESSED, SURFACE OR PENDANT MOUNTED TO CEILING AS NOTED IN FIXTURE SCHEDULE.
	EXIT SIGN LIGHT FIXTURE, CEILING OR WALL MOUNTED WITH DIRECTIONAL ARROWS AS NOTED ON PLANS. WORD 'EXIT' TO BE LOCATED IN SHADED FACE(S).
	COMBO EXIT SIGN AND EGRESS LIGHTING FIXTURE, CEILING OR WALL MOUNTED WITH ARROWS AS NOTED ON PLANS OR IN FIXTURE SCHEDULE.
	EMERGENCY SELF-POWERED BATTERY PACK WITH LIGHT FIXTURE HEADS AS NOTED ON PLANS OR IN FIXTURE SCHEDULE.
	HALF SHADING OF ANY FIXTURE INDICATES LIFE SAFETY/EGRESS LIGHTING.
	FULL SHADING OF ANY FIXTURE INDICATES STANDBY/CRITICAL LIGHTING.

EXTERIOR:

	SINGLE-HEAD AREA LIGHT FIXTURE WITH BRACKET ARM AND POLE, MOUNTED TO CONCRETE BASE.
	TWO-HEAD AREA LIGHT FIXTURES WITH BRACKET ARMS AND POLE, MOUNTED TO CONCRETE BASE.
	SINGLE-HEAD AREA POST-TOP LIGHT FIXTURE WITH POLE, MOUNTED TO CONCRETE BASE.
	AREA LIGHT FIXTURE, SURFACE OR RECESSED MOUNTED TO WALL.
	LIGHT FIXTURE BOLLARD, MOUNTED TO CONCRETE BASE.
	GROUNDWELL MOUNTED FLUSH IN FINISHED GRADE.
	FLOODLIGHT FIXTURE, STANCHION MOUNTED ABOVE GRADE.
	LINEAR SIGN LIGHT FIXTURE, STANCHION MOUNTED ABOVE GRADE.
	STEPLIGHT FIXTURE, WALL MOUNTED.

AUDIO/VISUAL

S	LOUDSPEAKER, WALL MOUNTED, 12" BELOW CEILING OR +96" AFF, WHICHEVER IS LOWER.
S	LOUDSPEAKER, CEILING MOUNTED IN FLUSH BACK BOX. ADJACENT 70V OR 100V INDICATES DISTRIBUTED SAME VOLTAGE SPEAKER.
S	PROGRAM SPEAKER, CEILING OR STRUCTURE MOUNTED.
IP	AUDIO AND VIDEO INTERFACE PLATE, WALL MOUNTED, +18" UON OR AS OTHERWISE NOTED.
IP	AUDIO AND VIDEO INTERFACE PLATE, MOUNTED IN FLUSH FLOOR BOX.
AV	AUDIO AND VIDEO CABLE DISPLAY PLATE, WALL MOUNTED, 4 11/16" BOX WITH 1 1/4" CONDUIT TO ACCESSIBLE CEILING. HEIGHT AS NOTED.
AV	AUDIO AND VIDEO CABLE AT PROJECTOR THROUGH SUPPORT, DIRECT CONNECT TO PROJECTOR.
TD	FLAT PANEL DISPLAY, WALL MOUNTED AT 60" AFF OR AS NOTED.
SD	SIGNAGE DISPLAY, WALL MOUNTED AT 84" AFF OR AS NOTED.
PR	PROJECTOR WITH PROJECTOR MOUNT, 1.5"-2" NPT COLUMN AND CEILING SUPPORT HARDWARE.
CP	AUDIO AND VIDEO CONTROL PANEL, FLUSH WALL MOUNTED AT 42" UON IN BACKBOX
CP	AUDIO AND VIDEO CONTROL PANEL, MOUNTED ON CASEWORK IN SURFACE BOX OR WITH STAND.
CP	AUDIO AND VIDEO CONTROL PANEL, RACK MOUNTED.
C	VIDEO CONFERENCING CAMERA, WALL MOUNTED @ 84"UON.
C	VIDEO CONFERENCING CAMERA, CEILING MOUNTED IN CAMERA DOME.
	PROJECTION SCREEN, SIZE AND TYPE AS NOTED.
PS	PROJECTION SCREEN 3 WAY POWER SWITCH, WALL MOUNTED, +42" UON.
V	VOLUME CONTROLLER, WALL MOUNTED, +42" UON.
M	MICROPHONE JACK, WALL MOUNTED, +18" UON.
M	MICROPHONE JACK, MOUNTED IN FLUSH FLOOR BOX.
I M	INTERCOM STATION, WALL MOUNTED, +42" UON. 'M' DENOTES MASTER STATION.
I M	INTERCOM STATION, MOUNTED ON DESK. 'M' DENOTES MASTER STATION.
	INDICATING CLOCK WITH CLOCK OUTLET, WALL MOUNTED, 12" BELOW CEILING OR +96" AFF, WHICHEVER IS LOWER.
S	COMBINATION LOUDSPEAKER/INDICATING CLOCK WITH CLOCK OUTLET, WALL MOUNTED IN COMBINATION BACK BOX, 12" BELOW CEILING OR +96" AFF, WHICHEVER IS LOWER.
	TELEVISION JACK, WALL MOUNTED +18" UON OR AS NOTED.
	TELEVISION JACK, MOUNTED IN FLUSH FLOOR BOX.

CONVENTIONS

1	NUMBERED NOTE, APPLIES TO ALL DRAWINGS.
1	NUMBERED SHEET NOTE, APPLIES TO DRAWING CONTAINING NOTES ONLY.
①	OVERCURRENT PROTECTIVE DEVICE SPACE IDENTIFICATION TAG. REFERS TO LOCATION OF PROTECTIVE OR CONTROL DEVICE WITHIN SWITCHBOARDS, DISTRIBUTION BOARDS, MOTOR CONTROL CENTERS, ETC.
NAME	EQUIPMENT IDENTIFICATION TAG: ITEM FURNISHED AND INSTALLED UNDER ANOTHER SECTION AND WIRED UNDER THIS SECTION.
P2	CABLE AND/OR RACEWAY TAG, FUNCTION AS NOTED BELOW: P = POWER T = TELEPHONE C = COMMUNICATION
2004	FEEDER SIZE. REFER TO FEEDER SCHEDULE.
A / E-801	DETAIL REFERENCE: SHEET NUMBER DETAIL DESIGNATION
2-F3	FIXTURE IDENTIFICATION TAG: FIXTURE TYPE QUANTITY

TELECOMMUNICATION

W	TELECOMMUNICATION DEVICE, WALL MOUNTED AT +42". 1 CATEGORY 6 CABLE.
	TELECOMMUNICATION DEVICE, WALL MOUNTED, +18" UON. 2 CATEGORY 6 CABLE UON.
	TELECOMMUNICATION DEVICE, WALL MOUNTED OVER COUNTER, 6" ABOVE BACK SPLASH, UON. 2 CATEGORY 6 CABLE UON.
	TELECOMMUNICATION DEVICE, MOUNTED IN FLUSH FLOOR BOX. 2 CATEGORY 6 CABLE UON.
	TELECOMMUNICATION DEVICE, MOUNTED IN FIRE-RATED POKE-THRU FLOOR FITTING. 2 CATEGORY 6 CABLE UON.
	TELECOMMUNICATION DEVICE, MOUNTED IN FLOOR MONUMENT. 2 CATEGORY 6 CABLE UON.
	TELECOMMUNICATION DEVICE, MOUNTED ABOVE ACCESSIBLE CEILING IN SURFACE MOUNT BOX. 2 CATEGORY 6 CABLE UON.
	COMBINATION POWER/TELECOMMUNICATION DEVICES, MOUNTED IN FLUSH FLOOR BOX. TYPE AS NOTED ON PLANS OR IN SPECIFICATIONS. 2 CATEGORY 6 CABLE UON.
	COMBINATION POWER/TELECOMMUNICATION DEVICES, MOUNTED IN FIRE-RATED POKE-THRU FLOOR FITTINGS. TYPE AS NOTED ON PLANS OR IN SPECIFICATIONS. 2 CATEGORY 6 CABLE UON.
T	ELECTRIFIED FURNITURE PARTITION TELECOMMUNICATION CABLE FEED, WALL MOUNTED, +18" UON. CONSISTS OF 4 11/16" SQ. X 2 1/8" DEEP JUNCTION BOX, SINGLE GANG RING, AND STAINLESS STEEL COVERPLATE WITH 1 1/4" KO AND GROMMET. WRAP EXPOSED CABLE WITH SPIRAL WRAP.
P T	ELECTRIFIED FURNITURE PARTITION COMBINATION POWER/TELECOMMUNICATION FEEDS, MOUNTED IN FLUSH FLOOR BOX WITH KO'S IN COVERS TO ACCEPT FURNITURE WHIPS. TELECOMMUNICATIONS WHIP SHALL BE 1 1/4" MINIMUM.
T	ELECTRIFIED FURNITURE PARTITION TELECOMMUNICATION CABLE FEEDS, MOUNTED IN FIRE-RATED POKE-THRU THRU FLOOR FITTING WITH 1 1/4" KO'S IN COVER TO ACCEPT FURNITURE WHIPS.
WAP	WIRELESS ACCESS POINT, WALL MOUNTED, 8" BFC UON. 2 CATEGORY 6A CABLE UON.
WAP	WIRELESS ACCESS POINT, CEILING MOUNTED. 2 CATEGORY 6A CABLE UON.
#D/#V	QUANTITY OF DATA AND/OR VOICE TELECOMMUNICATIONS DEVICES.

