

ADDENDUM TO RFP DOCUMENTS

	ADDENDUM # 02
	SCCD RFP: # 14-014
	Project: Solano Community College District Theater Renovation
	Date: 08/03/2015

Addendum # 02 – The following clarifications are provided based on questions received and must be added/considered when completing your submittal: Acknowledgement of receipt of this **ADDENDUM** is required in the proposal’s cover letter of introduction. Please clearly note the addendum date and number.

**Increment 1 –
Architectural Drawings**
No change

Specifications

1. Section 00 0101 – Table of Contents (ADD 02- Updated to reflect ADD 02 changes)
2. Section 01 1116 Notice to Bidders (ADD 02 – Revised bid date)

**Increment 2 –
Architectural Drawings**

3. Sheet A0.1
 - Revised “DRAFTING & MATERIAL SYMBOLS”
4. Sheet A0.20
 - Revised plans at sheet grid lines D10 with tag for detail B1
 - Added detail B1.
5. Sheet A1.00-ALT
 - Revised note at sheet grid line D6. - Removed railing at loading dock.
6. Sheet A2.12
 - Revised Lockers in room 1235.
7. Sheet A2.13
 - Revised metal shelves and wood casework in room 1238.
8. Sheet A2.14
 - Add tub sink to 1264.
 - Revised casework in room 1231.
 - Revised casework in room 1242.
 - Revised metal lockers in corridor 1254.

- Revised metal shelves in room 1278
9. Sheet A2.60
 - Revised "Furniture and Equipment Schedule".
 - Revised "Materials Legend" - WD4
 10. Sheet A2.61
 - Revised Room Finish Notes.
 11. Sheet A4.02
 - Revised lockers in room 1235.
 - Revised metal shelves elevation on detail H4 - elevation 4.
 12. Sheet A4.03
 - Revised casework in detail F1, room 1243.
 - Revised metal shelves elevation on detail B5, elevations 1, 3 and 4
 13. Sheet A5.05
 - Revised casework elevation on detail H1 elevation 1.
 - Relocated hose bibb on detail H1 elevation 4.
 14. Sheet A5.06
 - Revised elevations on detail G7.
 15. Sheet A5.07
 - Added recessed alcove for phone on detail H1 elevation 2.
 16. Sheet A5.08
 - Revised locker elevation on detail C1 elevation 2.
 - Revised metal shelves elevations on detail E1.
 17. Sheet A5.09
 - Revised elevations on detail C1, elevations 2 and 3.
 - Revised elevation on detail H1, elevations 1 and 2.
 18. Sheet A8.13
 - Revised detail E1.
 - Revised detail H1.
 19. Sheet A9.80
 - Revised detail F1.
 - Revised detail H7.
 20. Sheet M2.2
 - Added a fire/smoke damper in the return duct in Office 310.
 21. Sheet P0.1
 - Removed the water heater -3 from the schedule
 - Added the new laundry sink to the fixture schedule.

22. Sheet P2.1

- Added the laundry sink to the plan in Costume.

23. Sheet P2.2

- Added the laundry sink to the plan in Costume
- Added the hose bib to the plan in Shop 720.

24. Sheet L2.00-ALT

- Added Note at SGL H11.

Specifications

25.	00 0101	TABLE OF CONTENTS (ADD 02 – Updated to reflect ADD 02 changes)
26.	00 1116	NOTICE TO BIDDERS (ADD-02 – Updated bid date)
27.	00 4519	NON-COLLUSION DECLARATION (ADD 02 - Corrected spelling on TOC)
28.	00 4546.02	DISABLED VETERAN BUSINESS ENTERPRISE PARTICIPATION CERTIFICATION (ADD 02 - Corrected spelling on TOC)
29.	01 2513A	SUBSTITUTION REQUEST FORM (ADD 02 – Added form)
30.	01 5639	TEMPORARY TREE AND PLANT PROTECTION (ADD 02 – added section)
31.	03 3000	CAST-IN-PLACE CONCRETE (ADD 02 – Revised related sections, added in hand-written DSA comment, section 2.11, B, 1)
32.	03 3100	CONCRETE FORMWORK (ADD 02 – Revised related sections)
33.	05 1200	STRUCTURAL STEEL FRAMING (ADD 02 – Revised related sections)
34.	05 3100	STEEL DECKING (ADD 02 – Revised related sections)
35.	05 5000	METAL FABRICATIONS (ADD 02 – Revised related sections)
36.	05 5213	PIPE AND TUBE RAILINGS (ADD 02 – Revised section 1.04 B)
37.	05 7113	FABRICATED METAL SPIRAL STAIRS (ADD 02 – Revised related sections. Revised section 2.05 finishes)
38.	06 1000	ROUGH CARPENTRY (ADD 02 – Revised related sections)
39.	06 1500	WOOD DECKING (ADD 02 – Revised related sections, removed blanks, revised section 1.04, B)
40.	06 1733	WOOD I-JOISTS (ADD 02 – Revised related sections)
41.	06 1800	GLUED-LAMINATED CONSTRUCTION (ADD 02 – Removed from project)
42.	06 2000	FINISH CARPENTRY (ADD 02 – Updated code reference editions, removed blanks)
43.	06 4023	INTERIOR ARCHITECTURAL WOODWORK (ADD 02 – Section removed from project)
44.	06 4100	ARCHITECTURAL WOOD CASEWORK (ADD 02 – Updated code reference editions)
45.	07 0151	MAINTENANCE OF MEMBRANE ROOFING (ADD 02 – Revised related sections)
46.	07 1400	FLUID-APPLIED WATERPROOFING (ADD 02 – Removed blanks)

- 47. 07 2100 THERMAL INSULATION (ADD 02 – Revised related sections, removed blanks, revised section 1.04, B)
- 48. 07 2500 WEATHER BARRIERS (ADD 02 – Revised related sections, revised section 1.05.)
- 49. 07 4243 COMPOSITE WALL PANELS (ADD 02 – Revised related sections)
- 50. 07 5420 MEMBRANE ROOFING (ADD 02 – Revised related sections, filled in/removed blanks)
- 51. 07 5901 MEMBRANE REROOFING PREPARATION (ADD 02 – Corrected spelling on TOC, edited lines 1.06.A and 2.01.A)
- 52. 07 6200 COPING SYSTEM SHEET METAL FLASHING AND TRIM (ADD 02 – Changed name of section, revised related sections)
- 53. 07 7100 ROOF SPECIALTIES (ADD 02 – Added submittal requirements, filled-in/removed blanks, revised section 1.04)
- 54. 07 7200 ROOF ACCESSORIES (ADD 02 – Revised section 1.06)
- 55. 07 7236 AUTOMATIC SMOKE VENTS (ADD 02 – Filled in/removed blanks)
- 56. 07 8400 FIRESTOPPING (ADD 02 – Revised related sections, filled in/removed blanks, revised section 1.04, B, C, D, and E.)
- 57. 07 9005 JOINT SEALANTS (ADD 02 – Revised related sections, filled in/removed blanks)
- 58. 07 9513 EXPANSION JOINT COVER ASSEMBLIES (ADD 02 – Replace entire section – added types and model numbers, removed/filled-in blanks)
- 59. 08 1113 HOLLOW METAL DOORS AND FRAMES (ADD 02 – Removed blanks)
- 60. 08 1416 FLUSH WOOD DOORS (ADD 02 – Filled in/removed blanks)
- 61. 08 3100 ACCESS DOORS AND PANELS (ADD 02 – Revised related sections, filled in/removed blanks, revised section 1.04))
- 62. 08 3323 OVERHEAD COILING DOORS (ADD 02 – Revised related sections, filled in/removed blanks)
- 63. 08 4113 ALUMINUM FRAMED ENTRANCES AND STOREFRONT (ADD 02 – Revised related sections)
- 64. 08 4229 AUTOMATIC ENTRANCES (ADD 02 – Filled in/removed blanks)
- 65. 08 4500 TRANSLUCENT WALL AND ROOF ASSEMBLIES (ADD 02 – Removed, replaced with Unit Skylights, 086200)
- 66. 08 5113 ALUMINUM WINDOWS (ADD 02 – Filled in/removed blanks)
- 67. 08 62 00 UNIT SKYLIGHTS (ADD 02 – Added to project)
- 68. 08 7100 DOOR HARDWARE (ADD 02 – Revised related sections, added DSA handwritten comment – section 4.2, A, 3.)
- 69. 08 8000 GLAZING (ADD 02 – Filled in/removed blanks, revised section 1.05, D and E)
- 70. 09 0561 COMMON WORK RESULTS FOR FLOORING PREPARATION
- 71. 09 2116 GYPSUM BOARD ASSEMBLIES (ADD 02 – Revised related sections, filled in/removed blanks, revised section 1.04)
- 72. 09 2216 NON-STRUCTURAL METAL FRAMING (ADD 02 – Revised related sections, filled in/removed blanks)

73. 09 2400 PORTLAND CEMENT PLASTERING (ADD 02 – Revised related sections, revised section 1.04, C)
74. 09 3000 TILING (ADD 02 –Revised related sections, filled in/removed blanks, revised section 1.04, D)
75. 09 5100 ACOUSTICAL CEILINGS (ADD 02 –Revised related sections, filled in/removed blanks, added submittal requirements, section 1.05 D and E, removed section 2.02, parts C and D; suspension system types.)
76. 09 5210 LINEAR WOOD CEILING PANELS (ADD 02 – Section removed from project)
77. 09 6500 RESILIENT FLOOR TILE (ADD 02 - Filled in/removed blanks, revised submittal requirements, section 1.4, D, revised manufacturers)
78. 09 6800 CARPETING (ADD 02 - Filled in/removed blanks, revised submittal requirements, section 1.04, D)
79. 09 6813 TILE CARPETING (ADD 02 - Filled in/removed blanks, revised submittal requirements, section 1.04, E, revised products)
80. 09 7200 WALL COVERINGS (ADD 02 – Revised related sections, moved Corner Guards from this section to section 102601 Wall and Corner Guards. Added Tackable Wall Coverings)
81. 09 7201 TACKABLE WALLCOVERINGS (ADD 02 – Section Removed)
82. 09 7416 FLEXIBLE WOOD VENEER WALLCOVERING (ADD 02 – Revised related sections, revised Part 2 – Products, and removed/filled-in blanks)
83. 09 7733 GLASS FIBER REINFORCED PLASTIC PANELS (ADD 02 – revised section 1.03)
84. 09 8115 ACOUSTICAL TREATMENTS (ADD 02 –Revised related sections, revised section 1.03)
85. 09 8311 ACOUSTICAL WALL SYSTEMS (ADD 02 –Revised related sections, revised section 1.04)
86. 09 8400 ACOUSTIC ROOM COMPONENTS (ADD 02 – Revised related sections, removed section 1.04, E)
87. 09 9000 PAINTING AND COATING (ADD 02 - Revised related sections)
88. 10 1400 SIGNAGE (ADD02 – Removed blanks, revised section 1.04 – added DSA handwritten comment)
89. 10 2113.19 PLASTIC TOILET COMPARTMENTS (ADD 02 – Removed blanks, revised sections 1.03 and 2.01)
90. 10 2601 WALL AND CORNER GUARDS (ADD 02 – Revised entire section- added to corner guards, revised sections 1.02, 1.03, 1.04, filled in blanks)
91. 10 2800 TOILET, BATH, AND LAUNDRY ACCESSORIES (ADD 02 – Removed blanks, revised entire section)
92. 10 4400 FIRE PROTECTION SPECIALTIES (ADD 02 – Removed blanks)
93. 10 5100 METAL LOCKERS (ADD 02 – Added section)
94. 11 5213 PROJECTION SCREENS (ADD 02 –Revised related sections, filled in/removed blanks)
95. 11 6133 PRODUCTION RIGGING (ADD 02 –Revised related sections)
96. 12 3600 COUNTERTOPS (ADD 02 –Revised related sections, filled in/removed blanks)

97.	12 9300	SITE FURNISHINGS (ADD 02 - Revised submittal requirements)
98.	14 2010	PASSENGER ELEVATORS (ADD 02 –Revised related sections, filled in/removed blanks)
99.	DIVISION 23	HEATING, VENTILATION, AND AIR-CONDITIONING (HVAC) (ADD 2- Corrected spelling on TOC)
100.	23 0900	CONTROLS (ADD 02 – Removed reference to invalid section)
101.	26 0010	BASIC ELECTRICAL REQUIREMENTS (ADD 02 –Removed reference to invalid division/section)
102.	26 0926	LOW-VOLTAGE LIGHTING CONTROL (ADD 02 –Revised related sections)
103.	27 4116	PRODUCTION AV SYSTEMS (ADD 02 – Revised related section and division number)
104.	31 0000	EARTHWORK AND GRADING (ADD 02 – revised related sections)
105.	31 1000	SITE PREPARATION (ADD 02 – revised related sections)
106.	31 2333	TRENCHING, BACKFILLING AND COMPACTING (ADD 02 – revised related sections)
107.	32 1233	PAVING AND SURFACING (ADD 02 – revised related sections)
108.	32 1313	CONCRETE PAVING (ADD 02 – revised related sections)
109.	32 1726	TACTILE WARNING SURFACING (ADD 02 – revised related sections)
110.	32 5000	RESTORATION OF SURFACES (ADD 02 – removed references to invalid section)
111.	32 8400	PLANTING IRRIGATION (ADD 02 – revised related sections)
112.	32 9000	PLANTING (ADD 02 – revised related sections)
113.	33 1000	WATER SYSTEMS (ADD 02 – revised related sections)
114.	33 3000	SANITARY SEWER (ADD 02 – revised related sections)
115.	33 4000	STORM DRAINAGE (ADD 02 – revised related sections)
116.	APPENDIX D	DSA103 TESTING AND INSPECTIONS LIST (ADD 02 Corrected spelling on TOC)

Answers to Submitted Questions:

117.

Question: Please clarify, is there a 3% DVBE goal and 15% SLDBE goal for this project?

Answer: Yes, and the 3% DVBE goal can be counted towards the 15% SLDBE goal. Included in this addendum is a list of DVBE contractors provided by Solano Community College District.

118.

Question: Can we do a good faith effort for both DVBE and SLDBE in case we cannot meet the goal on bid day?

Answer: Yes, requirements for a good faith effort for DVBE can be found in the specifications. The requirements for a good faith effort for SLDBE are listed in SLDBE appendix. As noted in the special conditions, all bidders must comply with the requirements in the SLDBE appendix.

INCREMENT 1
SPECIFICATIONS

for

Solano Community College
BLDG 1200 Theater Renovation

Suisun Valley Road
Fairfield, California

Addendum 02
June 26th, 2015

DSA Application No.: 02-113590
DSA File No.: 48-C1

SCCD Project No.: 14-014
LPAS Project No.: 764-0002

Prepared By

LPAS

2484 Natomas Park Drive, Suite 100
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01 5721	INDOOR AIR QUALITY CONTROLS
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01 6116	VOC CONTENT RESTRICTIONS
01 6600	PRODUCT DELIVERY, STORAGE, AND HANDLING
01 7000	EXECUTION AND CLOSEOUT REQUIREMENTS
01 7123	FIELD ENGINEERING
01 7329	CUTTING AND PATCHING
01 7419	CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
01 7600	ALTERATION PROJECT PROCEDURES
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01 7800	CLOSEOUT SUBMITTALS
01 7823	OPERATION AND MAINTENANCE DATA
01 7836	WARRANTIES
01 7839	RECORD DOCUMENTS

DIVISION 02 - EXISTING CONDITIONS

02 4100	DEMOLITION
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DIVISION 26 - ELECTRICAL

26 00 90	ELECTRICAL DEMOLITION
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DIVISION 32 - EXTERIOR IMPROVEMENTS

32 1000	DEMOLITION EXTERIOR SITE
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APPENDIX:

APPENDIX A - HAZARDOUS MATERIALS REPORT
APPENDIX B - GEOTECHNICAL EVALUATION AND GEOLOGIC HAZARDS ASSESSMENT
APPENDIX C - FLOW TEST REPORT
APPENDIX D – MEASURE Q EQUALITY, INCLUSION AND OUTREACH GUIDELINES

DOCUMENT 00 11 16

NOTICE TO BIDDERS

1. Notice is hereby given that the governing board (“Board”) of the Solano Community College District (“District”) will receive sealed bids (“Bid”) for the following project, **Building 1200 Theater Renovation Increment 1 & 2.**
2. Sealed Bids will be received until **2:00 P.M. August 18, 2015**, at **Solano Community College 4000 Suisun Valley Road Building 600 Boardroom, Fairfield, California, 94534** at or after which time the bids will be opened and publicly read aloud. Bids should be marked C/O Purchasing: Laura Scott. Any claim by a bidder (“Contractor”) of error in its bid must be made in compliance with section 5100 et seq. of the Public Contract Code. Any bid that is submitted after this time shall be non-responsive and returned to the Contractor.
3. All pre-bid questions must be submitted in writing to the Project Manager, Eric Van Pelt at eric@vpcsonline.com. Pre-Bid questions must be submitted by **August 11, 2015**.
4. The Project scope includes but not limited to:

Increment 1: The increment includes, all work of any nature detailed within the contract documents, including but not necessarily limited to: hard and soft demolition of structural and architectural components, removal and disposal of all hazardous containing materials, electrical demolition, HVAC demolition, site demolition and grading.

Refer to: Appendix A – Hazardous Materials Report
Drawings HAZ-01, HAZ-02 and HAZ-03
For removal and disposal of hazardous containing materials.

Roofing tile to be removed from the mansards will need to be palletized and stored on site as directed by the Construction Manager. The quantity of the tile is not known at this time; therefore, the contractor should anticipate storing 100 SF of this material.

Increment 2: This increment is a full modernization of the existing building. Will include the replacement of the existing interior floor, wall, and ceilings. Exterior envelope will have new storefront lobby. The existing roof system will be replaced. There will be upgrades made to the building structural systems. Mechanical, electrical, and plumbing systems will be removing and replacing with modern high efficient systems. There will be two additions to existing building, first is a new 900 SF restroom core, second is a new 2800 SF assembly space.

BOTH INCREMENTS WILL NEED TO BE FULLY COORDINATED BY AWARDED CONTRACTOR UNDER A SINGLE CONTRACT.

5. All bids shall be on the form provided by the District. Each bid must conform and be responsive to all pertinent Contract Documents, including, but not limited to, the Instructions to Bidders.
6. To bid on this Contract, the Contractor is required to possess one or more of the following State of California Contractor Licenses:
B – General Building

The Contractor's license(s) must remain active and in good standing throughout the term of the Contract.

7. A bid bond by an admitted surety insurer on the form provided by the District, shall accompany the Bid Form and Proposal, as a guarantee that the Contractor will, within seven (7) calendar days after the date of the Notice of Award, enter into a contract with the District for the performance of the services as stipulated in the bid.
8. The successful Contractor shall be required to furnish a 100 % Performance Bond and a 100% Payment Bond if it is awarded the contract for the Project, on the form provided by the district.
9. The successful Contractor may substitute securities for any monies withheld by the District to ensure performance under the Contract, in accordance with the provisions of section 22300 of the Public Contract Code.
10. The Contractor and all subcontractors under the Contractor shall pay all workers on all work performed pursuant to this Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the District, pursuant to sections 1770 et seq. of the California Labor Code. Prevailing wage rates are also available from the District or on the Internet at: <http://www.dir.ca.gov>.
11. The District has entered into a Project Labor Agreement that is applicable to this Project. For questions or assistance concerning the Project Labor Agreement, contact Eric Van Pelt, eric@vpcsonline.com.
12. Two mandatory pre-bid conferences and site visits will be held at **10:00 A.M. on July 23, 2015 and July 30, 2015 at Solano Community College, 4000 Suisun Valley Road Building 1200, Fairfield, California 94534**. All participants are required to sign in at the front of Building 1200. The Site Visit is expected to take approximately 1 hour. If mandatory, failure to attend or tardiness will render bid ineligible. Bidders shall attend at least one of these meetings to be qualified to bid.
13. Contract Documents are available on July 15, 2015. In addition, Contract Documents are available for Contractors' review at the following builders' exchanges:

Sacramento Builders Exchange 1331 T Street Sacramento, CA 95811 T: 916-442-8991 F: 916-446-3117	Solano-Napa Builders Exchange 135 Camino Dorado Napa, CA 94558 T: 707-255-2515 F: 707-255-2749	Bay Area Builders Exchange 2440 Stanwell Drive Concord, CA 94520 T: 925-685-8630 F: 925-685-3424
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14. Contract Documents are also available for purchase (non-refundable) and viewing through **BPXpress in Benicia at (707) 745-3593 or Benicia@blueprintexpress.com and on the public plan room:**
www.blueprintexpress.com/sccdmeasureq
13. The District's Board has found and determined that the following item(s) shall be used on this Project based on the purpose(s) indicated. (Public Contract Code section 3400(b)): A particular material, product, thing, or service is designated by specific brand or trade name for the following purpose(s): NONE
14. The Board reserves the right to reject any and all bids and/or waive any irregularity in any bid received. If the District awards the Contract, the security of unsuccessful Contractor(s) shall be returned within sixty (60) days from the time the award is made. Unless otherwise required by law, no Contractor may withdraw its bid for ninety (90) days after the date of the bid opening.
15. The District shall award the Contract, if it awards it at all, to the lowest responsive responsible bidder based on: The lowest total of the bid prices on the base contract and all additive or deductive alternates identified in the bid form.
16. Contact: Eric Van Pelt

Solano Community College – BLDG 1200 Theater Renovation - Inc 1 PROJECT NO. 14-014
4000 Suisun Valley Road, Fairfield, CA

Project Manager/ VPCS
Eric@vpcsonline.com

INCREMENT 2
SPECIFICATIONS

for

Solano Community College
BLDG 1200 Theater Renovation

Suisun Valley Road
Fairfield, California

Addendum 02
June 26th, 2015

DSA Application No.: 02-113590
DSA File No.: 48-C1

SCCD Project No.: 14-014
LPAS Project No.: 764-0002

Prepared By

LPAS

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01 5213	FIELD OFFICES AND SHEDS
01 5500	VEHICULAR ACCESS AND PARKING
<i>01 5639</i>	<i>TEMPORARY TREE AND PLANT PROTECTION (ADD 02 – added section)</i>
01 5713	TEMPORARY EROSION AND SEDIMENT CONTROL
01 5721	INDOOR AIR QUALITY CONTROLS
01 6000	PRODUCT REQUIREMENTS
01 6116	VOC CONTENT RESTRICTIONS
01 6600	PRODUCT DELIVERY, STORAGE, AND HANDLING
01 7000	EXECUTION AND CLOSEOUT REQUIREMENTS
01 7123	FIELD ENGINEERING
01 7329	CUTTING AND PATCHING
01 7419	CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
01 7600	ALTERATION PROJECT PROCEDURES
01 7700	CONTRACT CLOSEOUT AND FINAL CLEANING
01 7800	CLOSEOUT SUBMITTALS
01 7823	OPERATION AND MAINTENANCE DATA
01 7836	WARRANTIES
01 7839	RECORD DOCUMENTS

DIVISION 02 - EXISTING CONDITIONS (ADD 02 - Corrected spelling on TOC)

02 4100	DEMOLITION
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DIVISION 03 - CONCRETE

03 2000	CONCRETE REINFORCEMENT
<i>03 3000</i>	<i>CAST-IN-PLACE CONCRETE (ADD 02 – Revised related sections, added in hand-written DSA comment, section 2.11, B, 1)</i>
<i>03 3100</i>	<i>CONCRETE FORMWORK (ADD 02 – Revised related sections)</i>

DIVISION 05 - METALS

<i>05 1200</i>	<i>STRUCTURAL STEEL FRAMING (ADD 02 – Revised related sections)</i>
<i>05 3100</i>	<i>STEEL DECKING (ADD 02 – Revised related sections)</i>
<i>05 5000</i>	<i>METAL FABRICATIONS (ADD 02 – Revised related sections)</i>
<i>05 5213</i>	<i>PIPE AND TUBE RAILINGS (ADD 02 – Revised section 1.04 B)</i>
05 5400	COLD-FORMED METAL FRAMING
<i>05 7113</i>	<i>FABRICATED METAL SPIRAL STAIRS (ADD 02 – Revised related sections. Revised section 2.05 finishes)</i>

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

06 1000 ROUGH CARPENTRY (ADD 02 – Revised related sections)
06 1500 WOOD DECKING (ADD 02 – Revised related sections, removed blanks, revised section 1.04, B)
06 1600 SHEATHING
06 1733 WOOD I-JOISTS (ADD 02 – Revised related sections)
~~06 1800 GLUED-LAMINATED CONSTRUCTION (ADD 02 – Removed from project)~~
06 1850 STRUCTURAL GLUED-LAMINATED TIMBER
06 2000 FINISH CARPENTRY (ADD 02 – Updated code reference editions, removed blanks)
~~06 4023 INTERIOR ARCHITECTURAL WOODWORK (ADD 02 – Section removed from project)~~
06 4100 ARCHITECTURAL WOOD CASEWORK (ADD 02 – Updated code reference editions)

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 0151 MAINTENANCE OF MEMBRANE ROOFING (ADD 02 – Revised related sections)
07 1400 FLUID-APPLIED WATERPROOFING (ADD 02 – Removed blanks)
07 2100 THERMAL INSULATION (ADD 02 – Revised related sections, removed blanks, revised section 1.04, B)
07 2500 WEATHER BARRIERS (ADD 02 – Revised related sections, revised section 1.05.)
07 4243 COMPOSITE WALL PANELS (ADD 02 – Revised related sections)
07 5420 MEMBRANE ROOFING (ADD 02 – Revised related sections, filled in/removed blanks)
07 5901 MEMBRANE REROOFING PREPARATION (ADD 02 – Corrected spelling on TOC, edited lines 1.06.A and 2.01.A)
07 6200 ~~COPING SYSTEM SHEET METAL FLASHING AND TRIM (ADD 02 – Changed name of section, revised related sections)~~
07 7100 ROOF SPECIALTIES (ADD 02 – Added submittal requirements, filled-in/removed blanks, revised section 1.04)
07 7200 ROOF ACCESSORIES (ADD 02 – Revised section 1.06)
07 7236 AUTOMATIC SMOKE VENTS (ADD 02 – Filled in/removed blanks)
07 8400 FIRESTOPPING (ADD 02 – Revised related sections, filled in/removed blanks, revised section 1.04, B, C, D, and E.)
07 9005 JOINT SEALANTS (ADD 02 – Revised related sections, filled in/removed blanks)
07 9513 EXPANSION JOINT COVER ASSEMBLIES (ADD 02 – Replace entire section – added types and model numbers, removed/filled-in blanks)

DIVISION 08 - OPENINGS

08 1113 HOLLOW METAL DOORS AND FRAMES (ADD 02 – Removed blanks)
08 1213 HOLLOW METAL FRAMES
08 1416 FLUSH WOOD DOORS (ADD 02 – Filled in/removed blanks)
08 3100 ACCESS DOORS AND PANELS (ADD 02 – Revised related sections, filled in/removed blanks, revised section 1.04))
08 3323 OVERHEAD COILING DOORS (ADD 02 – Revised related sections, filled in/removed blanks)
08 4113 ALUMINUM FRAMED ENTRANCES AND STOREFRONT (ADD 02 – Revised related sections)
08 4229 AUTOMATIC ENTRANCES (ADD 02 – Filled in/removed blanks)
~~08 4500 TRANSLUCENT WALL AND ROOF ASSEMBLIES (ADD 02 – Removed, replaced with Unit Skylights, 086200)~~
08 5113 ALUMINUM WINDOWS (ADD 02 – Filled in/removed blanks)
08 62 00 UNIT SKYLIGHTS (ADD 02 – Added to project)
08 7100 DOOR HARDWARE (ADD 02 – Revised related sections, added DSA hand-written comment – section 4.2, A, 3.)
08 8000 GLAZING (ADD 02 – Filled in/removed blanks, revised section 1.05, D and E)

DIVISION 09 - FINISHES

09 0561	COMMON WORK RESULTS FOR FLOORING PREPARATION
09 2116	GYPSUM BOARD ASSEMBLIES (ADD 02 – Revised related sections, filled in/removed blanks, revised section 1.04)
09 2216	NON-STRUCTURAL METAL FRAMING (ADD 02 – Revised related sections, filled in/removed blanks)
09 2400	PORTLAND CEMENT PLASTERING (ADD 02 – Revised related sections, revised section 1.04, C)
09 3000	TILING (ADD 02 – Revised related sections, filled in/removed blanks, revised section 1.04, D)
09 5100	ACOUSTICAL CEILINGS (ADD 02 – Revised related sections, filled in/removed blanks, added submittal requirements, section 1.05 D and E, removed suspension system)
09 5210	LINEAR WOOD CEILING PANELS (ADD 02 – Section removed from project)
09 6500	RESILIENT FLOOR TILE (ADD 02 - Filled in/removed blanks, revised submittal requirements, section 1.4, D, revised manufacturers)
09 6800	CARPETING (ADD 02 - Filled in/removed blanks, revised submittal requirements, section 1.04, D)
09 6813	TILE CARPETING (ADD 02 - Filled in/removed blanks, revised submittal requirements, section 1.04, E, revised products)
09 7200	WALL COVERINGS (ADD 02 – Revised related sections, moved Corner Guards from this section to section 102601 Wall and Corner Guards. Added Tackable Wall Coverings)
09 7201	TACKABLE WALLCOVERINGS- (ADD 02 – Section Removed)
09 7416	FLEXIBLE WOOD VENEER WALLCOVERING (ADD 02 – Revised related sections, revised Part 2 – Products, and removed/filled-in blanks)
09 7733	GLASS FIBER REINFORCED PLASTIC PANELS (ADD 02 – revised section 1.03)
09 8115	ACOUSTICAL TREATMENTS (ADD 02 – Revised related sections, revised section 1.03)
09 8311	ACOUSTICAL WALL SYSTEMS (ADD 02 – Revised related sections, revised section 1.04)
09 8400	ACOUSTIC ROOM COMPONENTS (ADD 02 - Revised related sections, revised section 1.04, E)
09 9000	PAINTING AND COATING (ADD 02 - Revised related sections)

DIVISION 10 - SPECIALTIES

10 1101	VISUAL DISPLAY BOARDS
10 1400	SIGNAGE (ADD02 – Removed blanks, revised section 1.04 – added DSA hand-written comment)
10 2113.19	PLASTIC TOILET COMPARTMENTS (ADD 02 – Removed blanks, revised sections 1.03 and 2.01)
10 2601	WALL AND CORNER GUARDS (ADD 02 – Revised entire section- added to corner guards, revised sections 1.02, 1.03, 1.04)
10 2800	TOILET, BATH, AND LAUNDRY ACCESSORIES (ADD 02 – Removed blanks, revised entire section)
10 4400	FIRE PROTECTION SPECIALTIES (ADD 02 – Removed blanks)
10 5100	METAL LOCKERS (ADD 02 – Added section)
10 8100	BIRD AND PEST CONTROL

DIVISION 11 - EQUIPMENT

11 5213	PROJECTION SCREENS (ADD 02 – Revised related sections, filled in/removed blanks)
11 6133	PRODUCTION RIGGING (ADD 02 – Revised related sections)
11 6183	PRODUCTION LIGHTING CONTROL

DIVISION 12 - FURNISHINGS

12 3600 *COUNTERTOPS (ADD 02 –Revised related sections, filled in/removed blanks)*
12 6100 FIXED AUDITORIUM SEATING
12 9300 *SITE FURNISHINGS (ADD 02 - Revised submittal requirements)*

DIVISION 14 - CONVEYING EQUIPMENT

14 2010 *PASSENGER ELEVATORS (ADD 02 –Revised related sections, filled in/removed blanks)*

DIVISION 22 – PLUMBING

22 0500 PLUMBING AND UTILITIES

DIVISION 23 – HEATING, VENTILATION, AND AIR-CONDITIONING (HVAC) *(ADD 2- Corrected spelling on TOC)*

23 0500 MECHANICAL WORK GENERAL REQUIREMENTS
23 0550 HEATING, VENTILATING AND AIR CONDITIONING
23 0900 *CONTROLS (ADD 02 – Removed reference to invalid section)*
23 1313 AUTOMATIC FIRE PROTECTION SYSTEM

DIVISION 26 - ELECTRICAL

26 0010 *BASIC ELECTRICAL REQUIREMENTS (ADD 02 –Removed reference to invalid division/section)*
26 0060 POWER SYSTEM STUDY
26 0070 THEATRICAL SYSTEMS ELECTRICAL
26 0090 ELECTRICAL DEMOLITION
26 0519 BUILDING WIRE AND CABLE
26 0526 GROUNDING AND BONDING
26 0529 ELECTRICAL HANGERS AND SUPPORTS
26 0531 CONDUIT
26 0533 BOXES
26 0535 PRODUCTION SYSTEMS ELECTRICAL INSTALLATION
26 0536 CABLE TRAYS
26 0546 SIGNAL SYSTEMS RACEWAY
26 0553 ELECTRICAL IDENTIFICATION
26 0926 *LOW-VOLTAGE LIGHTING CONTROL (ADD 02 –Revised related sections)*
26 2213 DRY TYPE TRANSFORMERS
26 2416 PANELBOARDS
26 2419 INTEGRATED DISTRIBUTION ASSEMBLIES
26 2719 SURFACE RACEWAYS
26 2726 WIRING DEVICES
26 2816 OVERCURRENT PROTECTIVE DEVICES
26 2819 DISCONNECT SWITCHES
26 2900 MOTOR CONTROLS
26 4313 SURGE PROTECTIVE DEVICES
26 5100 INTERIOR ANDEXTERIOR LIGHTING
26 6113 FIRE ALARM SYSTEM
26 6516 SECURITY ALARM MONITORING SYSTEM
26 7113 TELECOMMUNICATION CABLING SYSTEM

DIVISION 27 – COMMUNICATIONS

27 4116 *PRODUCTION AV SYSTEMS (ADD 02 – Revised related section and division number)*

DIVISION 31 – EARTHWORK

31 0000 *EARTHWORK AND GRADING (ADD 02 – revised related sections)*
31 1000 *SITE PREPARATION (ADD 02 – revised related sections)*
31 2333 *TRENCHING, BACKFILLING AND COMPACTING (ADD 02 – revised related sections)*

DIVISION 32 - EXTERIOR IMPROVEMENTS

32 1233 *PAVING AND SURFACING (ADD 02 – revised related sections)*
32 1313 *CONCRETE PAVING (ADD 02 – revised related sections)*
32 1726 *TACTILE WARNING SURFACING (ADD 02 – revised related sections)*
32 3119 **DECORATIVE METAL FENCES AND GATES**
32 5000 *RESTORATION OF SURFACES (ADD 02 – removed references to invalid section)*
32 8400 *PLANTING IRRIGATION (ADD 02 – revised related sections)*
32 9000 *PLANTING (ADD 02 – revised related sections)*

DIVISION 33 – UTILITIES

33 1000 *WATER SYSTEMS (ADD 02 – revised related sections)*
33 3000 *SANITARY SEWER (ADD 02 – revised related sections)*
33 4000 *STORM DRAINAGE (ADD 02 – revised related sections)*

FOR REFERENCE ONLY:

APPENDIX A - HAZARDOUS MATERIALS REPORT
APPENDIX B.1 – SITE DATA REPORT
APPENDIX B.2 – LETTER FROM CA GEOLOGICAL SURVEY
APPENDIX B.3 – GEOTECHNICAL EVALUATION AND GEOLOGIC HAZARDS ASSESSMENT
APPENDIX C - FLOW TEST REPORT
APPENDIX D – DSA103 TESTING AND INSPECTIONS LIST *(ADD 02 Corrected spelling on TOC)*
APPENDIX E- MEASURE Q EQUALITY, INCLUSION AND OUTREACH GUIDELINES

DOCUMENT 00 11 16

NOTICE TO BIDDERS

1. Notice is hereby given that the governing board (“Board”) of the Solano Community College District (“District”) will receive sealed bids (“Bid”) for the following project, **Building 1200 Theater Renovation Increment 1 & 2.**
2. Sealed Bids will be received until **2:00 P.M. August 18, 2015**, at **Solano Community College 4000 Suisun Valley Road Building 600 Boardroom, Fairfield, California, 94534** at or after which time the bids will be opened and publicly read aloud. Bids should be marked C/O Purchasing: Laura Scott. Any claim by a bidder (“Contractor”) of error in its bid must be made in compliance with section 5100 et seq. of the Public Contract Code. Any bid that is submitted after this time shall be non-responsive and returned to the Contractor.
3. All pre-bid questions must be submitted in writing to the Project Manager, Eric Van Pelt at eric@vpcsonline.com. Pre-Bid questions must be submitted by **August 11, 2015**.
4. The Project scope includes but not limited to:

Increment 1: The increment includes, all work of any nature detailed within the contract documents, including but not necessarily limited to: hard and soft demolition of structural and architectural components, removal and disposal of all hazardous containing materials, electrical demolition, HVAC demolition, site demolition and grading.

Refer to: Appendix A – Hazardous Materials Report
Drawings HAZ-01, HAZ-02 and HAZ-03
For removal and disposal of hazardous containing materials.

Roofing tile to be removed from the mansards will need to be palletized and stored on site as directed by the Construction Manager. The quantity of the tile is not known at this time; therefore, the contractor should anticipate storing 100 SF of this material.

Increment 2: This increment is a full modernization of the existing building. Will include the replacement of the existing interior floor, wall, and ceilings. Exterior envelope will have new storefront lobby. The existing roof system will be replaced. There will be upgrades made to the building structural systems. Mechanical, electrical, and plumbing systems will be removing and replacing with modern high efficient systems. There will be two additions to existing building, first is a new 900 SF restroom core, second is a new 2800 SF assembly space.

BOTH INCREMENTS WILL NEED TO BE FULLY COORDINATED BY AWARDED CONTRACTOR UNDER A SINGLE CONTRACT.

5. All bids shall be on the form provided by the District. Each bid must conform and be responsive to all pertinent Contract Documents, including, but not limited to, the Instructions to Bidders.
6. To bid on this Contract, the Contractor is required to possess one or more of the following State of California Contractor Licenses:
B – General Building

The Contractor's license(s) must remain active and in good standing throughout the term of the Contract.