FIRE ALARM

	SMOKE DETECTOR INITIATING DEVICE, CEILING MOUNTED ON FLUSH OR SURFACE JUNCTION BOX.
	SMOKE DETECTOR INITIATING DEVICE, STRUCTURE MOUNTED ABOVE SUSPENDED CEILING TO SURFACE JUNCTION BOX.
	SMOKE DETECTOR INITIATING DEVICE, DUCT-MOUNTED TYPE WITH SAMPLING TUBE, LOCATED AT SUPPLY AIR FANS 2000cfm AND LARGER.
	SMOKE DETECTOR INITIATING DEVICE, IN-DUCT MOUNTED TYPE AT, DUCTED FSD'S.
BT BR	PROJECTED BEAM SMOKE DETECTOR INITIATING DEVICES TO INCLUDE TRANSMITTER, RECEIVER AND REMOTE INDICATOR STATION, WALL OR PENDANT MOUNTED IN FLUSH OR SURFACE JUNCTION BOX AS NOTED ON PLANS. BT=BEAM TRANSMITTER, BR=BEAM RECEIVER.
	HEAT DETECTOR INITIATING DEVICE, CEILING MOUNTED ON FLUSH OR SURFACE JUNCTION BOX.
	HEAT DETECTOR INITIATING DEVICE, STRUCTURE MOUNTED ABOVE SUSPENDED CEILING TO SURFACE JUNCTION BOX.
F	MANUAL PULL STATION INITIATING DEVICE, WALL MOUNTED AT +48" UON.
D 2	MOTOR OPERATED FIRE/SMOKE DAMPER 'FSD', NIEC. SYMBOL DENOTES INTERFACE FOR POWER, CONTROL AND POSSIBLY MONITORING CONNECTIONS FROM FIRE ALARM SYSTEM. ALSO, INCLUDES LOCAL POWER DISCONNECT MEANS. 'ES' BY FSD IMPLIES END SWITCH CONNECTIONS FOR MONITORING BOTH 'OPEN' AND 'CLOSED POSITIONS. ADJACENT NUMBER INDICATES QUANTITY OF ACTUATORS AND END SWITCH GROUPS REQUIRING CONNECTION PER FSD, IF MORE THAN 1.
	SPRINKLER SYSTEM WATER FLOW SWITCH, NIEC. SYMBOL DENOTES INTERFACE FOR MONITORING CONNECTION FROM FIRE ALARM SYSTEM.
	SPRINKLER SYSTEM TAMPER SWITCH, NIEC. SYMBOL DENOTES INTERFACE FOR MONITORING CONNECTION FROM FIRE ALARM SYSTEM.
	SPRINKLER SYSTEM POST INDICATING VALVE 'PIV', NIEC. SYMBOL DENOTES INTERFACE FOR MONITORING CONNECTION FROM FIRE ALARM SYSTEM. INCLUDE A REMOTE MOUNTED ADDRESSABLE MONITORING MODULE AT PIV.
SM	REMOTE MOUNTED SINGLE INPUT, ADDRESSABLE, MONITORING MODULE FOR INITIATING CIRCUIT CONNECTION.
DM	REMOTE MOUNTED DUAL INPUT, ADDRESSABLE, MONITORING MODULE FOR INITIATING CIRCUIT CONNECTION.
CR	REMOTE MOUNTED PROGRAMMABLE CONTROL RELAY MODULE FOR ADDRESSABLE CONTROL.
DPS	DIFFERENTIAL PRESSURE SWITCH, NIEC. SYMBOLS DENOTES INTERFACE FOR MONITORING CONNECTION FROM FIRE ALARM SYSTEM TO ANNUNCIATE FAN OPERATION. INCLUDE A REMOTE MOUNTED ADDRESSABLE MONITORING MODULE AT EACH LOCATION.
EOL	END-OF-LINE RESISTOR.
PS	AIR PRESSURE SWITCH FOR PRE ACTION SPRINKLER SYSTEMS, NIEC. SYMBOL DENOTES INTERFACE FOR MONITORING CONNECTION FROM FIRE ALARM SYSTEM. INCLUDE A REMOTE MOUNTED ADDRESSABLE MONITORING MODULE AT EACH LOCATION.
	MAGNETIC TYPE DOOR HOLD OPEN/RELEASE DEVICE, WALL MOUNTED, NIEC. SYMBOL DENOTES INTERFACE FOR POWER AND CONTROL CONNECTIONS FROM FIRE ALARM SYSTEM.
	AUDIBLE NOTIFICATION APPLIANCE, WALL MOUNTED, 6" BELOW CEILING OR +80" AFF, WHICHEVER IS LOWER.
	VISIBLE NOTIFICATION APPLIANCE, WALL MOUNTED, 6" BELOW CEILING OR +80" AFF, WHICHEVER IS LOWER. NUMBER ASSOCIATED WITH 'cd' REPRESENTS CANDELA RATING OF STROBE.
	AUDIBLE/VISIBLE NOTIFICATION APPLIANCE, WALL MOUNTED, 6" BELOW CEILING OR +80" AFF, WHICHEVER IS LOWER. NUMBER ASSOCIATED WITH 'cd' REPRESENTS CANDELA RATING OF STROBE.
	AUDIBLE NOTIFICATION APPLIANCE, CEILING MOUNTED IN FLUSH BACK BOX.
	VISIBLE NOTIFICATION APPLIANCE, CEILING MOUNTED IN FLUSH BACK BOX. NUMBER ASSOCIATED WITH 'cd' REPRESENTS CANDELA RATING OF STROBE.
	AUDIBLE/VISIBLE NOTIFICATION APPLIANCE, CEILING MOUNTED IN FLUSH BACK BOX. NUMBER ASSOCIATED WITH 'cd' REPRESENTS CANDELA RATING OF STROBE.
	FIREMAN'S TELEPHONE JACK, WALL MOUNTED, +42" UON.

3

SECURITY

A	ALARM MONITORING CONTACT, MOUNTED AS NOTED ON PLANS.
EP	ELECTRIFIED PANIC HARDWARE, NIEC, BUT WIRED UNDER THIS DIVISION.
MP	MECHANICAL PANIC HARDWARE, NIEC, BUT WIRED UNDER THIS DIVISION.
RX	REQUEST-TO-EXIT SWITCH, NIEC, FURNISH WITH DOOR HARDWARE AND WIRED UNDER THIS DIVISION.
P	POWER TRANSFER DEVICE, NIEC.
D	DURESS STATION, MOUNTED AS NOTED ON PLANS.
M	AREA MOTION SENSOR, CEILING MOUNTED, UON.
PS	AREA MOTION SENSOR, WALL MOUNTED, +84" UON.
GB	GLASS BREAK DETECTOR, CEILING MOUNTED, UON.
CR	CARD READER CONTROLLER, WALL MOUNTED, +36" UON.
K	KEY PAD CONTROLLER, WALL MOUNTED, +42" UON.
PS	REMOTE MOUNTED POWER SUPPLY FOR LOW-VOLTAGE EQUIPMENT CONNECTIONS.
	FIXED POSITION CCTV CAMERA, MOUNTED AS NOTED ON PLANS. 1 CATEGORY 6A CABLE UON.
	PAN/TILT/ZOOM (PTZ) CCTV CAMERA, MOUNTED AS NOTED ON PLANS. 1 CATEGORY 6A CABLE UON.
	CCTV MONITOR.
EP	ELECTRONIC MORTISE DOOR LOCK, NIEC, BUT WIRED UNDER THIS DIVISION.