7. A bid bond by an admitted surety insurer on the form provided by the District, shall accompany the Bid Form and Proposal, as a guarantee that the Contractor will, within seven (7) calendar days after the date of the Notice of Award, enter into a contract with the District for the performance of the services as stipulated in the bid.
8. The successful Contractor shall be required to furnish a 100 % Performance Bond and a 100% Payment Bond if it is awarded the contract for the Project, on the form provided by the district.
9. The successful Contractor may substitute securities for any monies withheld by the District to ensure performance under the Contract, in accordance with the provisions of section 22300 of the Public Contract Code.
10. The Contractor and all subcontractors under the Contractor shall pay all workers on all work performed pursuant to this Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the District, pursuant to sections 1770 et seq. of the California Labor Code. Prevailing wage rates are also available from the District or on the Internet at: <http://www.dir.ca.gov>.
11. The District has entered into a Project Labor Agreement that is applicable to this Project. For questions or assistance concerning the Project Labor Agreement, contact Eric Van Pelt, eric@vpcsonline.com.
12. Two mandatory pre-bid conferences and site visits will be held at **10:00 A.M. on July 23, 2015 and July 30, 2015 at Solano Community College, 4000 Suisun Valley Road Building 1200, Fairfield, California 94534**. All participants are required to sign in at the front of Building 1200. The Site Visit is expected to take approximately 1 hour. If mandatory, failure to attend or tardiness will render bid ineligible. Bidders shall attend at least one of these meetings to be qualified to bid.
13. Contract Documents are available on July 15, 2015. In addition, Contract Documents are available for Contractors' review at the following builders' exchanges:

Sacramento Builders Exchange 1331 T Street Sacramento, CA 95811 T: 916-442-8991 F: 916-446-3117	Solano-Napa Builders Exchange 135 Camino Dorado Napa, CA 94558 T: 707-255-2515 F: 707-255-2749	Bay Area Builders Exchange 2440 Stanwell Drive Concord, CA 94520 T: 925-685-8630 F: 925-685-3424
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14. Contract Documents are also available for purchase (non-refundable) and viewing through **BPXpress in Benicia at (707) 745-3593 or Benicia@blueprintexpress.com and on the public plan room:**
www.blueprintexpress.com/sccdmeasureq
13. The District's Board has found and determined that the following item(s) shall be used on this Project based on the purpose(s) indicated. (Public Contract Code section 3400(b)): A particular material, product, thing, or service is designated by specific brand or trade name for the following purpose(s): NONE
14. The Board reserves the right to reject any and all bids and/or waive any irregularity in any bid received. If the District awards the Contract, the security of unsuccessful Contractor(s) shall be returned within sixty (60) days from the time the award is made. Unless otherwise required by law, no Contractor may withdraw its bid for ninety (90) days after the date of the bid opening.
15. The District shall award the Contract, if it awards it at all, to the lowest responsive responsible bidder based on: The lowest total of the bid prices on the base contract and all additive or deductive alternates identified in the bid form.
16. Contact: Eric Van Pelt

Solano Community College – BLDG 1200 Theater Renovation - Inc 2 PROJECT NO. 14-014
4000 Suisun Valley Road, Fairfield, CA

Project Manager/ VPCS
Eric@vpcsonline.com

SUBSTITUTION REQUEST FORM

TO: _____ DATE: _____

PROJECT: _____

We hereby submit to your consideration the following product instead of the specified item for the above referenced project:

Proposed Substitution: _____

Section _____ Paragraph _____ Specified Item _____

Attach complete technical data, including laboratory tests, if applicable.

Provide complete information below on changes to Drawings and Specifications which proposed substitution will require for its proper installation.

- A. Does the substitution affect dimensions shown on Drawings? Yes ___ No _____ If yes, clearly indicate changes.

- B. What effect does substitution have on other trades? _____

- C. What effect does substitution have on construction schedule? _____

- D. Cost difference between proposed substitution and specified item? _____
- E. Manufacturer's warranty/guarantees of the proposed and specified items are:
_____ Same _____ Different (explain on attachment)

The undersigned certifies that the function, appearance and quality are equivalent or superior to the specified item. The undersigned also certifies that all costs caused by or resulting from the requested substitution including, but not limited to, additional design work, construction changes and review time will be paid by the firm requesting the substitution.

Submitted by:
Signature: _____

Firm _____

Address _____

Date _____

Telephone _____

Evaluated by:
Accepted _____ Accepted as Noted

Not Accepted _____ Received Too Late

By _____

Firm _____

Date _____

Remarks _____

SECTION 01 5639
TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. SUMMARY
 - 1. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.
 - 2. Related Sections:
 - a. Division 01 Section "Temporary Facilities and Controls" for temporary site fencing.
 - b. Division 31 Section "Site Preparation" for removing existing trees and shrubs.
- C. DEFINITIONS
 - 1. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction.
 - 2. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction.
 - 3. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.
- D. SUBMITTALS
 - 1. Product Data: For each type of the following:
 - a. Plastic Protection-Zone Fencing: Orange, non-fading, 4' high minimum.
 - b. Protection-Zone Signage: Full-size Samples of each size and text, ready for installation.
 - 2. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
 - a. Species and size of tree.
 - b. Location on site plan. Include unique identifier for each.
 - c. Reason for pruning.
 - d. Description of pruning to be performed.
 - e. Description of maintenance following pruning.
 - 3. Qualification Data: For qualified arborist and tree service firm.
 - 4. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.
 - 5. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.
 - 6. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.
 - a. Use sufficiently detailed photographs or videotape.
 - b. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.
- E. QUALITY ASSURANCE
 - 1. Arborist Qualifications: Licensed arborist in jurisdiction where Project is located.
 - 2. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.
 - 3. Pre-installation Conference:
 - a. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:

- 1) Construction schedule. Verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
 - 2) Enforcing requirements for protection zones.
 - 3) Arborist's responsibilities.
 - 4) Field quality control.
- F. PROJECT CONDITIONS
1. The following practices are prohibited within protection zones:
 - a. Storage of construction materials, debris, or excavated material.
 - b. Parking vehicles or equipment.
 - c. Foot traffic.
 - d. Erection of sheds or structures.
 - e. Impoundment of water.
 - f. Excavation or other digging unless otherwise indicated.
 - g. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
 2. Do not direct vehicle or equipment exhaust toward protection zones.
 3. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements.
1. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch maximum opening in pattern and weighing a minimum of 0.4 lb/ft.; remaining flexible; inert to most chemicals and acids; minimum tensile yield strength of 2000 psi and ultimate tensile strength of 2680 psi; secured with plastic bands or galvanized-steel or stainless-steel wire ties; and supported by tubular or T-shape galvanized-steel posts spaced not more than 8 feet apart.
 - a. Height: 4 feet
 - b. Color: High-visibility orange, nonfading.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- B. For the record, prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

C. PREPARATION

1. Locate and clearly identify trees to remain. Flag each tree trunk at 54 inches above the ground.
2. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

3.02 TREE- AND PLANT-PROTECTION ZONES

- A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones in a manner that will prevent people and animals from easily entering protected area. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.
- B. Maintain protection zones free of weeds and trash.
- C. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

- D. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.
 - 1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
 - 2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.03 EXCAVATION

- A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Division 31 Section "Earth Moving."
- B. Trenching near Trees: Where utility trenches are required within protection zones, hand excavate under or around tree roots or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.
- C. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.04 ROOT PRUNING

- A. Prune roots that are affected by temporary and permanent construction. Prune roots as follows:
 - 1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
 - 2. Cut Ends: Do not paint cut root ends.
 - 3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
 - 4. Cover exposed roots with burlap and water regularly.
 - 5. Backfill as soon as possible according to requirements in Division 31 Section "Earth Moving."
- B. Root Pruning at Edge of Protection Zone: Prune roots flush with the edge of the protection zone, by cleanly cutting all roots to the depth of the required excavation.
- C. Root Pruning within Protection Zone: Clear and excavate by hand to the depth of the required excavation to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

3.05 CROWN PRUNING

- A. Prune branches that are affected by temporary and permanent construction. Prune branches as follows:
 - 1. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by arborist.
 - 2. Cut branches with sharp pruning instruments; do not break or chop.
 - 3. Do not apply pruning paint to wounds.
- B. Remove branches and dispose of off-site.

3.06 REGRADING

- A. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.
 - 1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.

- B. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
- C. Minor Fill within Protection Zone: Where existing grade is 2 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.

3.07 REPAIR AND REPLACEMENT

- A. General: Repair or replace trees indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.
 - 1. Submit details of proposed root cutting and tree repairs.
 - 2. Have arborist perform the root cutting, branch pruning, and damage repair of trees.
 - 3. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
 - 4. Perform repairs within 24 hours.
 - 5. Replace vegetation that cannot be repaired and restored to full-growth status, as determined by Architect.
- B. Trees: Remove and replace trees indicated to remain that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.
 - 1. Provide new trees of same size and species as those being replaced for each tree that measures 6 inches or smaller in caliper size.
 - 2. Plant and maintain new trees as specified in Division 32 Section "Planting."

3.08 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove excess excavated material, displaced trees, trash and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 03 3000 – Cast in Place Concrete

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Footings.
 - 2. Slabs-on-grade.
 - 3. Suspended slabs.
- B. Related Requirements:
 - 1. Section 017419 "Construction Waste Management and Disposal" for recycling & disposal requirements.
 - 2. Section 090561 "Common work results for flooring preparation" for treatment of slabs to receive floor coverings.
 - 3. Section 310000 "Earthwork and Grading" for drainage fill under slabs-on-grade.
 - 4. Section 321313 "Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals: See Section 018113 "Sustainable Design Requirements."
- C. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- D. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- E. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.

1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.
- F. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
1. Location of construction joints is subject to approval of the Architect.
- G. Samples: For waterstops and vapor retarder.
- 1.5 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Material Certificates: For each of the following, signed by manufacturers:
1. Cementitious materials.
 2. Admixtures.
 3. Form materials and form-release agents.
 4. Waterstops.
 5. Vapor retarders.
 6. Semirigid joint filler.
 7. Joint-filler strips.
 8. Repair materials.
- D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
1. Aggregates.
- E. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- F. Field quality-control reports.
- 1.6 QUALITY ASSURANCE
- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
1. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."
- E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5 and Section 7, "Lightweight Concrete."
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- F. Preinstallation Conference: Conduct conference at Project site.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other approved panel materials.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- D. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.
- E. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- F. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- G. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- H. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

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

2.2 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 60 percent.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- C. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars, assembled with clips.
- D. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.
- E. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.
- F. Galvanized-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from galvanized-steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.
- B. Zinc Repair Material: ASTM A 780, zinc-based solder, paint containing zinc dust, or sprayed zinc.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

2.4 CONCRETE MATERIALS

- A. Regional Materials: Concrete shall be manufactured from aggregates that have been extracted or recovered, as well as manufactured, within 500 miles (800 km) of Project site.
- B. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 1. Portland Cement: ASTM C 150, Type I or Type III, gray. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class F or C.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

- C. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: see Structural Drawings.
- D. Lightweight Aggregate: ASTM C 330, see Structural Drawings for nominal maximum aggregate size.
- E. Water: ASTM C 94/C 94M and potable.

2.5 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- C. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Construction Chemicals - Building Systems; Rheocrete 222+.
 - b. Grace Construction Products, W. R. Grace & Co.; DCI-S.
 - c. Sika Corporation; FerroGard 901.

2.6 WATERSTOPS

- A. Flexible Rubber Waterstops: CE CRD-C 513, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Greenstreak.
 - b. Williams Products, Inc.
 - 2. Profile: **[Flat, dumbbell with center bulb] [Flat, dumbbell without center bulb] [Ribbed with center bulb] [Ribbed without center bulb] [As indicated].**
 - 3. Dimensions: **[4 inches by 3/16 inch thick (100 mm by 4.75 mm thick)] [6 inches by 3/8 inch thick (150 mm by 10 mm thick)] [9 inches by 3/8 inch thick (225 mm by 10 mm thick)]; nontapered.**

2.7 VAPOR RETARDER

- A. Sheet Vapor Retarder: ASTM E 1745, Class A, except with maximum perm rating of 0.01. Include manufacturer's recommended adhesive or pressure-sensitive tape.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Reef Industries, Inc.; Griffolyn Vaporguard.
- b. Stego Industries, LLC; Stego Wrap 15 mil Class A.
- c. Sundance Sun VB

2.8 CURING MATERIALS

- A. Low-Emitting Materials: Products shall comply with VOC limits of authorities having jurisdiction, and all products used inside the weatherproofing membrane of the building shall further comply with the following VOC limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 1. Concrete Curing Compounds: 100g/L
- B. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dayton Superior Corporation; Sure Film (J-74).
 - b. L&M Construction Chemicals, Inc.; E-CON.
 - c. Meadows, W. R., Inc.; EVAPRE.
 - d. Sika Corporation; SikaFilm.
- C. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- D. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- E. Water: Potable.

2.9 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, per ASTM D 2240.
- C. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.10 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
 4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.

- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows. Fly Ash and Pozzolan must conform to ASTM C618 Class F:
 - 1. Fly Ash: 25 percent. Class N or F – Class C not permitted.
 - 2. Combined Fly Ash and Pozzolan: 25 percent.
 - 3. Ground Granulated Blast-Furnace Slag: 50 percent.
 - 4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
 - 4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: 3000 psi (20.7 MPa) at 28 days.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.50.
 - 3. Slump Limit: 4 inches (100 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
 - 4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.
 - 5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch (25-mm) or less nominal maximum aggregate size.

- B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength:
 - a. Foundations, Shearwalls, and other concrete not noted on S0.02: 3000 psi (20.7 MPa) at 28 days.
 - b. Slab on Grade and elevated Slabs: 4000 psi (20.7 MPa) at 28 days.
 2. Minimum Cementitious Materials Content: 540 lb/cu. yd. (320 kg/cu. m).
 3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
 4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.
 5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for [1-inch (25-mm) or less nominal maximum aggregate size.
 6. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
 7. Maximum Water-Cementitious Materials Ratio: 0.46.
- C. Suspended Slabs: Proportion structural lightweight concrete mixture as follows:
1. Minimum Compressive Strength: 3000 psi (20.7 MPa) at 28 days.
 2. Calculated Equilibrium Unit Weight: 110 lb/cu. ft. (1762 kg/cu. m), plus or minus 3 lb/cu. ft. (48.1 kg/cu. m) as determined by ASTM C 567.
 3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
 4. Air Content: 6 percent, plus or minus 2 percent at point of delivery for nominal maximum aggregate size greater than 3/8 inch (10 mm).
 5. Air Content: 7 percent, plus or minus 2 percent at point of delivery for nominal maximum aggregate size 3/8 inch (10 mm) or less.
 6. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.13 FABRICATING REINFORCEMENT

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

2.14 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.
1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
 - 2. Class B, 1/4 inch (6 mm) for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

2. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORES AND RESHORES

- A. Comply with ACI 318 (ACI 318M) and ACI 301 for design, installation, and removal of shoring and reshoring.
 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 1. Provide level and compact base material.
 2. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
 3. Provide continuous perimeter seal between vapor barrier and footing/grade beam with manufacturer's double sided tape, termination bar, or both.
 4. Overlap joints 6 inches and seal with manufacturer's tape.
 5. Apply tape to a clean and dry vapor barrier.
 6. Seal all penetrations (including pipes) per vapor retarder manufacturer's instructions.
 - a. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.

- b. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all sides with tape.

3.6 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
- F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.8 WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

3.9 CONCRETE PLACEMENT

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

B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

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

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

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.

3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

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

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

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

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.10 FINISHING FORMED SURFACES

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

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

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

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.11 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in one direction.

1. Apply scratch finish to surfaces indicated and to receive concrete floor toppings or to receive mortar setting beds for bonded cementitious floor finishes.
 - C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
 1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing.
 - D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
 - b. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs.
 - E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
 1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
 - F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- 3.12 MISCELLANEOUS CONCRETE ITEMS
- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
 - B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
 - C. Equipment Bases and Foundations:
 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 2. Construct concrete bases 4 inches (100 mm) high unless otherwise indicated; and extend base not less than 6 inches (150 mm) in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
 3. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.

4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.13 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.

- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 - 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - 6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm)

clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.16 FIELD QUALITY CONTROL

A. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

B. Inspections:

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

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
6. Compression Test Specimens: ASTM C 31/C 31M.

- a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
 9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
 12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- D. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 48 hours of finishing.

END OF SECTION

SECTION 03 3100 – CONCRETE FORMWORK

PART 1 - PART 1 - GENERAL

1.1 DESCRIPTION

- A. Principal work in this Section includes but is not necessarily limited to:
 - 1. Formwork and shoring for cast-in-place concrete.
 - 2. Accessories and form coating.
 - 3. Installation of inserts, bolts, anchors and other items furnished by other trades for installation in formed concrete. Coordination of work of all trades affecting concrete formwork.
- B. Work installed but furnished in other Sections includes but is not necessarily limited to:
 - 1. Items supplied by other trades where the items must be placed when forms are erected.
- C. Related work in other Sections includes but is not necessarily limited to:
 - 1. Section 03 30 00 for waterproofing beneath wearing slabs.

1.2 SUBMITTALS

- A. General: Make submittals in accordance with the requirements of Section 013000.
- B. Manufacturer's data: Submit manufacturer's product data and installation instructions for proprietary materials including form coatings, manufactured form systems, ties and accessories. Submit written certification by the form coating manufacturer that the form coating will have no adverse effect as specified below.
- C. Shop drawings:
 - 1. Submit shop drawings, signed and sealed by a California-registered civil or structural engineer, for fabrication and erection of formwork and shoring. Show the general construction of forms including jointing, special formed joints or reveals, temporary openings, location and pattern of form tie placement, and form panel layout, and other items which affect the exposed concrete visually. Include details of inserts and anchorages. Indicate sequence of removal of forms and shoring.
 - 2. The Contractor shall be solely responsible for the structural adequacy of the forms, ties, shoring and bracing. Any requirements given herein are minimum for appearance purposes only, not to be considered as structural design.

1.3 QUALITY ASSURANCE

- A. Standards: The applicable provisions of ACI 347R, Guide to Formwork for Concrete, and ACI 301, Chapter 4, Specification for Structural Concrete for Buildings, govern the work of this Section.
- B. Definitions:

1. Exposed concrete: Exposed-to-view concrete which will receive finish materials such as paint, applied directly to its surface, or left unfinished. Not included is exposed concrete in Mechanical and Utility Rooms and exposed exterior architectural concrete.
2. Concealed concrete: Covered by structure or with finish material other than that applied directly to its surface as specified above. Included is exposed concrete in mechanical and utility rooms.