ABBREVIATIONS

A	AMPERES
AFI	ARC FAULT CIRCUIT INTERRUPTER
AF	AMPERE OVERCURRENT FRAME SIZE (WHEN APPLIED TO CIRCUIT BREAKERS) OR AMPERE FUSE SIZE (WHEN APPLIED TO FUSES)
AFF	ABOVE FINISHED FLOOR
AIC	ASYMMETRIC INTERRUPTING CURRENT
AL	ALUMINUM
AT	AMPERE OVERCURRENT TRIP (WHEN APPLIED TO CIRCUIT BREAKERS)
ATS	AUTOMATIC TRANSFER SWITCH
BAS	BUILDING AUTOMATION SYSTEM
BPS	BOLTED PRESSURE CONTACT SWITCH
C	CONDUIT
CCTV	CLOSED CIRCUIT TELEVISION
CL	CURRENT LIMITING CIRCUIT BREAKER OR FUSE
CP	CIRCULATION PUMP
CKT	CIRCUIT
CT	CURRENT TRANSFORMER
CU	COPPER
DF	DRINKING FOUNTAIN
DW	DISH WASHER
(E)	EXISTING TO REMAIN
EC	ELECTRICAL CONTRACTOR
EF	EXHAUST FAN
EP	EXPLOSION PROOF
EPO	EMERGENCY POWER OFF
EMCS	ENERGY MANAGEMENT CONTROLS SYSTEM
EMT	ELECTRICAL METALLIC TUBING
ETD	EMERGENCY TRANSFER DEVICE
EWH	ELECTRIC WATER HEATER
F	FUSED
(F)	FUTURE
FACP	FIRE ALARM CONTROL PANEL
FAJB	FIRE ALARM JUNCTION BOX
FFCP	FIREMAN'S FAN CONTROL PANEL
FLA	FULL LOAD AMPERES
FMC	FLEXIBLE METAL CONDUIT
FSD	FIRE/SMOKE DAMPER
FSEC	FOOD SERVICE EQUIPMENT CONTRACTOR
FRAP	FIREMAN'S REMOTE ANNUNCIATOR PANEL
G	GROUND
GB	GROUND BUS
GD	GARBAGE DISPOSAL
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GND	GROUND
GRAP	GENERATOR REMOTE ANNUNCIATOR PANEL
BWH	GAS WATER HEATER
HPC	HIGH PRESSURE CONTACT SWITCH
IMC	INTERMEDIATE METAL CONDUIT
IWH	INSTANTANEOUS OR POINT OF USE WATER HEATER
JB	JUNCTION BOX
LSCP	LIFE SAFETY CONTROL PANEL
LCP	LIGHTING CONTROL PANEL
MBGB	MAIN BUILDING GROUND BUS
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MLO	MAIN LUGS ONLY
MT	EMPTY
MTC	EMPTY CONDUIT
MTS	MANUAL TRANSFER SWITCH
MW	MIRCOWAVE
(N)	NEW
NC	NORMALLY CLOSED
NF	NON-FUSED
NIEC	NOT IN ELECTRICAL CONTRACT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OC	ON CENTER
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
PNL	PANEL
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
RF	REFRIGERATOR
(R)	EXISTING TO BE REMOVED
(RR)	REMOVE AND RELOCATE
RSC	RIGID STEEL CONDUIT
SAD	SEE ARCHITECTURAL DRAWINGS
TC	TIME CLOCK
TP	TWISTED-PAIR
SPD	SURGE PROTECTION DEVICE
TX	TRANSFORMER
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
UPS	UNINTERRUPTIBLE POWER SUPPLY
UR	UNDERCOUNTER REFRIGERATOR
V	VOLTS
VA	VOLTS-AMPS
VFD	VARIABLE FREQUENCY DRIVE
VM	VENDING MACHINE
W	WATTS
WAP	WIRELESS ACCESS POINT
WH	WATER HEATER
WP	WEATHERPROOF
2SP	TWO SPEED
1Ø	1 PHASE
3Ø	3 PHASE
1P	1 POLE
2P	2 POLE
3P	3 POLE
3W	3 WIRE
4W	4 WIRE

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E0.02	LIGHTING SCHEDULES & PROJECT NOTES
E0.03	INTERIOR TITLE 24
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E1.01	ELECTRICAL SITE PLAN
E2.01	LIGHTING PLAN - FIRST FLOOR
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E3.01	POWER & TELECOM PLAN - FIRST FLOOR
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E3.03	POWER PLAN ROOF
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E5.01	FIRE ALARM PLAN - FIRST FLOOR
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E7.04	AV RISER DIAGRAM
E8.01	ELECTRICAL DETAILS
E8.02	ELECTRICAL DETAILS
E8.03	ELECTRICAL DETAILS
E8.04	ELECTRICAL DETAILS
E8.05	ELECTRICAL DETAILS

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SYMBOLS LIST & DRAWING
INDEX

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NUMBERED SHEET NOTES

1. LOCATE DEVICES FLUSH IN CEILING FOR PROJECTOR, COORDINATE WITH SIGNAL PLANS AND REFER TO AV RISER DIAGRAMS.
2. PROVIDE A LAB BENCH PEDESTAL, CONFIGURATION AS SHOWN, WATERSAVER FAUCET COMPANY EWS SERIES OR EQUAL WITH SATIN ALUMINUM FINISH. VERIFY LOCATION WITH LAB FURNISHING DRAWINGS.
3. PROVIDE A LAB BENCH PEDASTAL AT INSTRUCTOR'S DEMOSTATION TABLE, WITH PROVISIONS FOR POWER AND DATA.
4. LOCATE DEVICES FOR INSTRUCTOR'S AV EQUIPMENT, COORDINATE WITH SIGNAL PLANS AND REFER TO AV RISER DIAGRAMS.
5. PROVIDE SURFACE RACEWAY, LEGRAND/WIREMOLD AL3300 SERIES OR EQUAL FOR POWER ONLY, AL5200 SERIES OR EQUAL WHERE POWER AND DATA IS REQUIRED.
6. PROVIDE LAB PEDASTAL AT CASEWORK AT EACH LOCATION SHOW. ACCOUNT FOR TWO PEDESTALS, EACH WITH TWO GFCI RECEPTACLES IN BACK-TO-BACK CONFIGURATION, LEGRAN LBP2 OR EQUAL.
7. PROVIDE TWO LAB PEDESTALS AT INTRUCTOR'S DEMONSTRATION TABLE, ONE FOR POWER, ONE FOR DATA.
8. PROVIDE GROUNDING BUSBAR AT EACH ISLAND, REFER TO LAB FURNISHING PLANS.
9. PROVIDE 30A, 208V/1Ø CONNECTION AT SPECIALTY RECEPTACLE, VERIFY NEMA CONFIGURATION WITH OWNER PROVIDED EQUIPMENT.
10. PROVIDE DEDICATED 120V CIRCUIT AND PROVIDE CONNECTION TO ALL VAVS ON THIS FLOOR. CIRCUITING TO EACH VAV NOT SHOWN. COORDINATE EXACT LOCATIONS AND QUANTITY WITH MECHANICAL PLANS.

NUMBERED SHEET NOTES

11. PROVIDE DEDICATED 120V CIRCUIT, AND CIRCUIT BREAKER WITH RED TRIP HANDLE, AND PROVIDE CONNECTION TO ALL FSDS ON THIS FLOOR. CIRCUITING TO EACH FSD NOT SHOWN. COORDINATE EXACT LOCATIONS AND QUANTITY WITH MECHANICAL PLANS, COORDINATE WITH FIRE ALARM PLANS.
12. LOCATED POWER AND DATA FOR LOCK BOX. VERIFY MOUNTING HEIGHT WITH OWNER.
13. LOCATE RECEPTACLE FOR ELECTRIC WATER COOLER, REFER TO PLUMBING PLANS, ROUGH-IN PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.
14. PROVIDE LINE VOLTAGE CONNECTION AS SHOWN, AND SEPARATE LOW VOLTAGE CONTROL CONNECTION AS REQUIRED (NOT SHOWN) FOR MOTORIZED BLINDS. REFER TO MANUFACTURER'S INSTALLATION INSTRUCTIONS.
15. PROVIDE CONTROL SWITCH FOR MOTORIZED BLINDS, GANG WITH LOW VOLTAGE LIGHTING CONTROL SWITCH WHERE APPLICABLE.
16. LOCATE DEVICES FOR FLAT PANEL DISPLAY, REFER TO E4.01.
17. PROVIDE 120V CONNECTION FOR FIRE RISER BELL AS REQUIRED, REFER TO FIRE PROTECTION PLANS.
18. LOCATE RECEPTACLE FOR CAMERA, REFER TO TO E4.01.
19. INSTALL DEVICE IN SURFACE MOUNTED BOX ATTACHED TO MOBILE TABLE, WITH 8' SO CORD TERMINATED WITH N5-15P PLUG. REFER TO LAB FURNISHINGS DRAWINGS.
20. PROVIDE 3-1" MTC. WITH PULL STRING BETWEEN 12"X12" JUNCTION BOXES LOCATED ABOVE ACCESSIBLE CEILING SPACE, AND HOME RUN TO ELECTRICAL ROOM M123.
21. LOCATE DEVICES ON LAB PEDESTAL AT COUNTERTOP.

GENERAL SHEET NOTES

A. ALL CONDUIT AND RACEWAY PENETRATIONS THROUGH FIRE RATED WALLS AND FIXTURES/DEVICES INSTALLED IN RATED ASSEMBLIES SHALL MAINTAIN THE RATING OF THE ASSEMBLY PER SECTION 712 OF THE CBC. REFER TO DETAILS J & K/E8.02 FOR RATED PENETRATION DETAILS. REFER TO ARCHITECTURAL PLANS FOR IDENTIFICATION OF FIRE RATED CONDITIONS.

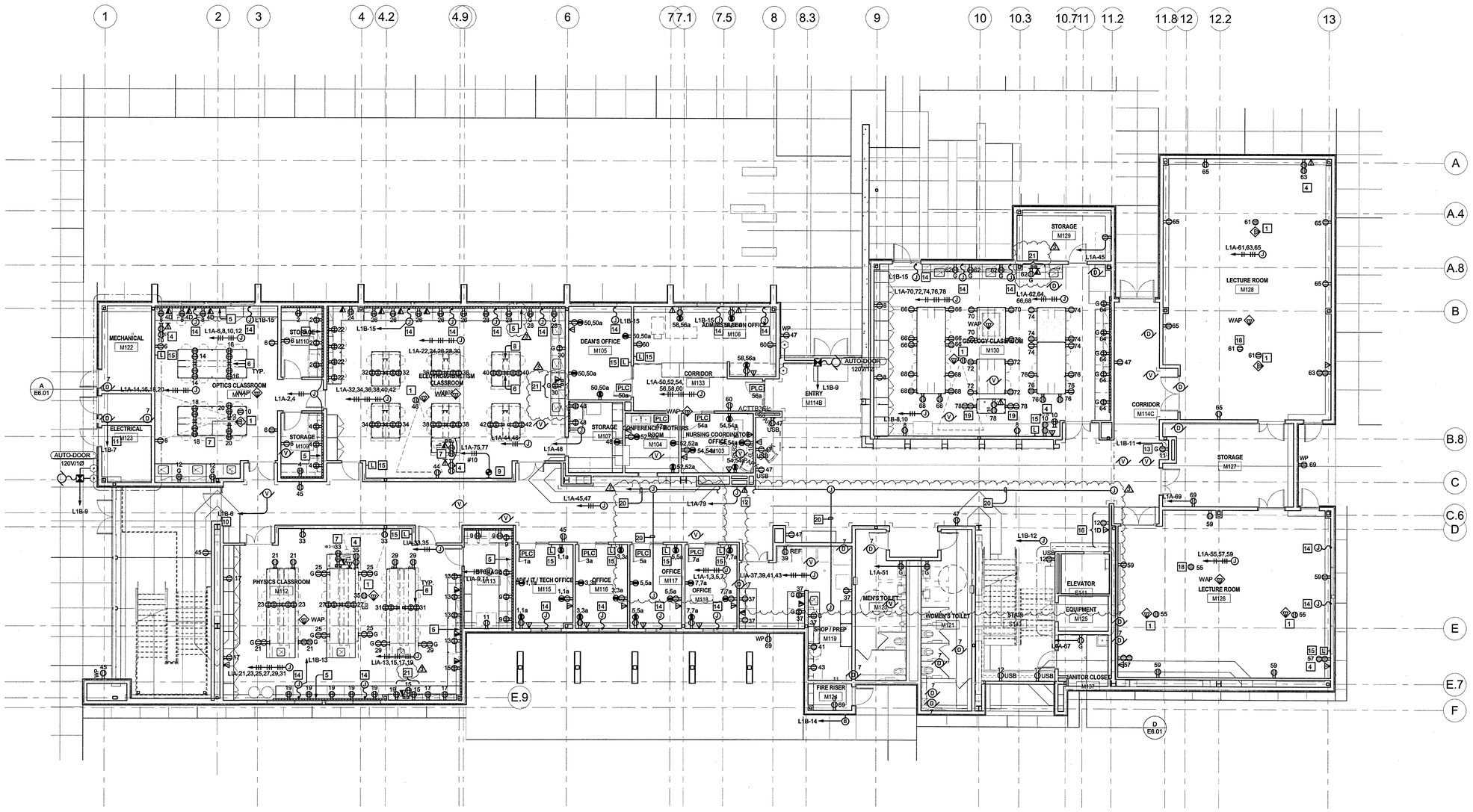
B. ALL TELECOM OUTLETS WILL HAVE A 4-11/16" SQ. BOX WITH SINGLE GANG RING AND 1-1/4" CONDUIT TO ACCESSIBLE CEILING.

C. ALL WAP LOCATIONS WILL HAVE TWO CATEGORY 6A DATA CABLES AMD TERMINATED ABOVE CEILING WITH 20' OF COIL.

D. 12"W X4"H CABLE TRAY SHALL BE ROUTED ABOVE CEILING IN THE CORRIDOR. A MINIMUM OF 1-4" CONDUIT SHALL BE STUBBED INTO SPACES FROM THE CABLE TRAY. ADDITIONAL CONDUITS SHALL BE PROVIDED WHEN CONDUIT FILL REACHES 40%.

E. WHERE TELECOMMUNICATIONS OUTLETS ARE SHOWN IN 'FLOATING' CASEWORK, PROVIDE 1.25"C. ROUTED UNDER SLAB TO NEAREST WALL, AND UP TO ACCESSIBLE CEILING SPACE.

F. WIRELESS ACCESS POINTS SHALL BE PROVIDED BY THE OWNER AND INSTALLED BY THE CONTRACTOR. COORDINATE WITH OWNER'S IT REPRESENTATIVE.



A E3.01 POWER & TELECOM - FIRST FLOOR

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

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MOHR HALL MODERIZATION

POWER & TELECOM PLAN - FIRST FLOOR

NORTH

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E3.01

NUMBERED SHEET NOTES

1. LOCATE DEVICES FLUSH IN CEILING FOR PROJECTOR, COORDINATE WITH SIGNAL PLANS AND REFER TO AV RISER DIAGRAMS.
2. PROVIDE 120V CONNECTION TO HEADWALL UNIT, REFER TO LAB FURNISHING DRAWINGS TO VERIFY LOCATION, MOUNTING HEIGHT, AND ADDITIONAL REQUIREMENTS.
3. PROVIDE AV POKE-THROUGH DEVICE, LEGRAND EVOLUTION SERIES OR EQUAL, AT INSTRUCTORS STATION.
4. LOCATE DEVICES FOR INSTRUCTOR'S AV EQUIPMENT, COORDINATE WITH SIGNAL PLANS AND REFER TO AV RISER DIAGRAMS.
5. PROVIDE DEDICATED 120V CIRCUIT AND PROVIDE CONNECTION TO ALL VAVS ON THIS FLOOR. CIRCUITING TO EACH VAV NOT SHOWN. COORDINATE EXACT LOCATION AND QUANTITY WITH MECHANICAL PLANS.
6. PROVIDE DEDICATED 120V CIRCUIT, AND CIRCUIT BREAKER WITH RED TRIP HANDLE, AND PROVIDE CONNECTION TO ALL FSDS ON THIS FLOOR. CIRCUITING TO EACH FSD NOT SHOWN. COORDINATE EXACT LOCATIONS AND QUANTITY WITH MECHANICAL PLANS, COORDINATE WITH FIRE ALARM PLANS.
7. LOCATE OUTLET IN BASE CABINET FOR AUTOMATIC FAUCET POWER SUPPLY, COORDINATE WITH LF DRAWINGS.
8. TYPICAL RECESSED MULTI-SERVICE POKE-THROUGH DEVICE, WITH DUPLEX RECEPTACLES AND TELECOMMUNICATIONS AS INDICATED. LEGRAND EVOLUTION 6AT OR EQUAL.
9. RECESSED MULTI-SERVICE POKE-THROUGH DEVICE, WITH TWO DUPLEX RECEPTACLES, TELECOMMUNICATIONS AS INDICATED, AND PASS THROUGH FOR AV CABLING. LEGRAND EVOLUTION 8AT OR EQUAL. REFER TO SIGNAL PLANS AND AV RISER DIAGRAMS FOR ADDITIONAL REQUIREMENTS.
10. PROVIDE LINE VOLTAGE CONNECTION AS SHOWN, AND SEPARATE LOW VOLTAGE CONTROL CONNECTION AS REQUIRED (NOT SHOWN) FOR MOTORIZED BLINDS. REFER TO MANUFACTURER'S INSTALLATION INSTRUCTIONS.
11. PROVIDE CONTROL SWITCH FOR MOTORIZED BLINDS, GANG WITH LOW VOLTAGE LIGHTING CONTROL SWITCH WHERE APPLICABLE.
12. PROVIDE POWER AND DATA AT AV RACK LOCATED UNDER COUNTER, REFER TO E4.2.
13. LOCATE DEVICES FOR OWNER FURNISHED COPIER.
14. LOCATE RECEPTACLE FOR CAMERA, REFER TO TO E4.02.
15. PROVIDE 3-1" MTC. WITH PULL STRING BETWEEN 12"X12" JUNCTION BOXES LOCATED ABOVE ACCESSIBLE CEILING SPACE, AND HOME RUN TO ELECTRICAL ROOM M123.
16. LOCATE DEVICES ON LAB PEDESTAL AT COUNTERTOP.

GENERAL SHEET NOTES

A. ALL CONDUIT AND RACEWAY PENETRATIONS THROUGH FIRE RATED WALLS AND FIXTURES/DEVICES INSTALLED IN RATED ASSEMBLIES SHALL MAINTAIN THE RATING OF THE ASSEMBLY PER SECTION 712 OF THE CBC. REFER TO DETAILS J & K/E8.02 FOR RATED PENETRATION DETAILS. REFER TO ARCHITECTURAL PLANS FOR IDENTIFICATION OF FIRE RATED CONDITIONS.