C. Tolerances for exposed concrete:

1. General: Following is a list of the maximum permissible deviations from established lines, grades and dimensions for exposed concrete.
 - a. Honeycombs, bubbles and similar defects are considered a part of the finish and are to be distinguished from tolerances described herein.
 - b. Variations in the level of elevated concrete such as floors and beams shall be measured before removal of supporting shores. The Contractor is responsible for deflection.
2. Variation from plumb:
 - a. In the lines and surfaces of columns, piers, walls and arises:
 - 1) In 10 ft.: 1/4". In any story or 20 ft. maximum: 3/8". In 40 ft. or more: 3/4".
 - b. For exposed corner columns, control-joint grooves and other conspicuous lines: In any bay or 20 ft.: Maximum 1/4". In any 40 ft. or more: 1/2".
3. Variation from the level or from the grades shown:
 - a. In floors, ceiling, beam soffits, joints and in arises:
 - 1) In any 10 ft.: 1/4". In any bay or 20 ft. maximum: 3/8". In 40 ft. or more: 3/4".
 - b. For exposed lintels, joists, sills, parapets, horizontal grooves and other conspicuous lines:
 - 1) In any bay or 20 ft. maximum: 1/4". In 40 ft. or more: 1/2".
4. Variation of linear building lines from established position in plan and related position of columns, walls and partitions:
 - a. In any bay or 20 ft. maximum: 1/2". In 40 ft. or more: 1".
5. Variation in size and location of sleeves, floor openings and wall openings: 1/4".
6. Variation in cross-sectional dimensions of columns, beams, joists and in the thickness of slabs and walls:
 - a. Minus 1/4".
 - b. Plus 1/2".
7. Variation in steps: Do not exceed the requirements of the Building Code.

D. Tolerances for concealed concrete: Concealed concrete shall meet the following requirements.

1. Sufficiently accurate to accommodate the details of abutting work.
2. Measurably accurate so that the maximum deviation is not over 3/8" in 8 ft.
3. Measurably accurate so that the total maximum deviation is not over 1" in 40 ft. or more.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Forms for exposed finish concrete (flat surfaces):

1. Unless otherwise indicated, construct formwork with plywood, metal, metal-framed plywood-faced or other panel type materials acceptable to the Architect providing continuous, straight, as-cast surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system where shown. Provide form material with sufficient thickness to withstand pressure of placed concrete without bow or deflection beyond allowable tolerances. Use full size panels when forming exterior face of exterior walls exposed to view
2. Use plywood complying with US Product Standards PS-1, "B-B High Density Overlaid Concrete Form", Class 1, edge-sealed, with each piece bearing the legible trademark of an approved inspection agency.
3. Required form features:
 - a. True shape and edges.
 - b. Sharp, undamaged corners and edges.
 - c. Uniformly smooth, clean surfaces without checks or knots.
 - d. Free of damage, holes, bumps, warps and bends.
 - e. Hard, waterproof surface.
 - f. Single-unit forms without lapped joints for columns, beams and joists.
4. Do not use the following forms:
 - a. Segmented units for joists.
 - b. Boards.
 - c. Plywood without high density overlay contact surface.
 - d. Earth forms.

B. Cylindrical columns and supports: One of the following.

1. Form round-section members with paper or fiber tubes, constructed of laminated plies using water-resistant type adhesive.
 - a. Line interior surface with polyethylene sheeting having minute perforations to permit uniform moisture penetration and wax-impregnate exterior for weather and moisture protection.
 - b. Provide units with sufficient wall thickness to resist loads imposed by wet concrete without deformation.
2. Form round-section members of not less than 12 gage galvanized steel sheets. Butt sections together, with bolted or keyed and welded joints. Finish interior joints of forms smooth so there is no visible seam on finished concrete surfaces.

C. Forms for concealed finish: Form concrete surfaces which will be concealed in the finished structure with plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and 1 side for tight fit.

1. Forms that cannot be removed after concrete has been poured:
 - a. High density polystyrene blocks, (HDFM-1), Styrofoam PD Board, with minimum compressive strength of 60 lbs/sq.inch, by The Dow Chemical Co., or equal. Thickness shall be as required.
 - b. Constructed of steel; no wood or fiberboard forms permitted at these locations.

D. Form ties:

1. For all concrete that will remain exposed to view: Provide factory-fabricated, adjustable-length, removable or snap-off metal ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal. Provide plastic cone ties where indicated on Drawings or approved by the Architect.
2. Unless otherwise shown, provide ties so that portion remaining within concrete after removal of exterior parts is at least 1-1/2" from the outer concrete surface. Provide form ties, which will leave a hole not larger than 1" diameter in the concrete surface.
3. Form ties fabricated on the job site, or wire ties, wood spreaders, or embedded types in which embedded portion is less than 1-1/2" from exterior face of concrete, are not acceptable.

E. Form coating: Commercial formulation that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds, nor affect subsequent finishes to be applied to concrete surfaces.

F. Inserts:

1. Metal inserts for anchorage of materials or equipment to concrete construction not supplied by other trades and as required for the work.
2. Adjustable wedge inserts of malleable cast iron, complete with bolts, nuts and washers; minimum 3/4" bolt size unless otherwise indicated.
3. Threaded inserts of malleable cast iron, furnished complete with full-depth bolts; minimum 3/4" bolt size, unless otherwise indicated.
4. Stainless steel sheet metal reglets formed of the same material and gage as the flashing metal to be built into the reglets. Fill reglet or cover slot to prevent intrusion of concrete or debris.

G. Chamfer strips: 3/4" x 3/4" virgin vinyl with 1/2" radius and 1/2" nailing leg at corner.

H. Prefabricated construction joint keyways: Key-Loc by Form-A-Key Products Division, or Keyed Kold Joint by the Burke Company, or equal, complete with all accessories.

2.2 DESIGN OF FORMWORK

- A. Design, erect, support, brace and maintain formwork so that it will safely support vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure. Carry vertical and lateral loads to ground by formwork system and in-place construction that has attained adequate strength for that purpose.
- B. Design forms and falsework to include assumed values of live load, dead load, weight of moving equipment operated on formwork, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of structure during construction.
- C. Design formwork to be readily removable without impact, shock or damage to concrete surfaces and adjacent materials.
- D. For concrete surfaces which will remain exposed in the Work, seal joints with sealant or tape to prevent cement paste leakage. At other locations provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints to prevent leakage and fins.
- E. Design formwork to take into account the placing rate, temperature, vibrating and retarding admixtures so all portions of the assembly withstand the concrete pressures without deformation beyond 1/360 of spans.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine substrates and adjoining construction, and conditions under which formwork will be installed.
- B. Do not proceed with installation until unsatisfactory conditions detrimental to the proper and timely completion of this work have been corrected.

3.2 FORM CONSTRUCTION

A. General:

1. Construct forms complying with ACI 347, to the sizes, shapes, lines and dimensions shown, and as required to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required. Use selected materials to obtain required finishes.
2. Provide camber in formwork as required for anticipated deflections due to weight and pressures during concrete placement and construction loads for long span members without intermediate supports.
3. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where the slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and assure ease of removal.
4. Provide temporary openings where interior of formwork is inaccessible for clean-out, for inspection before concrete placement, and for placement of concrete. Brace temporary closures and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms in as inconspicuous location as possible, consistent with project requirements.
5. Form intersecting planes to provide true, clean-out corners, with edge grain of plywood not exposed as form for concrete.
6. Before concrete placement, check the lines and levels of erected formwork. Make corrections and adjustments to ensure proper size and location of concrete members and stability of forming systems.
7. During concrete placement, check formwork and related supports to ensure that forms are not displaced and that completed work will be within specified tolerances.
8. The Contractor shall engage a licensed surveyor to verify that formwork is within specified allowable tolerances. Surveyor shall report in writing to the Construction Manager, with copy to the Contractor, certifying formwork as acceptable or indicating deviations from allowable tolerances.

- B. Provisions for other trades: Provide openings in concrete formwork to accommodate work of other trades. Accurately place and securely support items to be built into forms.

- C. Cleaning and tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is to be placed. Re-tighten forms immediately after concrete placement as required to eliminate mortar leaks.

3.3 FORMS FOR EXPOSED CONCRETE

A. General:

1. Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes. Do not splinter forms by driving ties through improperly prepared holes.
2. Do not use metal cover plates for patching holes or defects in forms.
3. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.
4. Use extra studs, walers and bracing to prevent bowing of forms between studs.
5. Assemble forms so they may be readily removed without damage to exposed concrete surfaces.
6. Form molding shapes, recesses and projections with smooth-finish materials, and install in forms with sealed joints to prevent displacement.

B. Corner treatment:

1. Form exposed corners of beams and columns with chamfers to produce smooth, solid, unbroken lines, except where otherwise indicated.
2. Form chamfers with 3/4" x 3/4" strips, unless otherwise indicated, accurately formed and surfaced to produce uniformly straight lines and tight edge joints. Extend terminal edges to require limit and miter chamfer at changes in direction.
3. Concealed corners may be formed either square or chamfered.

C. Joint locations:

1. Utilize largest available form panels for minimum joint spacing of 8 ft. x 4 ft.
2. Arrange joints in a symmetrical pattern so center of the surface involved is either a joint or the center of a form unit. Use form units of matching size where possible.
3. Arrange forms with continuous support at every joint to keep from offsetting during the placing operation.
4. Exposed joints not shown shall be made and located to least impair the strength of the structure.
5. Where a joint will occur, thoroughly clean the surface of the concrete and remove laitance. In addition, wet vertical joints thoroughly and slush with neat cement grout immediately before placement of new concrete. A delay until the concrete is no longer plastic in columns or walls (minimum of 2 hours) must occur before concrete is placed in the beams or slabs to be supported.
6. At horizontal construction joints, provide 1-1/2" continuous blocking at top of first casting. Remove blocking and re-brace forming member tightly against first casting to form a leak-proof joint for second placement.
7. There shall be no horizontal construction joints in concrete beams.
 - a. Construction joints shall be made in the center of spans with vertical bulkheads.
 - b. When a beam intersects a girder at this point, the joints in the girders shall be offset a distance equal to twice the width of the beam.
 - c. The location of construction joints is subject to the Engineer's review in each case.
 - d. Provide additional reinforcing at construction joints as directed by the Engineer.
8. Locate construction joints in suspended floors at locations indicated on Drawings.
9. Refer to Section 03300 for additional provisions on this subject.

3.4 PREPARATION OF FORM SURFACES

- A. Clean form surfaces of embedded materials, of accumulated mortar or grout from previous concreting, and of other foreign material before concrete is placed in them.
- B. Unless otherwise specified or approved, treat form surfaces as follows:

1. Before placement of either the reinforcing steel or the concrete, cover the form surfaces with specified coating material. Steel forms shall be free of rust.
2. Coat high density overlay plywood with mill oil of 100 or higher viscosity, in accordance with APA recommendations.
3. Do not allow excess form coating material to stand in puddles in the forms nor to come in contact with hardened concrete against which fresh concrete is to be placed.

3.5 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set and build into the work anchorage devices and other embedded items required for other work that is attached to, or supported by concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of the items to be attached thereto.
- B. Edge forms and screeds strips for slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in the finished slab surface. Provide and secure units to support types of screeds required.

3.6 REMOVAL OF FORMS

- A. General: Comply with California Building Code, Section 1906.2 Removal of Forms, shores and Reshoring.
- B. Formwork not supporting concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided that curing and protection operations are maintained.
- C. Formwork supporting weight of concrete, such as beam soffits, joists, slabs and other structural elements may not be removed in less than 14 days, and not until concrete has attained design minimum 28-day compressive strength. Determine potential compressive strength of in-place concrete after tests of field-cured specimens, representative of the concrete location or members, have been made by the Contractor's Testing Agency.
- D. Form facing material may be removed 4 days after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

3.7 RE-USE OF FORMS

- A. Clean and repair surfaces of forms to be re-used. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable. Apply new form coating compound material to concrete contact surfaces as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except when acceptable to the Architect.

END OF SECTION 03100

SECTION 05 1200 – STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Structural steel.
 - 2. Grout.
- B. Related Requirements:
 - 1. Section 017419 "Construction Waste Management" for recycling & disposal requirements.
 - 2. Section 053100 "Steel Decking" for field installation of shear connectors through deck.
 - 3. Section 055000 "Metal Fabrications" for steel lintels or shelf angles not attached to structural-steel frame, miscellaneous steel fabrications and other steel items not defined as structural steel.
 - 4. Section 099000 "Painting and Coating" for surface preparation and priming requirements.

1.3 DEFINITIONS

- A. Structural Steel: Elements of structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges
- B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.
- C. Heavy Sections: Rolled and built-up sections as follows:
 - 1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches (38 mm).
 - 2. Column base plates thicker than 2 inches (50 mm).
- D. Protected Zone: Structural members or portions of structural members indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.
- E. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings...

1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Include embedment drawings.
 - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pre-tensioned and slip-critical high-strength bolted connections.
 - 5. Identify members and connections of the Seismic-Load-Resisting System.
 - 6. Indicate locations and dimensions of protected zones.
 - 7. Identify demand critical welds.
- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:
 - 1. Power source (constant current or constant voltage).
 - 2. Electrode manufacturer and trade name, for demand critical welds.
- D. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, fabricator, professional engineer, testing agency.
- B. Welding certificates.
- C. Product Test Reports: For the following:
 - 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 2. Direct-tension indicators.
 - 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 - 4. Shear stud connectors.
 - 5. Shop primers.
 - 6. Nonshrink grout.
- D. Survey of existing conditions.
- E. Field quality-control and special inspection reports.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector.

- B. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel."
 - 1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
- D. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 341 and AISC 341s1.
 - 3. AISC 360.
 - 4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
 - 1. Select and complete connections using schematic details indicated and AISC 360.
 - 2. Use Load and Resistance Factor Design; data are given at factored-load level.
- B. Moment Connections: Type FR, fully restrained.
- C. Construction: Moment frame.

2.2 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M or ASTM A 572/A 572M, Grade 50(345).

- B. Channels, Angles, M, S-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M, ASTM A 572/A 572M, Grade 50 (345), ASTM A 529/A 529M, Grade 50 (345).
- D. Corrosion-Resisting Structural-Steel Shapes, Plates, and Bars: ASTM A 588/A 588M, Grade 50 (345).
- E. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.
- F. Corrosion-Resisting, Cold-Formed Hollow Structural Sections: ASTM A 847/A 847M, structural tubing.
- G. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
 - 1. Weight Class: Standard.
 - 2. Finish: Black, except where indicated to be galvanized.
- H. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.
- I. Steel Forgings: ASTM A 668/A 668M.
- J. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts; ASTM A 563 Grade C (ASTM A 563M, Class 8S) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish...
- B. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH (ASTM A 563M, Class 10S) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M,) Type 10.9, compressible-washer type with plain finish.
- C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers.
 - 1. Finish: Hot-dip or mechanically deposited zinc coating.
 - 2. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with mechanically deposited zinc coating, mechanically deposited zinc coating, baked epoxy-coated finish.
- D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
 - 1. Finish: Plain.

- E. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1D1.1M, Type B.
- F. Unheaded Anchor Rods: ASTM F 1554, Grade 36, ASTM F 1554, Grade 55, weldable].
 - 1. Configuration: Straight.
 - 2. Nuts: ASTM A 563 (ASTM A 563M) heavy hex carbon steel.
 - 3. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 4. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
 - 5. Finish: Plain, .
- G. Headed Anchor Rods: ASTM F 1554, Grade 36, ASTM F 1554, Grade 55, weldable, straight.
 - 1. Nuts: ASTM A 563 (ASTM A 563M) heavy hex carbon steel.
 - 2. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 3. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
 - 4. Finish: Plain
- H. Threaded Rods: A 572/A 572M, Grade 50 (345)
 - 1. Nuts: ASTM A 563 (ASTM A 563M) heavy hex carbon steel.
 - 2. Washers: ASTM F 436 (ASTM F 436M) hardened
 - 3. Finish: Plain
- I. Clevises and Turnbuckles: ASTM A 108, Grade 1035, made from cold-finished carbon steel bars.
- J. Eye Bolts and Nuts: ASTM A 108, Grade 1030, made from cold-finished carbon steel bars.
- K. Sleeve Nuts: ASTM A 108, Grade 1018, made from cold-finished carbon steel bars.

2.4 PRIMER

- A. Primer: Comply with Section 099113 "Exterior Painting", Section 099123 "Interior Painting", and Section 099600 "High Performance Coatings".
- B. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

2.5 GROUT

- A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.
- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, non-corrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303 "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
 - 1. Camber structural-steel members where indicated.
 - 2. Fabricate beams with rolling camber up.

3. Identify high-strength structural steel according to ASTM A 6/ A 6M and maintain markings until structural steel has been erected.
 4. Mark and match-mark materials for field assembly.
 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning." or SSPC-SP 3, "Power Tool Cleaning."
- F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.
- G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.7 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.8 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
 2. Surfaces to be field welded.
 3. Surfaces of high-strength bolted, slip-critical connections.
 4. Surfaces to receive sprayed fire-resistive materials.
 5. Galvanized surfaces.
 6. Surfaces enclosed in interior construction.

2.9 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/ A 123M.
 - 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
 - 2. Galvanize lintels and shelf angles attached to structural-steel frame and located in exterior walls.

2.10 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
 - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Visually inspect, shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1. Liquid Penetrant Inspection: ASTM E 165.
 - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - 3. Ultrasonic Inspection: ASTM E 164.
 - 4. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - 1. Perform bend tests if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Conduct tests according to requirements in AWS D1.1D.1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.
- E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, for compliance with requirements.
 - 1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.
 - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360
- B. Base plates, Bearing Plates, and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of base plate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow curing. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.

- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M] for tolerances, appearances, welding procedure specifications, weld quality, and methods used in welding work.
 - 1. Comply with AISC 303 and AISC 360 bearing, alignment adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs [where indicated], back gouge, and grind steel smooth.
 - 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances of AISC 303, "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
 - 4. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
 - a. Grind butt welds flush.
 - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

3.5 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.
- B. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

END OF SECTION

SECTION 05 3100 – STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:

1. Roof deck.
2. Acoustical cellular roof deck.
3. Composite floor deck.
4. Noncomposite form deck.

B. Related Sections include the following:

1. Section 017419 "Construction Waste Management" for recycling & disposal requirements.
2. Division 03 Section 033000 "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.
3. Section 051200 "Structural Steel Framing" for shop- and field-welded shear connectors.
4. Section 055000 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product Certificates: For each type of steel deck.
- C. Evaluation Reports: For steel deck.
- D. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.
 - 1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 ROOF DECK

- A. 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:
 - 1. Epic Metals Corporation.
 - 2. Nucor Corp.; Vulcraft Group.
 - 3. Verco Manufacturing Co.
 - 4. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.
- B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
 - 1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 (230) minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Manufacturer's standard.
 - 2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), G60 (Z180) zinc coating.
 - 3. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), G60 (Z180) zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Manufacturer's standard.
 - 4. Deck Profile: As indicated.
 - 5. Profile Depth: As indicated.
 - 6. Design Uncoated-Steel Thickness: As indicated.
 - 7. Span Condition: As indicated.
 - 8. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.3 ACOUSTICAL ROOF DECK

- A. 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:
1. Epic Metals Corporation.
 2. Nucor Corp.; Vulcraft Group.
 3. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.
- B. Acoustical Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 (230) minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Manufacturer's standard.
 2. Deck Profile: As indicated.
 3. Cellular Deck Profile: As indicated with bottom plate.
 4. Profile Depth: As indicated.
 5. Design Uncoated-Steel Thicknesses; Deck Unit/Bottom Plate: As indicated
 6. Span Condition: As indicated.
 7. Side Laps: Overlapped or interlocking seam at Contractor's option.
 8. Acoustical Perforations: Cellular deck units with manufacturer's standard perforated flat-bottom plate welded to ribbed deck.
 9. Sound-Absorbing Insulation: Manufacturer's standard premolded roll or strip of glass or mineral fiber.
 - a. Factory install sound-absorbing insulation into cells of cellular deck.
 10. Acoustical Performance: NRC , tested according to ASTM C 423.