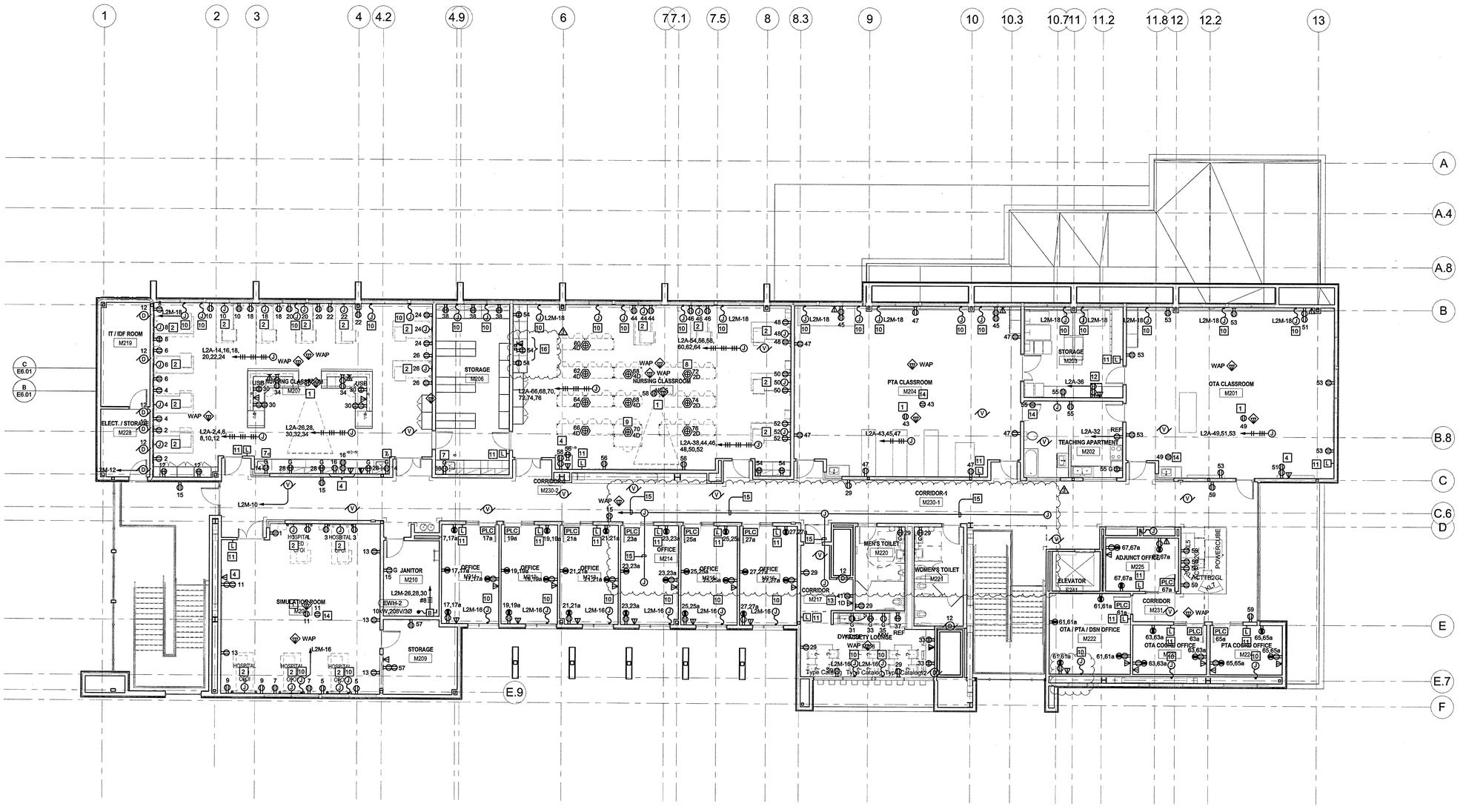
B. ALL TELECOM OUTLETS WILL HAVE A 4-11/16" SQ. BOX WITH SINGLE GANG RING AND 1-1/4" CONDUIT TO ACCESSIBLE CEILING.

C. ALL WAP LOCATIONS WILL HAVE TWO CATEGORY 6A DATA CABLES AMD TERMINATED ABOVE CEILING WITH 20' OF COIL.

D. 12"W X4"H CABLE TRAY SHALL BE ROUTED ABOVE CEILING IN THE CORRIDOR. A MINIMUM OF 1-4" CONDUIT SHALL BE STUBBED INTO SPACES FROM THE CABLE TRAY. ADDITIONAL CONDUITS SHALL BE PROVIDED WHEN CONDUIT FILL REACHES 40%.

E. WHERE TELECOMMUNICATIONS OUTLETS ARE SHOWN IN 'FLOATING' CASEWORK, PROVIDE 1.25"C. ROUTED UNDER SLAB TO NEAREST WALL, AND UP TO ACCESSIBLE CEILING SPACE.

F. WIRELESS ACCESS POINTS SHALL BE PROVIDED BY THE OWNER AND INSTALLED BY THE CONTRACTOR. COORDINATE WITH OWNER'S IT REPRESENTATIVE.



A E3.02 POWER & TELECOM - SECOND FLOOR

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

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MOHR HALL MODERIZATION

POWER & TELECOM PLAN - SECOND FLOOR

NORTH

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May 22, 2018

E3.02

NUMBERED SHEET NOTES

1. OWNER FURNISHED, CONTRACTOR INSTALLED PROJECTOR AT CEILING. REFER TO DETAIL B/E8.01 FOR MOUNTING REQUIREMENTS AND AV RISER DIAGRAM FOR WIRING REQUIREMENTS.
2. PROVIDE WALL MOUNTED AV SPEAKERS AT +8'-0" A.F.F REFER TO H/E8.01 FOR MOUNTING REQUIREMENTS.
3. ROUGH-IN AT +18" FOR PASS THROUGH AV CABLING TO AV CABINET. REFER TO AV RISER DIAGRAMS FOR ADDITIONAL REQUIREMENTS. PROVIDE 1.25" CONDUIT STUB TO ACCESSIBLE CEILING SPACE. REFER TO D/E7.04.
4. PROVIDE CABLE TRAY ABOVE ACCESSIBLE CEILING SPACE, REFER TO SPECIFICATIONS. REFER TO DETAILS J,K,L/E8.04
5. PROVIDE 2-2"C. STUBBED FROM CABLE TRAY TO ACCESSIBLE CEILING SPACE.
6. PROVIDE ROUGH-IN AT CASEWORK FOR AV CABLING. REFER TO AV RISER DIAGRAMS FOR ADDITIONAL REQUIREMENTS. PROVIDE 1.25" CONDUIT STUB TO ACCESSIBLE CEILING SPACE.
7. PROVIDE A 137" DIAGONAL POWERED PROJECTION SCREEN RECESSED IN CEILING. C/E8.01
8. PROVIDE A 164" DIAGONAL POWERED PROJECTION SCREEN RECESSED IN CEILING. C/E8.01
9. PROVIDE A CEILING MOUNT FOR OFCI 80" FLAT PANEL DISPLAY. REFER TO DETAIL L/E8.03 MOUNTING REQUIREMENTS AND AV RISER DIAGRAM FOR WIRING REQUIREMENTS.
10. PROVIDE A TV WALL MOUNT FOR OFCI SIGNAGE DISPLAY- REFER TO I/E8.04
11. OFCI BROADCAST CAMERA. COORDINATE EXACT LOCATION WITH OWNERS REPESENTATIVE. REFER TO A/E8.05.
12. INSTALL A SHORT THROW PROJECTOR ON WALL MOUNT ABOVE WHITE BOARD. REFER TO A/E8.01
13. MOUNT A CONTROL PANEL, HDMI, AND VGA/AUDIO MODULES ON DESK TOP MOUNTING DEVICE.

GENERAL SHEET NOTES

A. ALL CONDUIT AND RACEWAY PENETRATIONS THROUGH FIRE RATED WALLS AND FIXTURES/DEVICES INSTALLED IN RATED ASSEMBLIES SHALL MAINTAIN THE RATING OF THE ASSEMBLY PER SECTION 712 OF THE CBC. REFER TO DETAILS J AND K/E8.02 FOR RATED PENETRATION DETAILS. REFER TO ARCHITECTURAL PLANS FOR IDENTIFICATION OF FIRE RATED CONDITIONS.

B. CAMERA DATA CABLES SHALL BE TERMINATED ABOVE ACCESSIBLE CEILING WITH A PATCH CORD TO THE CAMERA.

C. CLOCKS SHALL BE 12" ANALOG WITH BLACK HOUSING AND WHITE FACE. PROVIDE RECESSED CLOCK-HANGER RECEPTACLE, P&S S3713-W OR EQUAL, AND CONNECT TO CIRCUIT INDICATED, REFER TO POWER PLANS. REFER TO SPECIFICATION SECTION 275313 FOR ADDITIONAL REQUIREMENTS.

D. REFER TO SPECIFICATION SECTION 286516 FOR ADDITIONAL REQUIREMENTS FOR THE ACCESS AND INTRUSION SYSTEM. REFER TO DETAILS D&E/E7.02 FOR RISER AND ELEVATION.

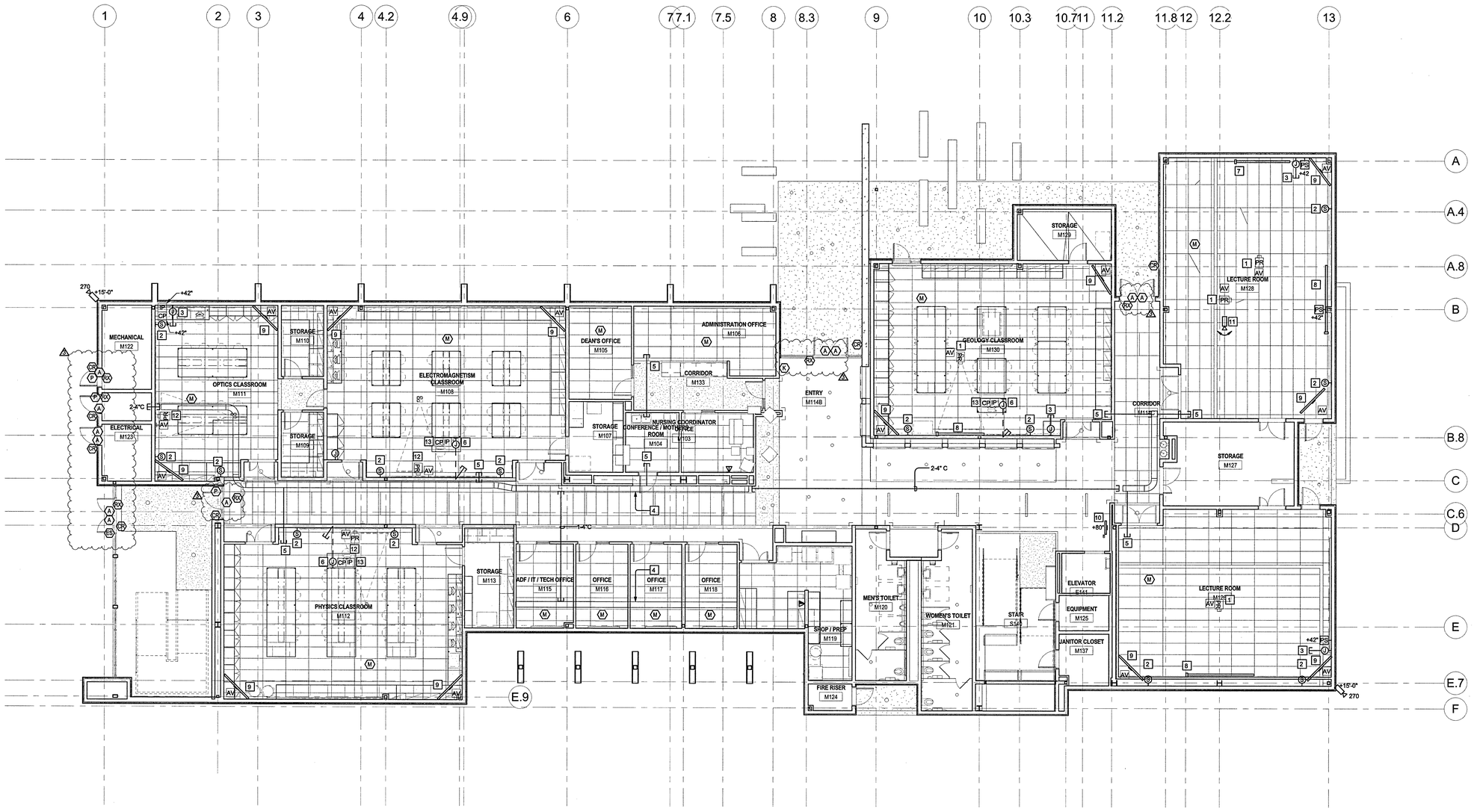
E. REFER TO SPECIFICATION SECTION 274100 AND RISER DIAGRAMS ON SHEET E7.04 FOR ADDITIONAL REQUIREMENTS FOR THE AV SYSTEM. AV WALLPLATE DEVICES SHALL BE INSTALLED WITHIN 6" OF AND AT THE SAME ELEVATION AS POWER AND DATA DEVICES, WHER APPLICABLE. COORDINATE WITH THE POWER/TELECOM PLANS PRIOR TO ROUGH-IN.

F. REFER TO SPECIFICATION SECTIONS 260546 AND 270536 FOR ADDITIONAL REQUIREMENTS FOR SIGNAL SYSTEMS RACEWAY AND CABLE TRAY. REFER TO DETAILS J,K&L/E8.04 FOR INSTALLATION DETAILS.

G. ALL LOW VOLTAGE CABLE SHALL BE INSTALLED IN CONDUIT, CABLE TRAY, OR J-HOOKS.

H. ALL CAMERA CABLES SHALL BE TERMINATED ON A 24 PORT PATCH PANEL WITH GREEN JACKS.

I. REFER TO SPECIFICATION SECTION 275126 FOR REQUIREMENTS OF THE ASSISTIVE LISTENING SYSTEM. INCLUDE A FIXED TRANSMITTER IN THE AV EQUIPMENT RACK AT ALL CLASSROOMS, LABS AND LECTURE ROOMS, AND TIE INTO CLASSROOM AV SYSTEM. PROVIDE A PORTABLE SYSTEM FOR USE IN CONFERENCE ROOMS. REFER TO ARCHITECTURE PLANS FOR SEATING CAPACITY AND ALS CALCULATIONS.



A E4.01 SIGNAL PLAN - FIRST FLOOR

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

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MOHR HALL MODERIZATION

SIGNAL PLAN - FIRST FLOOR

NORTH

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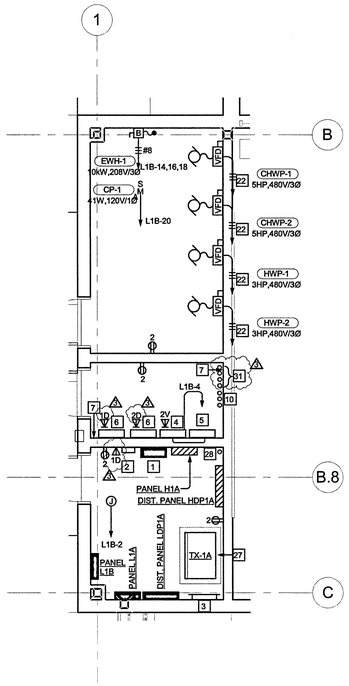
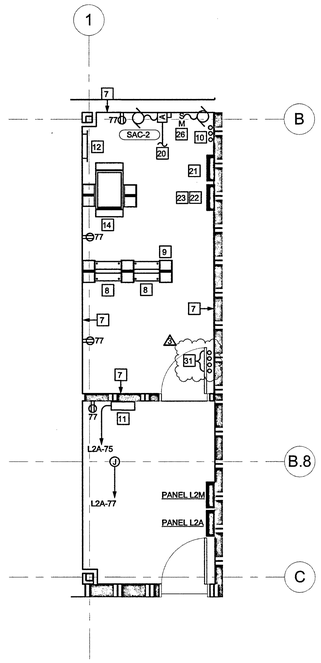
1/8" = 1'-0"
May 22, 2018

E4.01



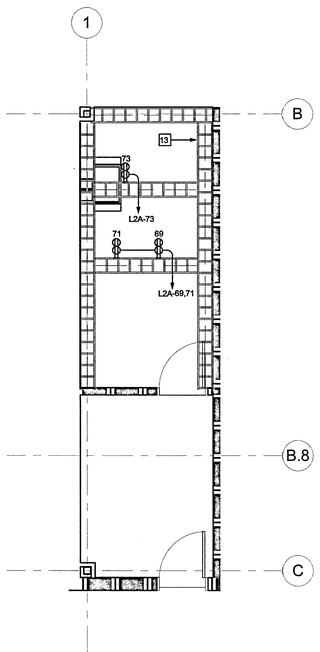
A E6.01 ELECTRICAL & MECHANICAL ROOMS - FIRST FLOOR

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



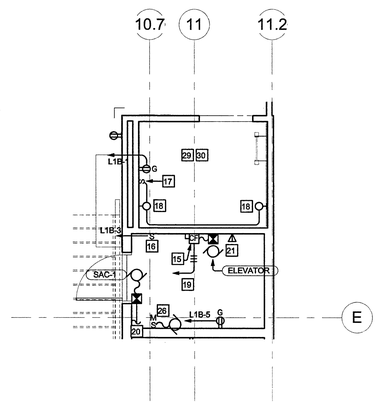
B E6.01 IDF/ELECTRICAL ROOM - SECOND FLOOR

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



C E6.01 IDF/ELECTRICAL ROOM - LADDER RACK

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



D E6.01 ELEVATOR EQUIPMENT ROOM AND PIT

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

GENERAL SHEET NOTES

A REFER TO DETAIL A/E8.02 FOR INSTALLATION OF WALL MOUNTED PANELBOARDS AND OTHER WALL MOUNTED EQUIPMENT.

B REFER TO SHEET DETAIL B/E8.02 FOR TYPICAL HOUSEKEEPING PAD.

C FOR TYPICAL PANELBOARDS INSTALLATION, REFER TO A/E8.02.