2.4 COMPOSITE FLOOR DECK

- A. 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:
1. Epic Metals Corporation.
 2. Nucor Corp.; Vulcraft Group.
 3. Verco Manufacturing Co.
 4. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.
- B. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 (230) minimum, with top surface phosphatized and unpainted and underside surface shop primed with manufacturers' standard gray baked-on, rust-inhibitive primer.
 2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230)G60 (Z180), zinc coating.
 3. Profile Depth: As indicated.
 4. Design Uncoated-Steel Thickness: As indicated.
 5. Span Condition: As indicated.

2.5 NONCOMPOSITE FORM DECK

- A. 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:
1. Nucor Corp.; Vulcraft Group.
 2. Verco Manufacturing Co.
 3. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.
- B. Noncomposite Form Deck: Fabricate ribbed-steel sheet noncomposite form-deck panels to comply with "SDI Specifications and Commentary for Noncomposite Steel Form Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 (230) minimum, with underside surface shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Manufacturer's standard.
 2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230)G60 (Z180) zinc coating.
 3. Profile Depth: As indicated.
 4. Design Uncoated-Steel Thickness: As indicated.
 5. Span Condition: As indicated.
 6. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.6 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10(4.8-mm) minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth.
- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- H. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.
- I. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch (1.52 mm) thick, with factory-punched hole of 3/8-inch (9.5-mm) minimum diameter. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck. For drains, cut holes in the field.

- J. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck, with 3-inch-(76-mm-) wide flanges and level recessed pans of 1-1/2-inch (38-mm) minimum depth. For drains, cut holes in the field.
- K. Galvanizing Repair Paint: ASTM A 780.
- L. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
 - 1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches (38 mm) long, and as follows:

1. Weld Diameter: 3/4 inch (19 mm), nominal.
 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds 12 inches (305 mm) apart in the field of roof and 6 inches (150 mm) apart in roof corners and perimeter, based on roof-area definitions in FMG Loss Prevention Data Sheet 1-28 as indicated.
 3. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 18 inches (457 mm) , and as follows:
1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.
 2. Mechanically clinch or button punch.
 3. Fasten with a minimum of 1-1/2-inch-(38-mm-) long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 2 inches(38 mm), with end joints as follows:
1. End Joints: Lapped 2 inches (51 mm) minimum.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld flanges to top of deck. Space welds not more than 12 inches (305 mm) apart with at least one weld at each corner.
1. Install reinforcing channels or zees in ribs to span between supports and weld .
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.
1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.4 FLOOR-DECK INSTALLATION

- A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
1. Weld Diameter: 3/4 inch (19 mm), nominal.
 2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches (305 mm) apart, but not more than 18 inches (457 mm) apart.
 3. Weld Spacing: Space and locate welds as indicated.
 4. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches (914 mm), and as follows:
1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.
 2. Mechanically clinch or button punch.
 3. Fasten with a minimum of 1-1/2-inch-(38-mm-) long welds.

- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 2 inches (38 mm) with end joints as follows:
 - 1. End Joints: Lapped.
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.
- E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.
- F. Install piercing hanger tabs at 14 inches (355 mm) apart in both directions, within 9 inches (228 mm) of walls at ends, and not more than 12 inches (305 mm) from walls at sides, unless otherwise indicated.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform field tests and inspections.
- B. Field welds will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.6 PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
 - 1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
- C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05 5000 – METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:

1. Steel framing and supports for ceiling-hung toilet compartments.
2. Steel framing and supports for operable partitions.
3. Steel framing and supports for overhead doors.
4. Steel framing and supports for countertops.
5. Steel tube reinforcement for low partitions.
6. Steel framing and supports for mechanical and electrical equipment.
7. Steel framing and supports for applications where framing and supports are not specified in other Sections.
8. Elevator machine beams, hoist beams, and divider beams.
9. Shelf angles.
10. Miscellaneous steel trim including steel angle corner guards steel edgings and loading-dock edge angles.
11. Metal ladders.
12. Metal ships' ladders.
13. Metal bollards.
14. Loose bearing and leveling plates for applications where they are not specified in other Sections.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

C. Related Requirements:

1. Section 017419 "Construction Waste Management and Disposal" for recycling & disposal requirements.
2. Division 03 Section 033000 "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts and other items cast into concrete.
3. Section 051200 "Structural Steel Framing."
4. Section 055213 "Pipe and Tube Railings."
5. Section 09 9000 "Painting and Coatings" for surface preparation and priming requirements.
6. Section 12 9300 "Site Furnishings" for bicycle racks.
7. Section 32 9000 "Planting" for tree grates.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Paint products.
 - 2. Grout.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
 - 1. Steel framing and supports for ceiling-hung toilet compartments.
 - 2. Steel framing and supports for operable partitions.
 - 3. Steel framing and supports for overhead doors.
 - 4. Steel framing and supports for countertops.
 - 5. Steel tube reinforcement for low partitions.
 - 6. Steel framing and supports for mechanical and electrical equipment.
 - 7. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 8. Elevator machine beams.
 - 9. Shelf angles.
 - 10. Metal ladders.
 - 11. Metal ships' ladders.
 - 12. Miscellaneous steel trim including steel angle corner guards, steel edgings, and [loading-dock edge angles.
 - 13. Metal bollards.
 - 14. Loose steel lintels.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code--Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.
- D. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- E. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- F. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
- G. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
- H. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
- I. Zinc-Coated Steel Wire Rope: ASTM A 741.
 - 1. Wire-Rope Fittings: Hot-dip galvanized-steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.
- J. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: As indicated.
 - 2. Material: Cold-rolled steel, ASTM A 1008/A 1008M, Grade 33 (Grade 230)].
- K. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
- L. Aluminum Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.
- M. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.
- N. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

- O. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M),, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless-steel fasteners for fastening aluminum.
 - 2. Provide stainless-steel fasteners for fastening stainless steel.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593 (ASTM F 738M); with hex nuts ASTM F 594 (ASTM F 836M); and, where indicated, flat washers; Alloy Group 1(A1).
- D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.
- E. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
- F. Cast-in-Place Anchors in Concrete:
- G. Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors].
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.4 MISCELLANEOUS MATERIALS

- A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." **(LEED v4 only)**
- B. Shop Primers: Provide primers that comply with Section 09 9000 "Painting and Coatings."
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- F. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa),.

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners, unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
 - 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts if units are installed after concrete is placed.
- C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings
- D. Galvanize miscellaneous framing and supports where indicated.
- E. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.7 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) o.c., unless otherwise indicated.
 - 1. Provide mitered and welded units at corners.
 - 2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches (50 mm) larger than expansion or control joint.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Galvanize shelf angles located in exterior walls.
- D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.8 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize plates.

2.9 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.
- B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span, but not less than 8 inches (200 mm) unless otherwise indicated.

- C. Galvanize loose steel lintels located in exterior walls.

2.10 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with not less than two integrally welded steel strap anchors for embedding in concrete.

2.11 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize exterior miscellaneous steel trim.

2.12 METAL LADDERS

- A. General:
 - 1. Comply with ANSI A14.3, except for elevator pit ladders.
 - 2. For elevator pit ladders, comply with ASME A17.1/CSA B44.
- B. Steel Ladders:
 - 1. Space siderails 16 inches (406 mm) apart unless otherwise indicated.
 - 2. Siderails: Continuous, 3/8-by-2-1/2-inch (9.5-by-64-mm) steel flat bars, with eased edges.
 - 3. Rungs: 3/4-inch-(19-mm-) diameter steel bars.
 - 4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
 - 5. Provide platforms as indicated fabricated from welded or pressure-locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than 3/4 inch (19 mm) in least dimension.
 - 6. Support each ladder at top and bottom and not more than 60 inches (1500 mm) o.c. with welded or bolted steel brackets.
 - 7. Galvanize ladders, including brackets.

2.13 METAL SHIPS' LADDERS

- A. Provide metal ships' ladders where indicated. Fabricate of open-type construction with channel or plate stringers, pipe and tube railings, unless otherwise indicated. Provide brackets and fittings for installation.
 - 1. Treads shall be not less than 5 inches (127 mm) exclusive of nosing or less than 8-1/2 inches (216 mm) including the nosing, and riser height shall be not more than 9-1/2 inches (241 mm).
 - 2. Fabricate ships' ladders, including treads and railings from steel.
 - 3. Fabricate treads and platforms from rolled-steel floor plate.
 - 4. Comply with applicable railing requirements in Section 055213 "Pipe and Tube Railings."

- B. Galvanize exterior steel ships' ladders, including treads, railings, brackets, and fasteners.

2.14 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 40 steel pipe.
 - 1. Where bollards are indicated to receive controls for door operators, provide cutouts for controls and holes for wire.
- B. Fabricate bollards with 3/8-inch-(9.5-mm-) thick steel base plates for bolting to concrete slab. Drill base plates at all 4 corners for 3/4-inch (19-mm) anchor bolts
 - 1. Where bollards are to be anchored to sloping concrete slabs, angle base plates for plumb alignment of bollards.

2.15 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.16 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products:
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion
- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
- D. Shop prime with as specified in Section 09 9000 "Painting and Coatings."

2.17 ALUMINUM FINISHES

- A. As-Fabricated Finish: AA-M12.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.

Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - 1. Cast Aluminum: Heavy coat of bituminous paint.
 - 2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

3.3 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 INSTALLING METAL BOLLARDS

- A. Anchor bollards to existing construction with expansion anchor, anchor bolts, through bolts. Provide four 3/4-inch (19-mm) bolts at each bollard, unless otherwise indicated.
 - 1. Embed anchor bolts at least 4 inches (100 mm) in concrete.
- B. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete

- C. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches (75 mm) above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- D. Fill bollards solidly with concrete, mounding top surface to shed water.
 - 1. Do not fill removable bollards with concrete.

3.5 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.6 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 9000 "Painting and Coatings".
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION

SECTION 05 5213
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall mounted handrails.
- B. Stair railings and guardrails.
- C. Free-standing railings at steps.
- D. Balcony railings and guardrails.

1.02 RELATED REQUIREMENTS

- A. Section 06 2000 - Finish Carpentry: Wood handrail.
- B. Section 09 2116 - Gypsum Board Assemblies: Placement of backing plates in stud wall construction.
- C. Section 09 9113 - Exterior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
- C. Samples: Submit two, 4" inch (____ mm) long samples of handrail. Submit two samples of elbow, wall bracket, and end stop.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.
- B. Allow for expansion and contraction of members and building movement without damage to connections or members.
- C. Dimensions: See drawings for configurations and heights.
- D. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
- E. Provide slip-on non-weld mechanical fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.02 FABRICATION

- A. Accurately form components to suit specific project conditions and for proper connection to building structure.
- B. Fit and shop assemble components in largest practical sizes for delivery to site.
- C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

END OF SECTION

SECTION 05 5400 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Exterior load-bearing wall framing.
 - 2. Interior load-bearing wall framing.
 - 3. Exterior non-load-bearing, curtain-wall framing.
 - 4. Floor joist framing.
 - 5. Roof trusses.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads as indicated on structural drawings.

1.3 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Include layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
 - 1. Include structural analysis calculations signed and sealed by the California registered civil engineer responsible for their preparation.
 - 2. See design build notes on structural drawings.

1.4 QUALITY ASSURANCE

- A. Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" for calculating structural characteristics of cold-formed metal framing.
 - 1. Engineering Responsibility: Engage a qualified professional engineer to prepare design calculations, Shop Drawings, and other structural data.
- B. Mill certificates signed by steel sheet producer.
- C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

- D. Fire-Test-Response Characteristics: Where metal framing is part of a fire-resistance-rated assembly, provide framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by GA File Numbers in GA-600, "Fire Resistance Design Manual," or by design designations from UL's "Fire Resistance Directory" or from the listings of another testing agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Allied American Studco, Inc.
 - 2. Angeles Metal Systems.
 - 3. California Expanded Metal Products Co.
 - 4. California Metal Systems, Inc.
 - 5. Clark Steel Framing Industries.
 - 6. Consolidated Fabricators Corp.
 - 7. Consolidated Systems, Inc.
 - 8. Dale Industries, Inc.
 - 9. Design Shapes in Steel.
 - 10. Dietrich Industries, Inc.
 - 11. Knorr Steel Framing Systems.
 - 12. MarinoWare; Div. of Ware Industries, Inc.
 - 13. Scafco Corp.
 - 14. Steel Construction Systems.
 - 15. Steel Developers, LLC.
 - 16. Steeler, Inc.
 - 17. Studco of Hawaii, Inc.
 - 18. Super Stud Building Products, Inc.
 - 19. Unimast, Inc.
 - 20. United Metal Products, Inc.
 - 21. Western Metal Lath.

2.2 MATERIALS

- A. Steel Sheet: ASTM A 653/A 653M, structural steel, G60 (Z180) zinc coating, Grade 33 (230) for minimum uncoated steel thickness of 0.0428 inch (1.09 mm) and less; Grade 50 (340) for minimum uncoated steel thickness of 0.0538 inch (1.37 mm) and greater.
- B. Wall Framing: Manufacturer's standard steel studs, of web depths indicated, with stiffened flanges, complying with ASTM C 955, and as follows:
 - 1. Minimum Uncoated-Steel Thickness: As shown on drawings.
 - 2. Flange Width: 1-5/8 inches minimum (41 mm).

3. Track: Manufacturer's standard U-shaped steel track, unpunched, with straight flanges, complying with ASTM C 955, manufacturer's standard flange width, and minimum uncoated-steel thickness matching steel studs.
- C. Joist Framing: Manufacturer's standard C-shaped steel joists, of web depths indicated, unpunched, with stiffened flanges, complying with ASTM C 955, and as follows:
1. Minimum Uncoated-Steel Thickness: As indicated on drawings.
 2. Flange Width: 1-5/8 inches (41 mm) minimum.
 3. Track: Manufacturer's standard U-shaped steel joist track, of web depths indicated, unpunched, with unstiffened flanges, complying with ASTM C 955, and as follows:
 - a. Minimum Uncoated-Steel Thickness: Matching steel joists.
 - b. Flange Width: 1-5/8 inches (41 mm), minimum.

2.3 ACCESSORIES AND MISCELLANEOUS MATERIALS

- A. Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi (230 MPa), of manufacturer's standard thickness and configuration, unless otherwise indicated.
- B. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
- E. Mechanical Fasteners: Corrosion-resistant-coated, self-drilling, self-threading steel drill screws.
- F. Galvanizing Repair Paint: ASTM A 780.
- G. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- H. Thermal Insulation: ASTM C 665, Type I, unfaced mineral-fiber blankets produced by combining glass or slag fibers with thermosetting resins.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Preparation: Grout bearing surfaces uniform and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction. contact of bearing flanges or track webs on supporting concrete or masonry construction.

- B. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to ASTM C 1007, manufacturer's written recommendations, and requirements in this Section.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
 - 3. Install framing members in one-piece lengths.
 - 4. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed.
 - 5. Install insulation in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
 - 6. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

- C. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

- D. Load-Bearing Wall Installation: Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends. Squarely seat studs against webs of top and bottom tracks. Space studs as indicated, set plumb, align, and fasten both flanges of studs to top and bottom tracks.
 - 1. Align studs vertically where wall-framing continuity is interrupted by floor framing. Where studs cannot be aligned, continuously reinforce track to transfer loads.
 - 2. Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads.
 - 3. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.
 - 4. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
 - 5. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings.

6. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
 7. Install horizontal bridging in stud system, spaced as indicated on Shop Drawings. Fasten at each stud intersection.
 8. Install miscellaneous framing and connections, including supplementary framing, blocking, bracing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.
- E. Non-Load-Bearing, Curtain-Wall Installation: Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure. Space studs as indicated; set plumb, align, and fasten both flanges of studs to track, unless otherwise indicated.
1. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 2. Install horizontal bridging in curtain-wall studs, spaced in rows indicated on Shop Drawings but not more than 54 inches (1370 mm) apart. Fasten at each stud intersection.
 3. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable curtain-wall-framing system.
- F. Joist Installation: Install, align, and securely anchor perimeter joist track sized to match joists as indicated on Shop Drawings. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten to both flanges of joist track.
1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm). Reinforce ends and bearing points of joists as indicated on Shop Drawings.
 2. Space joists not more than 2 inches (51 mm) from abutting walls and at spacings indicated.
 3. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists if indicated.
 4. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated. Install web stiffeners to transfer axial loads of walls above.
 5. Install bridging at each end of joists and at intervals indicated. Fasten bridging at each joist intersection as indicated.
 6. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
 7. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.
- G. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

3.2 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing agency to perform field quality-control testing.
 - 1. Field and shop welds will be subject to testing and inspection.
 - 2. Remove and replace Work that does not comply with specified requirements.
 - 3. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

END OF SECTION 05 5400

SECTION 05 7113
FABRICATED METAL SPIRAL STAIRS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes fabricated spiral stairs with steel central-supporting columns and radiating treads.
- B. Related Sections:
1. Section 062000 "Finish Carpentry" for wood treads.
 2. Section 096500 "Resilient Floor Tile" for resilient treads.
 3. Section 096813 "Tile Carpeting" for carpeting treads.

1.03 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design fabricated spiral stairs, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance of Stairs: Fabricated spiral stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to [SEI/ASCE 7] <Insert requirement>:
1. Uniform Load: [40 lbf/sq. ft. (1.92 kN/sq. m)] [100 lbf/sq. ft. (4.79 kN/sq. m)].
 2. Concentrated Load: 300 lbf (1.33 kN) applied on an area of 4 sq. in. (2580 sq. mm).
 3. Uniform and concentrated loads need not be assumed to act concurrently.
 4. Railing Loads: Stairs shall withstand stresses resulting from railing loads in addition to loads specified above.
- C. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to [SEI/ASCE 7] <Insert requirement>:
1. Handrails:
 - a. Uniform load of [50 lbf/ft. (0.73 kN/m)] applied in any direction.
 - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 2. Top Rails of Guards:
 - a. Uniform load of [50 lbf/ft. (0.73 kN/m) applied in any direction] [50 lbf/ft. (0.73 kN/m) applied horizontally and concurrently, with 100 lbf/ft. (1.46 kN/m) applied vertically downward].
 - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 3. Infill of Guards:
 - a. Concentrated load of [50 lbf (0.22 kN)] [200 lbf (0.89 kN)] applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
 - b. Uniform load of 25 lbf/sq. ft. (1.2 kN/sq. m) applied horizontally.
 - c. Infill load and other loads need not be assumed to act concurrently.
- D. Seismic Performance: Fabricated spiral stairs shall withstand the effects of earthquake motions determined according to [SEI/ASCE 7] <Insert requirement>.
1. Component Importance Factor is [1.5] [1.0].

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for components.

- B. Shop Drawings: For fabricated spiral stairs. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Provide templates for anchors, bolts, and other anchorage devices specified for installation under other Sections.
- C. Samples for Initial Selection: For products involving selection of color, texture, or design.