3 D DATA DROPS FOR LIGHTING CONTROL SYSTEM, BMS, FIRE ALARM, ACCESS CONTROL AND INTRUSION SHALL BE LANDED AT PATCH PANELS ON THE 4-PORT RACK.

NUMBERED SHEET NOTES

1 PROVIDE MINI-INVERTER, BODINE ELI-S-250 OR EQUAL, WALL MOUNTED ABOVE LIGHTING CONTROL RELAY PANEL.

2 PROVIDE A 4-RELAY LIGHTING CONTROL PANEL, SENSOR SWITCH NLIGHT NPANEL-4 OR EQUAL, WALL MOUNTED BELOW INVERTER.

3 BUILDING MAIN REFERENCE GROUND BUS, REFER TO B/E7.01.

4 FIRE ALARM CONTROL PANEL, SILENT KNIGHT 5820XL-EVS.

5 PROVIDE FIRE ALARM POWER SUPPLY, SILENT KNIGHT 5895XL (TOP), AND VOICE AMPLIFIER, SILENT KNIGHT EVS-125W (BOTTOM).

6 PROVIDE ACCESS AND INTRUSION SYSTEM CABINETS, REFER TO ELEVATION DETAIL E/E7.02.

7 PROVIDE PLYWOOD BACKBOARD, 4'W X 8'H X 0.75" COMMUNICATIONS GRADE AS INDICATED IN MPOE AND IDF ROOM AT +3" A.F.F. A MINIMUM OF TWO COATS OF FIRE RETARDANT PAINT, COLOR TO MATCH WALL FINISH, SHALL BE APPLIED TO ALL SURFACES OF THE BOARD PRIOR TO INSTALLATION.

8 PROVIDE 19"X84" FLOOR MOUNTED, 2-POST IDF EQUIPMENT RACKS, REFER TO INSTALLATION DETAILS. INSTALL PER A/E8.04.

9 PROVIDE 6" VERTICAL WIRE MANAGER AT THE WALL AND 10" VERTICAL CABLE MANAGERS, BETWEEN AND AT THE END OF RACK BAY.

10 LOW VOLTAGE SYSTEMS DUCT BANK/SITE CONDUITS STUB UP IN MPOE ROOM, REFER TO ELECTRICAL SITE PLAN, SHEET E1.01.

11 PROVIDE FIRE ALARM BOOSTER PANEL AND VOICE AMPLIFIER PANEL, WALL MOUNTED AND STACKED.

12 TELECOMMUNICATIONS GROUND BUS BAR.

13 OVERHEAD CABLE RUNWAY INSTALLED AT +84", REFER TO INSTALLATION DETAILS. REFER TO DETAILS B THROUGH G ON SHEET E8.04.

14 PROVIDE FLOOR MOUNTED 4-POST EQUIPMENT RACK, REFER TO SPECIFICATIONS AND INSTALLATION DETAILS. INSTALL PER A/E8.04.

15 ELEVATOR MOTOR DISCONNECTING MEANS FUSED PER ELEVATOR SHOP DRAWINGS. PROVIDE WITH AUXILIARY CONTACTS AND CONTROL WIRING BACK TO MAIN BREAKER TO SHUT DOWN ELEVATOR BATTERY POWER SUPPLY UPON SHUNT TRIP OF THE BREAKER PER CEC-620.91(C).

16 ELEVATOR CAB LIGHT AND VENTILATION DISCONNECTING MEANS CAPABLE OF BEING LOCKED IN THE OPEN POSITION.

3 17 LOCATE ELEVATOR PIT LIGHT SWITCH NEAR ACCESS DOOR PER ELEVATOR SHOP DRAWINGS. RECEPTACLE AND SWITCH SHALL BE LOCATED IN A NEMA 4X ENCLOSURE IF PIT IS SPRINKLED.

18 ELEVATOR PIT LIGHT, LITHONIA VW150IM12 OR EQUAL, PROVIDE WITH LED BULB RATED FOR ENCLOSED FIXTURE, MINIMUM 1600 LUMEN OUTPUT, HIGH OUTPUT LED BULB, MIN. 1500 LUMEN OUTPUT, RATED FOR ENCLOSURE FIXTURE. ASSEMBLY SHALL BE NEMA 4X RATED.

19 ELEVATOR FEEDER FROM MAIN SWITCHBOARD, REFER TO POWER ONE-LINE DIAGRAM A/E7.01.

20 PROVIDE CONNECTION FROM OUTDOOR UNIT PER MANUFACTURERS INSTALLATION INSTRUCTIONS, REFER TO E3.03.

21 PROVIDE DEDICATED PHONE LINE.

22 HOMERUN TO HDP1A, REFER TO POWER ONE-LINE DIAGRAM.

23 BUILDING ENTRANCE PROTECTOR (BEP). REFER TO SINGLE LINE DRAWING.

24 110/100 PAIR BLOCK FOR MISCELLANEOUS CATEGORY 6 HORIZONTAL CABLES. MISCELLANEOUS CABLES INCLUDE FIRE ALARM, SECURITY TELEPHONE, ELEVATOR PHONE AND EMERGENCY PHONES.

25 110/100 PAIR BLOCK FOR POWER SUM TIE CABLES TO VOICE PATCH PANEL ON RACK. REFER TO SINGLE LINE DIAGRAMS.

26 PROVIDE 120V CONNECTION TO CONDENSATE PUMP PROVIDED WITH SAC UNIT, REFER TO MECHANICAL SCHEDULES.

27 PROVIDE HOUSEKEEPING PAD, REFER TO B/E8.02.

28 2" MTC. FOR FUTURE PV, STUB UP TO ACCESSIBLE CEILING SPACE BELOW ROOF LEVEL. REFER TO POWER ONE-LINE DIAGRAM.

29 ALL ELECTRICAL DEVICES, FIXTURES, AND EQUIPMENT CONNECTIONS UNDER 48" SHALL BE NEMA 4 WEATHERPROOF, WIRING SHALL BE IDENTIFIED FOR USE IN WET LOCATIONS IN ACCORDANCE WITH THE REQUIREMENTS OF NFPA 70.

30 PROVIDE LIGHTING AT TOP OF ELEVATOR SHAFT AS REQUIRED BY MANUFACTURER, PROVIDE A MANUAL SWITCH AND TWO F2 WALL MOUNTED FIXTURES. PROVIDE CREDIT IF NOT REQUIRED BY THE ELEVATOR MANUFACTURER.

3 31 PROVIDE 4-4". SLEEVES BETWEEN FLOORS, PROVIDE UL LISTED FIRESTOPPING AS REQUIRED.

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REGISTERED PROFESSIONAL ENGINEER #E015494 Exp. 06/30/19 SCOTT WHEELER ELECTRICAL STATE OF CALIFORNIA

FILE NO.34-C3

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
02-116163
AC TM FLS SS
DATE 5-30-18

rev 3

REGISTERED PROFESSIONAL ENGINEER #E015494 Exp. 06/30/19 SCOTT WHEELER ELECTRICAL STATE OF CALIFORNIA

THIS DRAWING IS NOT FINAL OR TO BE USED FOR CONSTRUCTION UNTIL IT IS SIGNED BY THE ARCHITECT/ENGINEER.

PLAN CHECK SET

	REVISION	BY	DATE
3	REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE

MOHR HALL MODERIZATION

ENLARGED ROOM PLANS

B5017.00
1/4" = 1'-0"
May 22, 2018

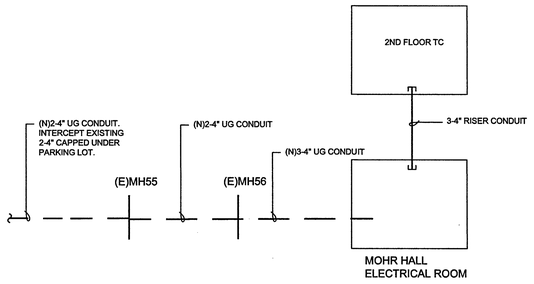
NORTH

E6.01

5/18/2018 12:44:57 PM C:\Users\mabel\Documents\B5017.00-LosRiosCCDMohrHall-E16-Central_mabel.rvt

GENERAL NOTES:

1. ALL CONDUIT SHALL BE A MINIMUM DEPTH OF 24".
2. FINISH ALL HARDSCAPE AND LANDSCAPE TO ORIGINAL CONDITION OR AS SHOWN ON PLAN DRAWINGS.