1.05 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.06 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.07 COORDINATION

- A. Coordinate installation of anchorages for fabricated spiral stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Accent Stairs <accentstairs.com>.
 - 2. Custom Iron Inc <www.customiron.com>.
 - 3. Duvinage Corporation .
 - 4. Goddard Manufacturing Co .
 - 5. Iron Shop (The) .
 - 6. Mylen Stairs .
 - 7. Pisor Industries, Inc .
 - 8. Salter Industries .
 - 9. Spiral Stairs of America .
 - 10. Stairways Inc <stairwaysinc.com>.

2.02 MATERIALS

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than [25] <Insert number> percent.
- C. Brackets, Flanges, and Anchors: Same metal and finish as supported item unless otherwise indicated.
- D. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- E. Steel Bars for Grating Treads and Platforms: ASTM A 36/A 36M or ASTM A 1011/A 1011M.
- F. Wire Rod for Grating Crossbars: ASTM A 510 (ASTM A 510M).
- G. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or Grade D.
- H. Steel Pipe Columns: ASTM A 53/A 53M, Schedule 40. Provide Schedule 80 for columns larger than NPS 4 (DN 100) and where required to support loads.

- I. Steel Pipe Railings: ASTM A 53/A 53M, Schedule 40.
- J. Steel Tubing: Either cold-formed steel tubing complying with ASTM A 500 or mandrel-drawn mechanical tubing complying with ASTM A 513, Type 5.
- K. Iron Castings: Either gray iron complying with ASTM A 48/A 48M or malleable iron complying with ASTM A 47/A 47M unless otherwise indicated or required by structural loads.
- L. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.
- M. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- N. Aluminum Pipe and Structural Round Tubing: ASTM B 429, Alloy 6063-T6.
- O. Extruded-Aluminum Tubing: ASTM B 221 (ASTM B 221M), Alloy 6063-T5/T52.
- P. Aluminum Castings: ASTM B 26/B 26M, Alloy 319.0-F.
- Q. Extruded-Bronze Handrails: ASTM B 455, Alloy UNS No. C38500 (architectural bronze).
- R. Seamless Bronze Tubing: ASTM B 135 (ASTM B 135M), Alloy UNS No. C23000 (red brass, 85 percent copper).
- S. Seamless Brass Tubing: ASTM B 135 (ASTM B 135M), Alloy UNS No. C26000 (cartridge brass, 70 percent copper).
- T. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.

2.03 MISCELLANEOUS MATERIALS

- A. Fasteners: For connecting stair components and for anchoring stairs to other construction, select fasteners of the type, grade, and class required to produce connections capable of withstanding design loadings.
 - 1. For aluminum, provide fasteners fabricated from Type 304 stainless steel.
 - 2. For steel and cast iron, use plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
- B. Low-Emitting Paints and Coatings: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Lacquer for Copper Alloys: Clear, air-drying, acrylic lacquer specially developed for coating copper-alloy products.
 - 1. Product: Subject to compliance with requirements, provide "Incralac" developed by International Copper Research Corporation.
- D. Shop Primers: Provide primers that comply with [Section 099113 "Exterior Painting."] [Section 099123 "Interior Painting."]
- E. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with finish paint systems indicated.
- F. Shop Primer for Galvanized Steel: Primer formulated for use over zinc-coated metal and compatible with finish paint systems indicated.
- G. Shop Primer for Aluminum: Primer formulated for use over aluminum and compatible with finish paint systems indicated.
- H. Wood for Stair Treads, Handrails, and Platforms: Laminated red oak, sanded to 120-grit smoothness. Apply uniform coat of manufacturer's standard clear sealer.
- I. Rubber Wearing Surfaces: Manufacturer's standard, 1/4-inch- (6-mm-) thick, molded-rubber covering in pattern and color indicated or, if not indicated, as selected by Architect from manufacturer's standard colors and patterns.

2.04 FABRICATION

- A. Assemble spiral stairs in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly

mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form work true to line and level with accurate angles and surfaces.
- D. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- E. Cut, reinforce, drill, and tap as needed to receive hardware, screws, and similar items.
- F. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove flux immediately.
 - 4. Provide [Type 1] [Type 2] [Type 3] welds according to NOMMA Guideline 1, "Joint Finishes."
 - 5. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and, except for fillet welds, welded surface matches contours of adjoining surfaces.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.
- H. Fabricate center column from steel pipe welded to baseplate for anchorage to floor structure. Brace column at upper floors by means of landings attached to column and floor structure unless otherwise indicated. Provide cap for column if top is exposed.
- I. Provide steel-bar grating treads and platforms with welded hubs and as follows:
 - 1. Radial grating treads.
 - 2. [Abrasive] [Rolled-steel, floor-plate] nosings.
 - 3. Straight flanges and welded-on legs.
 - 4. Tapered flanges without legs.
- J. Provide steel-framed treads[and platforms] welded to hubs or center column and without legs; wearing surface as follows:
 - 1. Cast iron with integral abrasive.
 - 2. Smooth steel plate with integral abrasive.
 - 3. Wood.
 - 4. Plywood insert for covering with finish flooring specified in another Section.
- K. Railings: Provide railing system indicated, uniformly bent to spiral shape, and continuing at top to form guardrail around floor opening.
 - 1. Space balusters less than 4 inches, clear.
 - 2. Space balusters to provide one baluster per tread, but spaced less than [21 inches (533 mm)], clear.
 - 3. Space intermediate rails less than 4 inches , clear.
 - 4. Locate bottom rail so that a 6-inch diameter sphere cannot pass between the stair and rail.
 - 5. Fabricate top rail from 1-1/2 inch OD steel pipe or round tubing.
 - 6. Fabricate balusters from 1/2-inch OD round steel bars.
 - 7. Fabricate intermediate rails from 7/8-inch- OD steel pipe.
 - 8. Fabricate intermediate rails from steel pipe same size as top rail.

2.05 STEEL AND IRON FINISHES

- A. Apply shop primer to prepared surfaces of handrails and railing components unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where needed for securing fabricated spiral stairs to in-place construction; include threaded fasteners for concrete and masonry inserts, through bolts, lag bolts, wood screws, and other connectors as required.
- B. Assemble fabricated spiral stair components to comply with manufacturer's written instructions, with each component aligned and in correct relation to each other, securely anchored to the supporting column and adjacent structure.
- C. Do not cut, alter, or drill stair components in the field that do not fit properly. Return components that do not fit to manufacturer for adjustment.
- D. Install fabricated spiral stairs accurately in location, alignment, and elevation; level and plumb; and according to manufacturer's written instructions.
- E. Install fabricated spiral stairs by welding to steel structure or to weld plates cast into concrete unless otherwise indicated.
- F. Field Welding:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

3.02 CLEANING AND PROTECTION

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint and paint exposed areas with same material.
- B. For galvanized surfaces, clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.
 - 1. Paint repaired areas with same material used for shop painting.
- C. Protect finished tread surfaces during construction by covering with 1/2-inch- (13-mm-) thick plywood secured with plastic strapping or another nonmarring fastening method.

END OF SECTION

SECTION 06 1000 – ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:

1. Framing with dimension lumber.
2. Framing with timber.
3. Framing with engineered wood products.
4. Shear wall panels.
5. Rooftop equipment bases and support curbs.
6. Wood blocking, cants, and nailers.
7. Wood furring and grounds.
8. Plywood backing panels.

B. Related Requirements:

1. Section 017419 "Construction Waste Management and Disposal" for recycling & disposal requirements.
2. Section 061600 "Sheathing."

1.3 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.
- C. Timber: Lumber of 5 inches nominal (114 mm actual) or greater in least dimension.
- D. Lumber grading agencies, and the abbreviations used to reference them, include the following:
1. NeLMA: Northeastern Lumber Manufacturers' Association.
 2. NLGA: National Lumber Grades Authority.
 3. RIS: Redwood Inspection Service.
 4. SPIB: The Southern Pine Inspection Bureau.
 5. WCLIB: West Coast Lumber Inspection Bureau.
 6. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - 3. For fire-retardant treatments include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
 - 4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - 5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. LEED Submittals: See Section 018113 "Sustainable Design Requirements."
- C. Fastener Patterns: Full-size templates for fasteners in exposed framing.

1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
 - 1. Wood-preservative-treated wood.
 - 2. Fire-retardant-treated wood.
 - 3. Engineered wood products.
 - 4. Shear panels.
 - 5. Power-driven fasteners.
 - 6. Powder-actuated fasteners.
 - 7. Expansion anchors.
 - 8. Metal framing anchors.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
- B. Wood-based Material Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Certified Wood: Provide lumber, plywood, and engineered wood products certified as "FSC Pure" or "FSC Mixed Credit" or "FSC Mixed %" at a minimum of 75% according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and to FSC STD-40-004, "FSC Standard for Chain of Custody Certification."
- B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
 - 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 4. Provide dressed lumber, S4S, unless otherwise indicated.
- C. Maximum Moisture Content of Lumber: 19 percent for 2-inch nominal (38-mm actual) thickness or less, 19 percent for more than 2-inch nominal (38-mm actual) thickness unless otherwise indicated.
- D. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWWA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 - 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
- D. Application: Treat all items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
 1. Use treatment that does not promote corrosion of metal fasteners.
 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 4. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664 and design value adjustment factors shall be calculated according to ASTM D 6841.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
- E. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat items indicated on Drawings, and the following:
 1. Framing for raised platforms.
 2. Concealed blocking.
 3. Framing for non-load-bearing partitions.
 4. Framing for non-load-bearing exterior walls.
 5. Roof construction.
 6. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: No. 2 grade minimum.
 - 1. Application: Interior partitions not indicated as load-bearing.
 - 2. Species:
 - a. Douglas fir-larch; WWPA.
- B. Load-Bearing Partitions: No. 2 or better grade.
 - 1. Application: Exterior walls and interior load-bearing partitions.
 - 2. Species:
 - a. Douglas fir-larch; WWPA.
- C. Ceiling Joists: No. 2 or better grade.
 - 1. Species:
 - a. Douglas fir-larch; WWPA.
- D. Joists, Rafters, and Other Framing Not Listed Above: No. 2 or better grade.
 - 1. Species:
 - a. Douglas fir-larch; WWPA.

2.5 TIMBER FRAMING

- A. Provide timber framing complying with the following requirements, according to grading rules of grading agency indicated:
- B. Species and Grade: Douglas fir-larch, Select Structural grade; WWPA.

2.6 ENGINEERED WOOD PRODUCTS

- A. Engineered Wood Products, General: Products shall contain no urea formaldehyde.
- B. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.
- C. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Boise Cascade Corporation.
 - b. Finnforest USA.
 - c. Georgia-Pacific.
 - d. Jager Building Systems Inc.
 - e. Louisiana-Pacific Corporation.
 - f. Pacific Woodtech Corporation.
 - g. Roseburg Forest Products Co.
 - h. Standard Structures Inc.
 - i. Stark Truss Company, Inc.
 - j. West Fraser Timber Co., Ltd.
 - k. Weyerhaeuser Company.

2. Extreme Fiber Stress in Bending, Edgewise: 2600 psi (17.9 MPa) for 12-inch nominal-(286-mm actual-) depth members.
 3. Modulus of Elasticity, Edgewise: 1,900,000 psi (13 700 MPa)
- D. Parallel-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Louisiana-Pacific Corporation.
 - b. Weyerhaeuser Company.
 2. Extreme Fiber Stress in Bending, Edgewise: 2900 psi (20 MPa) for 12-inch nominal-(286-mm actual-) depth members.
 3. Modulus of Elasticity, Edgewise: 2,200,000 psi (15 100 MPa).
- E. Wood I-Joists: Prefabricated units, I-shaped in cross section, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Provide units complying with material requirements of and with structural capacities established and monitored according to ASTM D 5055.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Anthony-Domtar Inc.
 - b. Boise Cascade Corporation.
 - c. Georgia-Pacific.
 - d. Huber, J. M. Corporation.
 - e. International Beams Inc.
 - f. International Paper Corporation.
 - g. Jager Building Systems Inc.
 - h. Louisiana-Pacific Corporation.
 - i. Nascor Incorporated.
 - j. Pacific Woodtech Corporation.
 - k. Roseburg Forest Products Co.
 - l. Standard Structures Inc.
 - m. Stark Truss Company, Inc.
 - n. Superior Wood Systems.
 - o. Weyerhaeuser Company.
 2. Web Material: Either oriented strand board or plywood, complying with DOC PS 1 or DOC PS 2, Exposure 1.
 3. Structural Properties: Provide units with depths and design values not less than those indicated.
 4. Provide units complying with APA PRI-400, factory marked with APA trademark indicating nominal joist depth, joist class, span ratings, mill identification, and compliance with APA standard.
- F. Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research/evaluation report for I-joists.
1. Manufacturer: Provide products by same manufacturer as I-joists.
 2. Material: All-veneer product glued-laminated wood or product made from any combination solid lumber, wood strands, and veneers.
 3. Thickness: 1-1/4 inches (32 mm).

4. Provide performance-rated product complying with APA PRR-401, rim board grade, factory marked with APA trademark indicating thickness, grade, and compliance with APA standard.

2.7 SHEAR WALL PANELS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 1. Shear Transfer Systems.
 2. Simpson Strong-Tie Co., Inc.
 3. Weyerhaeuser Company.
- B. Wood-Framed Shear Wall Panels: Prefabricated assembly consisting of wood perimeter framing, tie downs, and Exposure I, Structural I plywood or OSB sheathing.
 1. Products shall contain no urea formaldehyde and comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers." (LEED v4)
- C. Steel-Framed Shear Wall Panels: Prefabricated assembly consisting of cold-formed galvanized steel panel, steel top and bottom plates, and wood studs.
- D. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.8 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 1. Blocking.
 2. Nailers.
 3. Rooftop equipment bases and support curbs.
 4. Cants.
 5. Furring.
 6. Grounds.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber and any of the following species:
 - a. Douglas fir-larch; WWPA.
- C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
 - a. Douglas fir-larch; WWPA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.9 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: DOC PS 1, Exterior, A-C, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.
 - 1. Plywood shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.10 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with polymer coating or of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

2.11 METAL FRAMING ANCHORS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Cleveland Steel Specialty Co.
 - 2. KC Metals Products, Inc.
 - 3. Phoenix Metal Products, Inc.
 - 4. Simpson Strong-Tie Co., Inc.
 - 5. USP Structural Connectors.
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer that meet or exceed those indicated of products of manufacturers listed.

Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

- C. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- D. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.
 - 1. Use for wood-preserved-treated lumber and where indicated.
- E. Stainless-Steel Sheet: ASTM A 666, Type 304.
 - 1. Use for exterior locations and where indicated.
- F. Joist Hangers: U-shaped joist hangers with 2-inch-(50-mm-) long seat and 1-1/4-inch-(32-mm-) wide nailing flanges at least 85 percent of joist depth.
 - 1. Thickness: 0.062 inch (1.6 mm).
- G. I-Joist Hangers: U-shaped joist hangers with 2-inch-(50-mm-) long seat and 1-1/4-inch-(32-mm-) wide nailing flanges full depth of joist. Nailing flanges provide lateral support at joist top chord.
 - 1. Thickness: 0.062 inch (1.6 mm).
- H. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.
 - 1. Strap Width: 2 inches (50 mm).
 - 2. Thickness: 0.062 inch (1.6 mm).
- I. Bridging: Rigid, V-section, nailless type, 0.050 inch (1.3 mm) thick, length to suit joist size and spacing.
- J. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch (25 mm) above base and with 2-inch-(50-mm-) minimum side cover, socket 0.062 inch (1.6 mm) thick, and standoff and adjustment plates 0.108 inch (2.8 mm) thick.
- K. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.
 - 1. Width: 1-1/4 inches (32 mm).
 - 2. Thickness: 0.062 inch (1.6 mm).
 - 3. Length: As indicated.
- L. Rafter Tie-Downs: Bent strap tie for fastening rafters or roof trusses to wall studs below, 1-1/2 inches (38 mm) wide by 0.050 inch (1.3 mm) thick. Tie fastens to side of rafter or truss, face of top plates, and side of stud below.
- M. Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters or roof trusses to wall studs below, 2-1/4 inches (57 mm) wide by 0.062 inch (1.6 mm) thick. Tie fits over top of rafter or truss and fastens to both sides of rafter or truss, face of top plates, and side of stud below.

- N. Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, 1-1/4 inches (32 mm) wide by 0.050 inch (1.3 mm) thick by 36 inches (914 mm) long.
- O. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base.
 - 1. Bolt Diameter: 5/8 inch (15.8 mm).
 - 2. Width: 3-3/16 inches (81 mm).
 - 3. Body Thickness: 0.138 inch (3.5 mm).
 - 4. Base Reinforcement Thickness: 0.239 inch (6.1 mm).
- P. Wall Bracing: Angle bracing made for letting into studs in saw kerf, 15/16 by 15/16 by 0.040 inch (24 by 24 by 1 mm) thick with hemmed edges.

2.12 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density, polyethylene film aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).
- C. Adhesives for Gluing Furring to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
 - 1. Adhesives shall have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Follow more stringent local, regional, state and federal requirements where applicable.
- D. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

- E. Shear Wall Panels: Install shear wall panels to comply with manufacturer's written instructions.
- F. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- G. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- H. Do not splice structural members between supports, unless otherwise indicated.
- I. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.
- J. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal-(38-mm actual-) thickness.
- K. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet (6 m) o.c. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- L. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- M. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
- N. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.
- O. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
 - 1. Comply with approved fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.
 - 2. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

3.2 WOOD GROUND, BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.
- C. Where wood-preserved-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- D. Provide permanent grounds of dressed, pressure-preserved-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal-(19-by-63-mm actual-) size furring vertically at 24 inches (610 mm) o.c.
- C. Furring to Receive Gypsum Board or Plaster Lath: Install 1-by-2-inch nominal-(19-by-38-mm actual-) size furring vertically at 16 inches (406 mm) o.c.

3.4 WALL AND PARTITION FRAMING INSTALLATION

- A. General: Provide single bottom plate and double top plates using members of 2-inch nominal (38-mm actual) thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions and for load-bearing partitions where framing members bearing on partition are located directly over studs. Fasten plates to supporting construction, unless otherwise indicated.
 - 1. For exterior walls, provide 2-by-6-inch nominal-(38-by-140-mm actual-) size wood studs spaced 16 inches (406 mm) o.c. unless otherwise indicated.
 - 2. For interior partitions and walls, provide 2-by-4-inch nominal-(38-by-89-mm actual-) size wood studs spaced 16 inches (406 mm) o.c. unless otherwise indicated.
 - 3. Provide continuous horizontal blocking at midheight of partitions more than 96 inches (2438 mm) high, using members of 2-inch nominal (38-mm actual) thickness and of same width as wall or partitions.
- B. Construct corners and intersections with three or more studs.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
 - 1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal (89-mm actual) depth for openings 48 inches (1200 mm) and less in width, 6-inch nominal (140-mm actual) depth for openings 48 to 72 inches (1200 to 1800 mm) in width, 8-inch nominal (184-mm actual) depth for openings 72 to 120 inches (1800 to 3000 mm) in width, and not less than 10-inch nominal (235-mm actual) depth for openings 10 to 12 feet (3 to 3.6 m) in width.

2. For load-bearing walls, provide double-jamb studs for openings 60 inches (1500 mm) and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated.
- D. Provide diagonal bracing in walls, at locations indicated, at 45-degree angle, full-story height, unless otherwise indicated. Use metal wall bracing, let into studs in saw kerf. .

3.5 FLOOR JOIST FRAMING INSTALLATION

- A. General: Install floor joists with crown edge up and support ends of each member with not less than 1-1/2 inches (38 mm) of bearing on wood or metal, or 3 inches (76 mm) on masonry. Attach floor joists as follows:
1. Where supported on wood members, by using metal framing anchors.
 2. Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.
- B. Fire Cuts: At joists built into masonry, bevel cut ends 3 inches (76 mm) and do not embed more than 4 inches (102 mm).
- C. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches (1200 mm).
- D. Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third at ends. Do not bore holes larger than 1/3 depth of joist; do not locate closer than 2 inches (50 mm) from top or bottom.
- E. Provide solid blocking of 2-inch nominal (38-mm actual) thickness by depth of joist at ends of joists unless nailed to header or band.
- F. Lap members framing from opposite sides of beams, girders, or partitions not less than 4 inches (102 mm) or securely tie opposing members together. Provide solid blocking of 2-inch nominal (38-mm actual) thickness by depth of joist over supports.
- G. Anchor members paralleling masonry with 1/4-by-1-1/4-inch (6.4-by-32-mm) metal strap anchors spaced not more than 96 inches (2438 mm) o.c., extending over and fastening to 3 joists. Embed anchors at least 4 inches (102 mm) into grouted masonry with ends bent at right angles and extending 4 inches (102 mm) beyond bend.
- H. Provide solid blocking between joists under jamb studs for openings.
- I. Under non-load-bearing partitions, provide double joists separated by solid blocking equal to depth of studs above.
1. Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.
- J. Provide bridging of type indicated below, at intervals of 96 inches (2438 mm) o.c., between joists.
1. Diagonal wood bridging formed from bevel-cut, 1-by-3-inch nominal-(19-by-64-mm actual-) size lumber, double-crossed and nailed at both ends to joists.
 2. Steel bridging installed to comply with bridging manufacturer's written instructions.

3.6 CEILING JOIST AND RAFTER FRAMING INSTALLATION

- A. Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.
 - 1. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate and nail to first joist or anchor with framing anchors or metal straps. Provide 1-by-8-inch nominal-(19-by-184-mm actual-) size or 2-by-4-inch nominal-(38-by-89-mm actual-) size stringers spaced 48 inches (1200 mm) o.c. crosswise over main ceiling joists.
- B. Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
 - 1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches (50 mm) deeper. Bevel ends of jack rafters for full bearing against valley rafters.
 - 2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches (50 mm) deeper. Bevel ends of jack rafters for full bearing against hip rafter.
- C. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal-(19-by-140-mm actual-) size boards between every third pair of rafters, but not more than 48 inches (1219 mm) o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.
- D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions, if any.

3.7 TIMBER FRAMING INSTALLATION

- A. Install timber with crown edge up and provide not less than 4 inches (102 mm) of bearing on supports. Provide continuous members, unless otherwise indicated; tie together over supports as indicated if not continuous.
- B. Where beams or girders are framed into pockets of exterior concrete or masonry walls, provide 1/2-inch (13-mm) air space at sides and ends of wood members.
- C. Install wood posts using metal anchors indicated.
- D. Treat ends of timber beams and posts exposed to weather by dipping in water-repellent preservative for 15 minutes.

3.8 STAIR FRAMING INSTALLATION

- A. Provide stair framing members of size, space, and configuration indicated or, if not indicated, to comply with the following requirements:
 - 1. Size: 2-by-12-inch nominal-(38-by-286-mm actual-) size, minimum.
 - 2. Material: Laminated-veneer lumber, parallel-strand lumber, or solid lumber.
 - 3. Notching: Notch rough carriages to receive treads, risers, and supports; leave at least 3-1/2 inches (89 mm) of effective depth.
 - 4. Spacing: At least 3 framing members for each 36-inch (914-mm) clear width of stair.

- B. Provide stair framing with no more than 3/16-inch (4.7-mm) variation between adjacent treads and risers and no more than 3/8-inch (9.5-mm) variation between largest and smallest treads and risers within each flight.

3.9 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SECTION 06 1500
WOOD DECKING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Softwood lumber structural wood decking.
- B. Plywood structural wood decking.
- C. Glued laminated structural wood decking.
- D. Composite wood decking.
- E. Fire retardant treatment of wood.
- F. Preservative treatment of wood.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 03 3000 - Cast-in-Place Concrete: Bearing support.
- C. Section 06 1000 - Rough Carpentry: Bearing support.
- D. Section 09 9000 - Painting and Coating: Field finishing.

1.03 REFERENCE STANDARDS

- A. AWWA U1 - Use Category System: User Specification for Treated Wood; American Wood-Preservers' Association; 2012.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials.
- C. Shop Drawings: Indicate deck framing system, loads and cambers, bearing details, and framed openings.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Plywood Decking:
 - 1. Boise Cascade, LLC
 - 2. Georgia-Pacific Corporation
 - 3. Weyerhaeuser Co
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Fastener Type and Finish: Hot-dipped galvanized steel for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 - 2. Fastener Type and Finish for Composite Decking: Stainless steel, trim head.
 - 3. Screws: Bugle head, hardened steel, power driven type, length three times thickness of decking.
- B. Adhesive: Waterproof, air cure type, cartridge dispensed.

2.03 WOOD TREATMENT

- A. Factory-Treated Lumber and Plywood: Comply with requirements of AWWA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

B. Fire Retardant Treatment:

END OF SECTION

SECTION 06 1733 WOOD I – JOISTS

1. GENERAL

1.1. SECTION INCLUDES

- A. Wood chord and structural panel (OSB) web joists for roof framing.
- B. Bridging, bracing, and anchorage.
- C. Framing for openings.

1.2. REGULATORY REQUIREMENTS

- A. Comply with Chapter 16A, 17A and 23A of Part 2, Title 24, CCR.
- B. Manufacturer shall have current Product Acceptance from DSA.
- C. UL - Fire Resistance Directory.

1.3. QUALITY ASSURANCE

1.3.A.1. Manufacturer shall have produced the specified products for a period of five (5) years prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.

1.3.A.2. Manufacturer shall submit documentation demonstrating compliance with jurisdictional authority approved quality control program, including in-plant inspection by an approved testing and inspection laboratory.

B. Fabricator/Erector

1.3.B.1. For fabrication and installation of work, use only personnel who are thoroughly trained and experienced in the skills required, have installed similar applications of the specified products within one year prior to beginning work of this section, and who are completely familiar with the manufacturers' recommended methods of installation, as well as the requirements of this work.

C. Substitution requirements of alternate I-Joist systems.

1.3.C.1. Submit substitutions per provisions of Section 01253.

1.3.C.2. Current ICC Evaluation Service Report, is a prerequisite to consideration under the provisions of Section 01253.

1.3.C.3. Proposed alternate shall have same Section Modulus and the product of the Moment of Elasticity and Moment of Inertia (EI) as the specified product. Alternate joist dimensions and depths will not be allowed without the specific approval of the Architect and the Structural Engineer.

1.3.C.4. No Change Order for extension of time for any cause will be allowed in relationship to any proposed alternative product. No time extensions will be permitted for substitutions.

- 1.3.C.5.** Continuous inspection of fabrication and testing by a special inspector approved by DSA will be required for all substitutions. Cost of such inspection shall be paid by the Owner and back-charged to the Contractor. Test methods required to demonstrate equivalency to the specified I-joist shall be determined by the Architect, the Engineer and the Division of the State Architect.
- 1.3.C.6.** The Contractor shall pay all DSA filing and review fees caused by the substituted I-joist system, including joists, sheathing, bridging and related components, blocking and installation of the alternate system.
- 1.3.C.7.** The additional cost of design, engineering, review by Architect, Structural Engineer, and DSA, and all costs of construction resulting from the use of the substituted I-joist system shall be paid by the Contractor.

1.4. SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Shop Drawings:
 - 1.4.B.1.** Submit shop drawings prepared under supervision of a registered civil engineer, licensed in the State of California.
 - 1.4.B.2.** Shop drawings shall include complete details and procedures and diagrams. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate framing system, sizes and spacing of joists, loads and joist cambers, bearing and anchor details, bridging and bracing, and framed openings.
 - 1.4.B.3.** Provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as work of other sections.
 - 1.4.B.4.** Shop drawings shall clearly identify, in graphic form, all deviations from contract documents. Provide complete description and rationale for deviation.
 - 1.4.B.5.** Clearly identify all changes made in re-submitted shop drawings. Incorporate changes necessary due to field conditions in re-submittal.
- C. Product Data/Materials List:
 - 1.4.C.1.** Submit producer's or manufacturer's specifications and installation instructions. Include laboratory test reports and other data to show compliance with specifications, including specified standards.
- D. Engineering Submittal Criteria:
 - 1.4.D.1.** Submit calculations prepared under the direct supervision of a Civil Engineer licensed in the State of California.
 - 1.4.D.2.** Structural Calculations: Produce calculations in booklet form, 8-1/2 x 11 inch size.
 - 1.4.D.3.** Provide sufficient information with respect to design criteria, analysis methodology and material capacity to adequately evaluate proposed structural system for compliance with applicable sections of Title 24, CCR.

E. Fire Resistive Assemblies:

- 1.4.E.1.** After reviewing all relationships and building system components, provide written certification that specified system will provide fire resistive assembly as shown on drawings.

1.5. DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in accordance with manufacturer's instructions. Store and protect products under per manufacturer's recommendations with seals and labels intact and legible. Delivery and storage of materials shall be made so that material is not soiled, disfigured, or damaged.
- B. Transport and store joists in vertical position resting on bearing ends.
- C. Protect joists from moisture, warping, and distortion during transit and when site stored.

1.6. FIELD MEASUREMENTS

- A. Verify field measurements are as shown on shop drawings.

2. PART 2 - PRODUCTS

2.1. ACCEPTABLE MANUFACTURERS

- A. RedBuilt (Basis of Design).
- B. Series: Red I-Joist, as shown on drawings and as specified in this Section

2.2. MATERIALS

A. Wood Chord Members:

- 2.2.A.1.** RedBuilt: Redlam LVL per ICC Report ESR 2993, moisture content of 7-16 percent at time of fabrication.
- 2.2.A.2.** Web: Provide Performance Plus Oriented Strand Board (OSB), meeting PS-2-95 criteria, Exposure 1, minimum 7/16 inch thickness, and complying with ESR 2994.

- B. Joist Bridging: Type, size and spacing required by joist manufacturer, and as shown on drawings.

2.3. ACCESSORIES

- A. Wood Blocking, Plates, Support Members, and Framing for Openings: Per Section 06 11 00.
- B. Fasteners: Steel, type to suit application and per Section 06 11 00.

2.4. FABRICATION

- A. Verify dimensions and site conditions prior to fabrication.
- B. Design web joist in accordance with approved DSA standards. Provide system designed for dead and live loads as shown on drawings.

2.4.B.1. Dead Loads: Carefully review drawings and referenced sections of this specification. Design structural system to respond to loads imposed by such materials and assemblies as specified.

2.4.B.2. Deflection: Limit deflection to L/480, live load and long term load.

C. Fabricate with continuous chords.

D. Install web with ends jointed to form a continuous web.

E. Apply glue to groove centered in wide face of flange and pressure form and fit web into groove.

F. Include all extended ends and ceiling extensions, headers, bridging, shear blocks and panels, end supports, and end anchors required for complete installation

2.5. OTHER MATERIALS

A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3. PART 3 - EXECUTION

3.1. SURFACE CONDITIONS

A. Inspection:

3.1.A.1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

3.1.A.2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3.1.A.3. In the event of discrepancy, immediately notify the Architect.

3.1.A.4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. INSTALLATION

A. Install joists in accordance with manufacturer's instructions.

B. Place joists true to line and level. Provide temporary bracing to position joists in place until permanently secured.

C. Place permanent bridging, bracing, and anchors to maintain joists straight and in correct position before installation of decking or inducing loads.

D. Do not field cut joist flanges.

E. Place headers and supports to frame openings required.

3.3. ERECTION TOLERANCES

- A. Tolerances shall not be cumulative.
- B. Install joists aligned within 1/4 inch of true location.
- C. Install joist plumb and level, plus or minus 1/4 inch in 10 feet.

END OF SECTION 0617 33

SECTION 06 2000
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 06 4100 - Architectural Wood Casework: Shop fabricated custom cabinet work.
- C. Section 08 1416 - Flush Wood Doors.

1.03 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2009.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- C. AWI (QCP) - Quality Certification Program, www.awiqcp.org; current edition at www.awiqcp.org.
- D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- E. AWPA U1 - Use Category System: User Specification for Treated Wood; American Wood-Preservers' Association; 2012.
- F. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; Hardwood Plywood & Veneer Association; 2009.
- G. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.
- H. PS 1 - Structural Plywood; 2009.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.
- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data:
 - 1. Provide data on fire retardant treatment materials and application instructions.
- C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Provide the information required by AWI/AWMAC/WI (AWS).
- D. Samples: Submit two samples of wood trim 6 inch long.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
 - 1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
 - 2. Single Source Responsibility: Provide and install this work from single fabricator.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect work from moisture damage.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI/AWMAC/WI (AWS) for Premium Grade.
- B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.
- C. Interior Woodwork Items:
 - 1. Moldings, Bases, Casings, Chair Rails, and Miscellaneous Trim: Clear white pine; prepare for paint finish.

2.02 LUMBER MATERIALS

- A. Softwood Lumber: Douglas fir species, plain sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.
- B. Hardwood Lumber: Ash species, Quartersawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.

2.03 SHEET MATERIALS

- A. Softwood Plywood Not Exposed to View: Any face species, veneer core; PS 1 Grade A-B; glue type as recommended for application.
- B. Softwood Plywood Exposed to View: Face species as indicated, plain sawn, medium density fiberboard core; PS 1 Grade A-B; glue type as recommended for application.
- C. Hardwood Plywood: Face species as indicated, plain sawn, book matched, medium density fiberboard core; HPVA HP-1, Front Face Grade AA, Back Face Grade 1; glue type as recommended for application.

2.04 FASTENINGS

- A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

2.05 ACCESSORIES

- A. Lumber for Shimming, Blocking: Softwood lumber of Pine species.
- B. Primer: Alkyd primer sealer.

2.06 WOOD TREATMENT

- A. Factory-Treated Lumber: Comply with requirements of AWWA U1 - Use Category System for pressure impregnated wood treatments determined by use categories, expected service conditions, and specific applications.
- B. Fire Retardant Treatment (FR-S Type): Chemically treated and pressure impregnated; capable of providing flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
- C. Provide identification on fire retardant treated material.
- D. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

2.07 FABRICATION

2.08 SHOP FINISHING

- A. Prime paint surfaces in contact with cementitious materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (0.79 mm).
Do not use additional overlay trim to conceal larger gaps.

3.03 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch (1.6 mm).
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.79 mm).

END OF SECTION

SECTION 06 4100
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units.
- B. Countertops at Dressing Rooms.
- C. Cabinet hardware.
- D. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- C. Section 12 3600 - Countertops.

1.03 REFERENCE STANDARDS

- A. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.
- B. ANSI A208.1 - American National Standard for Particleboard; 2009.
- C. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2009.
- D. AWI (QCP) - Quality Certification Program, www.awiqcp.org; current edition at www.awiqcp.org.
- E. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Minimum Scale of Detail Drawings: 1-1/2 inch to 1 foot (1:8).
 - 2. Provide the information required by AWI/AWMAC/WI (AWS).
 - 3. Include certification program label.
- C. Product Data: Provide data for hardware accessories.
- D. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches (300 mm) square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.
- E. Samples: Submit (2) actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.

1.05 QUALITY ASSURANCE

- A. Quality Certification: Provide AWI Quality Certification Program (QCP) inspection report and quality certification of completed work.
 - 1. Provide labels or certificates indicating that the work complies with requirements of AWS Grade or Grades specified.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage.

1.07 FIELD CONDITIONS

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 CABINETS

- A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI (AWS) for Premium Grade.
- B. Plastic Laminate Faced Cabinets: Custom grade.
- C. Cabinets at _____:
 - 1. Finish - Exposed Exterior Surfaces: Decorative laminate.
 - 2. Finish - Exposed Interior Surfaces: Decorative laminate.
 - 3. Finish - Concealed Surfaces: Manufacturer's option.
 - 4. Cabinet Design Series: As indicated on drawings.
 - 5. Adjustable Shelf Loading: 50 lbs. per sq. ft..
- D. Cabinet Style: Flush overlay.
 - 1. Cabinet Doors and Drawer Fronts: Flush style.
 - 2. Drawer Side Construction: Multiple-dovetailed.
 - 3. Drawer Construction Technique: As recommended by fabricator.

2.02 LAMINATE MATERIALS

- A. Manufacturers:
 - 1. Wilsonart, LLC; _____: www.wilsonart.com.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.

2.03 COUNTERTOPS

- A. Plastic Laminate Countertops: Medium density fiberboard substrate covered with HPDL, conventionally fabricated and self-edge banded.

2.04 ACCESSORIES

- A. Adhesive: Type recommended by WI to suit application.
- B. Fasteners: Size and type to suit application.
- C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel finish in exposed locations.
- D. Concealed Joint Fasteners: Threaded steel.
- E. Grommets: Standard plastic or painted metal grommets for cut-outs, in color as indicated.

2.05 HARDWARE

- A. Hardware: BHMA A156.9, types as indicated for quality grade specified.
- B. Adjustable Shelf Supports: Standard side-mounted system using multiple holes for pin supports and coordinated self rests, satin chrome finish, for nominal 1 inch (25 mm) spacing adjustments.
- C. Drawer and Door Pulls: "U" shaped wire pull, steel with satin finish, 4 inch centers ("U" shaped wire pull, steel with satin finish, 100 mm centers).
- D. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with satin finish.
- E. Catches: Magnetic.
- F. Drawer Slides:
 - 1. Type: Extension types as scheduled.
 - 2. Static Load Capacity: Commercial grade.
 - 3. Mounting: Side mounted.
 - 4. Stops: Integral type.
 - 5. Features: Provide self closing/stay closed type.
- G. Hinges: European style concealed self-closing type, steel with polished finish.

2.06 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners.
- C. Mechanically fasten back splash to countertops as recommended by laminate manufacturer at 16 inches (400 mm) on center.
- D. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

2.07 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade specified and as follows:

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

- A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch (1 mm). Do not use additional overlay trim for this purpose.
- E. Secure cabinets to floor using appropriate angles and anchorages.

3.03 ADJUSTING

- A. Test installed work for rigidity and ability to support loads.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 07 0151
MAINTENANCE OF MEMBRANE ROOFING

PART 1 — GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including the Conditions of the Contract and Division 01 Specification Sections apply to this Section.
- B. Related Sections:
 - 1. Section 07 05 00 - Common Work Results for Thermal and Moisture Protection.
 - 2. Roof Insulation: Section 07 22 00 - Roof Insulation.