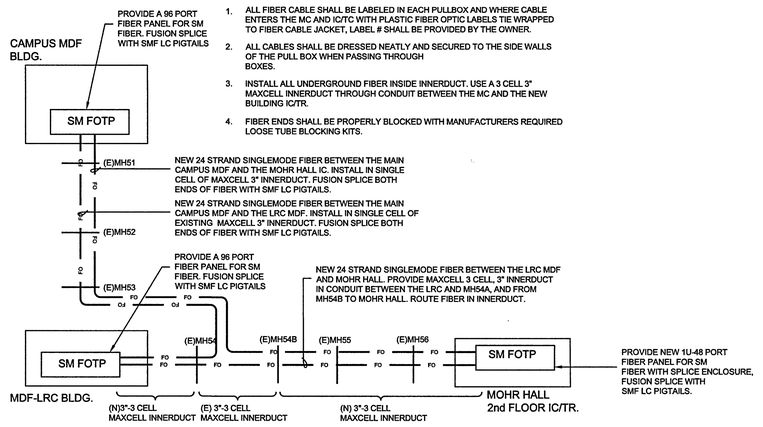


A E7.02 SITE TELECOMMUNICATIONS CONDUIT

NTS

GENERAL NOTES:

1. ALL FIBER CABLE SHALL BE LABELED IN EACH PULLBOX AND WHERE CABLE ENTERS THE MC AND IC/TC WITH PLASTIC FIBER OPTIC LABELS TIE WRAPPED TO FIBER CABLE JACKET, LABEL # SHALL BE PROVIDED BY THE OWNER.
2. ALL CABLES SHALL BE DRESSED NEATLY AND SECURED TO THE SIDE WALLS OF THE PULL BOX WHEN PASSING THROUGH BOXES.
3. INSTALL ALL UNDERGROUND FIBER INSIDE INNERDUCT. USE A 3 CELL 3" MAXCELL INNERDUCT THROUGH CONDUIT BETWEEN THE MC AND THE NEW BUILDING IC/TR.
4. FIBER ENDS SHALL BE PROPERLY BLOCKED WITH MANUFACTURERS REQUIRED LOOSE TUBE BLOCKING KITS.

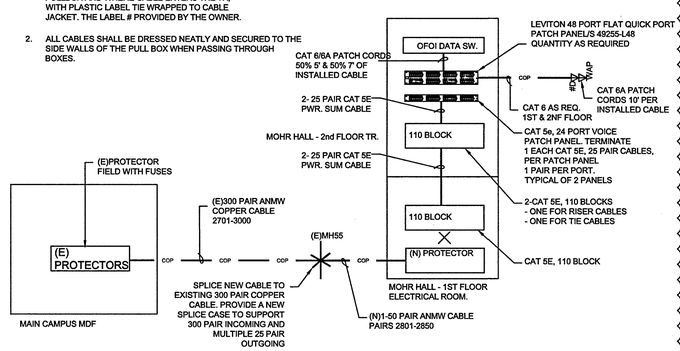


B E7.02 SITE FIBER ONE LINE DIAGRAM

NTS

GENERAL NOTES:

1. ALL COPPER CABLE SHALL BE LABELED IN EACH PULLBOX AND WHERE CABLE ENTERS THE TR, WITH PLASTIC LABEL TIE WRAPPED TO CABLE JACKET. THE LABEL # PROVIDED BY THE OWNER.
2. ALL CABLES SHALL BE DRESSED NEATLY AND SECURED TO THE SIDE WALLS OF THE PULL BOX WHEN PASSING THROUGH BOXES.

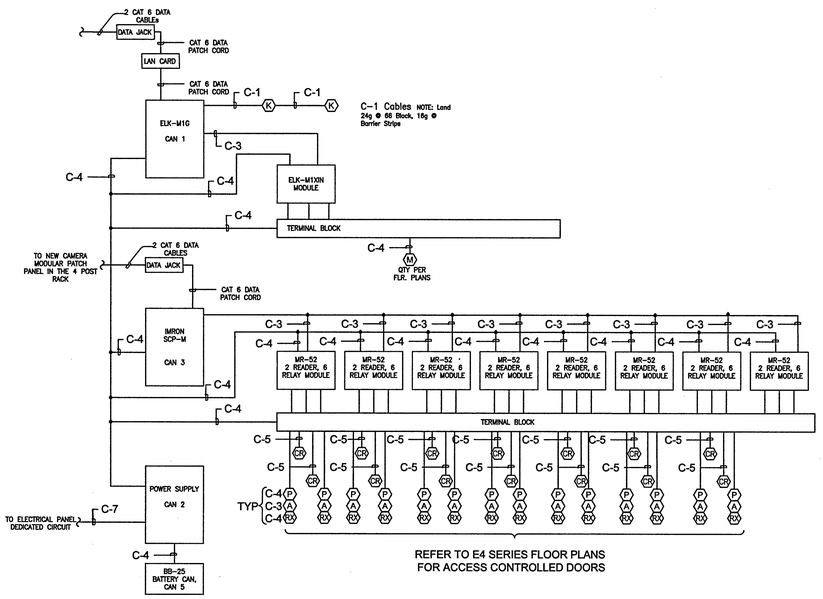


C E7.02 SITE/RISER COPPER ONE LINE DIAGRAM

NTS

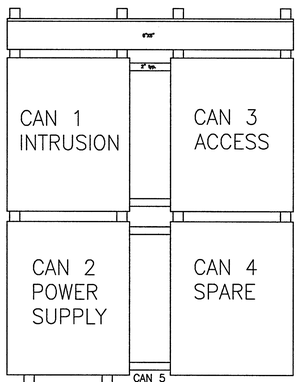
CABLE LEGEND

C-1	PART #: 5281 or plenum 5381 POWER: 16/2 STRANDED UTP: CAT 5E 24/2 PAIR DIAMETER: 0.170"x0.360" LISTINGS: UL, CMR, CL2R, FT4
C-2	PART #: 4978 or plenum 5088 AWG: 24 #/PAIR: 4 OHMS: 100 TYPE: UTP O.D.: .200" LISTINGS: CM, CL2
C-3	PART #: 1104 or plenum 3104 AWG: 22 #/COND: 4 STR/SOL: STR O.D.: .133" LISTINGS: CM, CL2
C-4	PART #: 1125 or plenum 3121 AWG: 16 #/COND: 2 STR/SOL: STR O.D.: .172" LISTINGS: CM, CL2
C-5	PART #: 1207 or plenum 3206 AWG: 22 #/COND: 8 STR/SOL: STR O.D.: .166" LISTINGS: CM, CL2
C-6	PART #: 5090 AWG: 24 PAIRS: 4 COLOR: BLACK PUTUP: 1,000' DESCRIPTION: CATEGORY 5E
C-7	PART #: 4154 AWG: 14 #/COND: 4 STRANDING: STR COLOR: BLACK LISTINGS: UL, FPL



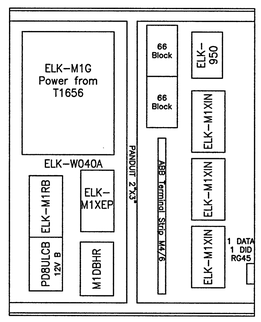
D E6.2 INTRUSION/ACCESS CONTROL SINGLE LINE DIAGRAM

NTS



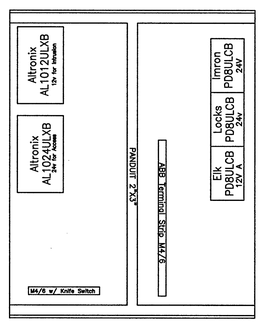
Use hinge gutter top of boxes for cable service loops. EMT above ceiling 40% fill max. Use station cable management or pipe to all end devices. No Splicing.

Battery Can Connect two batteries to 24 power supply. Connect one battery to 12v power supply. Additional power supplies require additional batteries. Scale as needed via voltage drop calculations.



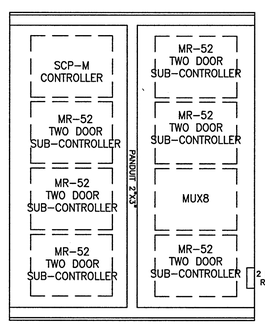
CAN 1
INTRUSION
Mier BW-LRC103
24"w 30"h 6"d

Equipment shown within Access/Intrusion cans is meant to communicate placement within the can, not actual quantities required per project. Specific quantities are to be determined by Contractor and verified through shop drawing submittal process. Keypad, motions, door switch cables home run to this enclosure. List circuits used on PD8 as voltage drop allows, include two parallel circuits to power M1G, use one circuit for XEP via Can 3. Confirm with District pinning intentions.



CAN 2
POWER SUPPLY
Mier BW-LRC103
24"w 30"h 6"d

Equipment shown within Access/Intrusion cans is meant to communicate placement within the can, not actual quantities required per project. Specific quantities are to be determined by Contractor and verified through shop drawing submittal process. Door lock power cables home run to this enclosure. Confirm with District pinning intentions.



CAN 3
ACCESS
Mier BW-LRC103
24"w 30"h 6"d

Equipment shown within Access/Intrusion cans is meant to communicate placement within the can, not actual quantities required per project. Specific quantities are to be determined by Contractor and verified through shop drawing submittal process. Push buttons, reader cables home rune to this enclosure. Confirm with District pinning intentions.

E E7.02 ACCESS/INTRUSION PANEL ELEVATION

NTS

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REGISTERED PROFESSIONAL ENGINEER #E015484 Exp. 06/30/19 SCOTT WHEELER ELECTRICAL STATE OF CALIFORNIA

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PLAN CHECK SET

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1	REVISED PLANS		

LOS RIOS COMM COLLEGE DISTRICT

LOS RIOS COMMUNITY COLLEGE SCHOOL DISTRICT
SACRAMENTO CITY COLLEGE
MOHR HALL REPLACEMENT

LOW VOLTAGE RISER DIAGRAMS

B5017.00

May 22, 2018

E7.02