1.02 SUMMARY

- A. Section includes products and procedures for properly maintaining existing roofing assets in accordance with maintenance agreements and warranty provisions in effect. Maintenance activities include but are not limited to the following:
 - 1. Scheduled inspections of installed roofing.
 - 2. Documentation of existing conditions.
 - 3. Sampling and testing by a qualified testing agency.
 - 4. Planning and scheduling maintenance procedures.
 - 5. Performing maintenance procedures in accordance with the provisions of warranties in effect, including but not limited to:
 - a. Blister Repair
 - b. Flashing Reinforcement
 - c. Edge Detail Repair
 - d. Pitch Pocket Repair
 - e. Flashing Replacement
 - f. Soil Stack and Vent Repair
 - g. Split Repair
 - h. Drain Repair
 - i. Gutter and Edge Detail Repair
 - 6. Reporting maintenance activities completed under the terms of the Contract.
- B. Related Sections:
 - 1. Division 07 Section Common Work Results for Thermal and Moisture Protection.
 - 2. Division 07 Section Sheet Metal Flashing and Trim.

1.03 REFERENCES

- A. The following resource documents will be provided by the Owner for the Contractor's use in maintaining the roofing system:
 - 1. Record Drawings
 - 2. Record Specifications
 - 3. Operation and maintenance manuals
 - 4. Manufacturer's warranty
 - 5. Installer warranty.
 - 6. Construction progress documentation
 - 7. Roofing maintenance records
 - 8. Existing maintenance agreements
 - 9. Insurance records

1.04 SUBMITTALS FOR REVIEW

- A. Product Data: Provide manufacturer's technical product data for each type of roofing product specified. Include data substantiating that materials comply with specified requirements.
- B. Specimen Warranty: Provide an unexecuted copy of the warranty specified for this Project, identifying the terms and conditions required of the Manufacturer and the Owner.

- C. Any material submitted as equal to the specified material must be accompanied by a report signed and sealed by a professional engineer licensed in the state in which the installation is to take place. This report shall show that the submitted equal meets the Design and Performance criteria in this specification. Substitution requests submitted without licensed engineer approval will be rejected for non-conformance.

1.05 SUBMITTALS FOR INFORMATION

- A. Manufacturer's Installation Instructions: Submit installation instructions and recommendations indicating special precautions required for installing the membrane.
- B. Manufacturer's Certificate: Certify that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.
- C. Manufacturer's Certificate: Submit a certified copy of the roofing manufacturer's ISO 9001 compliance certificate.
- D. Test Reports: Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM.
- E. Written certification from the roofing system manufacturer certifying the applicator is currently authorized for the installation of the specified roof system.
- F. Qualification data for firms and individuals identified in Quality Assurance Article below.

1.06 CONTRACT CLOSEOUT SUBMITTALS

- A. General: Comply with Requirements of Division 01 Section - Closeout Submittals.
- B. Special Project Warranty: Provide specified warranty for the Project, executed by the authorized agent of the Manufacturer.
- C. Roofing Maintenance Instructions. Provide a manual of manufacturer's recommendations for maintenance of installed roofing systems.
- D. Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.
- E. Demonstration and Training Schedule: Provide a schedule of proposed dates and times for instruction of Owner's personnel in the maintenance requirements for completed roofing work. Refer to Part 3 for additional requirements.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with not less than 12 years documented experience and have ISO 9001 certification.
- B. Installer Qualifications: Company specializing in modified bituminous roofing installation with not less than 5 years experience and authorized by roofing system manufacturer as qualified to install manufacturer's roofing materials.
- C. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress. Maintain proper supervision of workmen.
- D. Maintain a copy of the Contract Documents in the possession of the Supervisor/Foreman and on the roof at all times.
- E. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer.
 - 1. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.
- F. Source Quality Control: Manufacturer shall have in place a documented, standardized quality control program such as ISO-9001.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.
- B. Store and handle roofing sheets in a dry, well-ventilated, weather-tight place to prevent moisture exposure. Store rolls of felt and other sheet materials on pallets or other raised surface. Stand all roll materials on end. Cover roll goods with a canvas tarpaulin or other breathable material (not polyethylene).
- C. Do not leave unused materials on the roof overnight or when roofing work is not in progress unless protected from weather and other moisture sources.
- D. Secure all material and equipment on the job site. If any material or equipment is stored on the roof, assure that the integrity of the deck is not compromised at any time. Damage to the deck caused by the Contractor's actions will be the sole responsibility of the Contractor, and the deck will be repaired or replaced at his expense.

1.09 PRE-INSTALLATION CONFERENCE

- A. Pre-Installation Roofing Conference: Convene a pre-roofing conference approximately two (2) weeks before scheduled commencement of modified bituminous roofing system installation and associated work.
- B. Require attendance of installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of rooftop units and other work in and around roofing that must precede or follow roofing work (including mechanical work if any), Architect, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) Owner's insurers, testing agencies and governing authorities. Objectives of conference include:
 - 1. Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.
 - 2. Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work performed by others.
 - 3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
 - 4. Review roofing system requirements (drawings, specifications and other contract documents).
 - 5. Review required submittals both completed and yet to be completed.
 - 6. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
 - 7. Review required inspection, testing, certifying and material usage accounting procedures.
 - 8. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not mandatory requirement).
 - 9. Record discussion of conference including decisions and agreements (or disagreements) reached and furnish copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.
 - 10. Review notification procedures for weather or non-working days.
- C. The Owner's Representative will designate one of the conference participants to record the proceedings and promptly distribute them to the participants for record.
- D. The intent of the conference is to resolve issues affecting the installation and performance of roofing work. Do not proceed with roofing work until such issues are resolved the satisfaction of the Owner and Engineer of Record. This shall not be construed as interference with the progress of Work on the part of the Owner or Engineer of Record.

1.10 MANUFACTURER'S INSPECTIONS

- A. When the Project is in progress, the roofing system manufacturer will provide the following:
 - 1. Report progress and quality of the work as observed.
 - 2. Provide periodic job site inspections.
 - 3. Report to the Architect and/or Owner in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
 - 4. Confirm after completion that manufacturer has observed no application procedures in conflict with the specifications other than those that may have been previously reported and corrected.

1.11 PROJECT CONDITIONS

- A. Proceed with roofing work only when existing and forecasted weather conditions will permit a unit of work to be installed in accordance with manufacturer's recommendations and warranty requirements.
- B. Do not apply roofing insulation or membrane to damp deck surface.
- C. Do not expose materials subject to water or solar damage in quantities greater than can be weatherproofed during same day.
- D. All slopes greater than 2:12 require back-nailing to prevent slippage of the ply sheets. Use ring or spiral-shank one (1) inch cap nails, or screws and plates at a rate of one (1) fastener per ply (including the membrane) at each insulation stop. Place insulation stops at 16 ft o.c. for slopes less than 3:12 and four (4) ft o.c. for slopes greater than 3:12. On non-insulated systems, nail each ply directly into the deck at the rate specified above. When slope exceeds 2:12, install all plies parallel to the slope (strapping) to facilitate backnailing. Install four (4) additional fasteners at the upper edge of the membrane when strapping the plies.

1.12 SEQUENCING AND SCHEDULING

- A. Sequence installation of roofing with related units of work specified in other Sections to ensure that roof assemblies, including roof accessories, flashing, trim and joint sealers, are protected against damage from effects of weather, corrosion and adjacent construction activity.
- B. Complete all roofing field assembly work each day. Phased construction will not be accepted.

1.13 WARRANTY

- A. Upon completion of installation, and acceptance by the Owner and Architect, the Manufacturer will supply to the Owner the appropriate warranty.
- B. Installer will submit a two (2)-year warranty to the membrane manufacturer with a copy directly to Owner.

PART 2 — PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. When a particular trade name or performance standard is specified it shall be indicative of a standard required.
- B. Provide maintenance products as manufactured by
 - 1. The Garland Company
 - 2. 3800 East 91st Street
 - 3. Cleveland, Ohio 44105
 - 4. Telephone: (800) 762-8225
 - 5. Website: www.garlandco.com
 - 6. Or equal.
- C. No substitutions will be permitted that will compromise the terms of the Owner's warranty and maintenance agreements.

2.02 TEMPORARY ROOFING MATERIALS

- A. Sheathing Paper: Red-rosin type, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).

- B. Base Sheet: ASTM D4601, Type II, nonperforated, asphalt-coated, glass-fiber sheet.
- C. Glass-Fiber Felts: ASTM D2178, Type IV, asphalt-impregnated, glass-fiber felt.
- D. Asphalt Primer: ASTM D41.
- E. Roofing Asphalt: ASTM D312, Type III or IV.

2.03 MAINTENANCE MATERIALS

- A. Acceptable Products:
 - 1. Basis of Design: Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this section.
 - 2. The design is based upon roofing systems by The Garland Company Inc./CI, Local representative Richard Jones (800) 762-8225 ext. 720
 - a. Solar Bright 60 Membrane (ASTM D 751)
 - b. Membrane Thickness: (ASTM D 751) 60 mil nominal.
 - c. Breaking Strength (ASTM D 751): 515 lbf/in
 - d. Tearing Strength (ASTM D 751): 275 lbf/in
 - e. Factory Seam Strength (ASTM D 751) 90 lbf
 - f. Solar Reflectivity (ASTM E 903) 81%
 - g. Emissivity (ASTM E 903) 95%

2.04 PRODUCTS

- A. Accessories
 - 1. Solar Bright 60 membrane shall be used for all flashing requirements to match the field membrane and warranty expectations selected for the roofing system.
 - 2. Solar Bright 60 Inside Corners: Pre-molded corner flashing for inside corners. 80 mil thickness. Color - White.
 - 3. Solar Bright Outside Corners: Pre-molded corner flashing for outside corners. 80 mil thickness. Color - White.
 - 4. Solar Bright T-Joint Covers: 40 mil thick non-reinforced PVC flashing cut into a 4.5 inch (114mm) diameter circle used to seal step-offs at splice intersections.
 - 5. Solar Bright Pipe Flashings: A pre-molded flashing and clamping ring used for pipe penetrations. Available for 1 inch to 6 inch (25 - 152mm) diameter pipes.
 - 6. Solar Bright Split Pipe Seals: Pre-fabricated flashing consisting of 80 mil reinforced Membrane for pipes 1 inch to 6 inch (25 - 152mm) in diameter. A split (cut) and overlap tab are incorporated to allow the pipe seal to be opened and wrapped around the pipe when it is not possible to pull a standard pipe flashing over a round penetration.
 - 7. Solar Bright Non-Reinforced Flashing: 80 mil thick rolls 12 inches and 24 inches wide. Used for inside/outside corners and field fabricated pipe flashings when use of pre-molded accessories is not feasible.
 - 8. Solar Bright Heat Weldable Walkway Rolls: offering superior tear, puncture and weather resistance and designed to protect membrane in those areas exposed to repetitive foot traffic or other hazards. Walkway material may be heat welded to membrane using an automated heat welder or hand held heat welder. Walkway Rolls are 36 inches (914mm) wide by 60 feet (18.3 M) long and are nominal 80 mils thick.
 - 9. Single ply Coated Sheet Metal: Provide where flashing, gravel stops and sheet metal are in contact with Single -ply roofing membrane.

PART 3 — EXECUTION

3.01 EXAMINATION

- A. Examine substrate surfaces and conditions under which roofing maintenance will be performed. Do not proceed with roofing until unsatisfactory conditions have been corrected in a manner acceptable to Roofing System Manufacturer and Maintenance Contractor.

3.02 DOCUMENTING EXISTING CONDITIONS

- A. Document existing conditions with high-resolution photographic equipment and provide supplemental written reports for the Owner's records.

3.03 SAMPLING AND TESTING

- A. Prepare samples, such as core cuts, and deliver to a qualified testing agency for evaluation.
 - 1. Samples shall be of adequate size to perform testing procedures. Confer with the Owner's testing agency to assure adequate sampling.
 - 2. Place samples in containers approved by the Roofing System Manufacturer and ship in a manner that preserves their condition.

3.04 MAINTENANCE MEETING

- A. Prior to executing maintenance procedures, meet with the Owner and/or Owner's Facility Manager to review maintenance records, field reports, photographs, and certified test reports, and detailed proposals describing the extent of maintenance procedures and repairs required.
- B. Do not proceed with maintenance procedures and repairs without the approval of the Owner and/or Owner's Facility Manager

3.05 MAINTENANCE REQUIREMENTS, GENERAL

- A. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with the Owner's roofing maintenance programs.
- B. Insurance/Code Compliance: Comply with governing regulations and the Owner's insurance requirements.
- C. Protect other work from spillage of roofing materials and prevent materials from entering or clogging drains and conductors. Replace or restore surfaces damaged during maintenance.
- D. Apply roofing materials as specified herein unless recommended otherwise by manufacturer's instructions. Keep roofing materials dry before and during application.

3.06 ROOFING MAINTENANCE PROCEDURES

- A. Blister Repairs:

3.07 CLEANING

- A. Remove bitumen adhesive drippings from all walls, windows, floors, ladders and finished surfaces.
- B. In areas where finished surfaces are soiled by work of this Section, comply with the cleaning instructions of the manufacturer of surfaces.
- C. Repair or replace defaced or disfigured finishes caused by work of this section.

3.08 CONSTRUCTION WASTE MANAGEMENT

- A. Remove and properly dispose of waste products generated during maintenance procedures. Comply with requirements of authorities having jurisdiction
 - 1. Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Install insulation or membrane underlayment over the substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch (6 mm). Stagger joints both horizontally and vertically if multiple layers are provided.
 - 3. Secure insulation to the substrate with the required mechanical fasteners or insulation adhesive in accordance with the manufacturer's current application guidelines.
 - 4. Securely attach insulation to the roof deck for Adhered or Mechanically Fastened Roofing Systems. Attachment must have been successfully tested to meet or exceed the calculated uplift pressure required by Factory Mutual (FM I-90) & the International Building Code (ASCE-7) or ANSI/SPRI WD-1.
- B. Application; Mechanically attached system over roof deck.

1. It will be the responsibility of the roofing contractor to initiate and maintain a QC program to govern all aspects of the installation of the Roofing System.
2. The project foreman and or supervisor will be responsible for the daily execution of the QC program which will include but is not limited to the supervision, inspection and probing of all heat welding incorporated within the Roofing System.
3. If inconsistencies in the quality of the application of the composite, membrane and/or welds are found, all work shall cease until corrective actions are taken to ensure the continuity the installation.
4. Unroll and position membrane without stretching. Provide and secure both perimeter and field membrane sheets in accordance with the manufacturer's most current specifications and details.
5. Secure the membrane with the required fasteners and plates centered over the pre-printed marks approximately 1 1/2 inches (39mm) from the edge of the membrane sheet.
6. Install adjoining membrane sheets in the same manner in accordance with the manufacturer's current application requirements.
7. Attachment Schedule:
 - a. Field (Zone 1) Fastener Density: 12 inches on center
 - b. Perimeter (Zones 2 and 3) Fastener Density: 6 inches on center
 - c. Perimeter (Half-width) Sheets: 2
8. Parapet Wall Covering: Install as shown, extend to full height of parapet; lap under parapet cap flashing and over wall substrate 2 inches minimum on the back side of the wall. Secure in place 9" on center on the outside face to assure a completely watertight installation.
 - a. Walkway: Per manufacturer's instructions and as shown on drawings. If drawings do not show walkways a minimum of the service side of all HVAC units will have walkway installed.
9. Fasteners:
 - a. General: Per manufacturer's recommendation; fastening length and pattern based on performance values supplied by the fastener/disc manufacturer and conforming to Factory Mutual I-90 fastening pattern.
 - b. Walkway Fastening: Provide 2 inch continuous heat weld strip around perimeter of membrane.
10. Hot Air Welding
 - a. All field seams exceeding 10 feet in length shall be welded with an approved automatic welder.
 - b. All field seams must be clean and dry prior to initiating any field welding.
 - c. Remove foreign materials from the seams (dirt, oils, etc.) with Acetone or authorized alternative. Use CLEAN WHITE COTTON cloths and allow approximately five minutes for solvents to dissipate before initiating the automatic welder. Do not use denim or synthetic rags for cleaning.
 - d. All welding shall be performed only by qualified personnel to ensure the quality and continuity of the weld.
 - e. Contaminated areas within a seam will inhibit proper welding and will require a membrane patch.
11. Hand Welding
 - a. The lap or seam area of the membrane should be intermittently tack welded to hold the membrane in place.
 - b. The back "interior" edge of the membrane shall be welded first, with a thin, continuous weld to concentrate heat along the exterior edge of the lap during the final welding pass.
 - c. The nozzle of the hand held hot air welder shall be inserted into the lap at a 45° angle to the lap. Once the polymer on the material begins to flow, a hand roller shall be use to apply pressure at a right angle to the tip of the hand welder. Properly welded seams

- shall utilize a 1-1/2 inch wide nozzle, to create a homogeneous weld, a minimum of 1-1/2 inches in width.
- d. Smaller nozzles may be used for corners, and other field detailing, maintaining a minimum 1 inch weld.
12. Automatic Machine Welding
 - a. Follow all manufacturers' instructions for the safe operation of the automatic welder.
 - b. Follow local code requirements for electric supply, grounding and surge protection.
 - c. The use of a dedicated, portable generator is highly recommended to ensure a consistent electrical supply, without fluctuations that can interfere with weld consistency.
 - d. Properly welded seams shall utilize a 1-1/2 inch wide nozzle, to create a homogeneous weld, a minimum of 1-1/2 inches in width.
 13. Inspection
 - a. The job foreman and/or supervisor shall initiate daily inspections of all completed work which shall include, but is not limited to the probing of all field welding with a dull pointed instrument to assure the quality of the application and ensure that any equipment or operator deficiencies are immediately resolved.
 - b. Ensure that all aspects of the installation (sheet layout, attachment, welding, flashing details, etc.) are in strict accordance with the most current Solar Bright Roofing Systems Specifications and Details.
 - c. Excessive patching of field seams because of inexperienced or poor workmanship will not be accepted at time of FINAL INSPECTION FOR WARRANTY ACCEPTANCE.
 14. Metal Flashings:
 - a. General: Fabricate and install per Section 07601 - FLASHING AND SHEET METAL, as shown and per manufacturer's recommendations. Install PVC coated metal flashing at intersections of roofs with sloped or vertical surfaces, roof interruptions and penetrations.
 - b. Base Flashing: Extend up vertical surfaces 6 inches, minimum, and onto the horizontal roof surfaces not less than 3 inches, unless otherwise noted. Provide PVC coated metal flashing with 2 inches minimum overlap of roofing membrane; heat weld in the horizontal plane, with subsequent sealing of seams with sealant.
 - c. All perimeter edge details are to be fabricated from Garland/CI SolarBright Clad Metal.
 - d. Ensure all fascia extend a minimum of 2 inch lower than the bottom of the wood nailers.
 - e. Fasten all metal flashing to wood nailers or approved substrate with approved fasteners 8 inches on center.
 - f. Break and install Solar Bright Clad metal in accordance with approved details, ensuring proper attachment, maintaining 1/2 inch expansion joints and the installation of a minimum 2 inch bond breaker tape prior to sealing the joint.
 - g. Solidly weld Solar Bright Clad expansion joints with a 6 inch strip of Solar Bright membrane welded to the Solar Bright Clad, covering the bond breaker tape (cover plates are optional).
 15. Roof Drains
 - a. Flash all roof drains in accordance with Solar Bright roof drain details.
 - b. Replace all worn or broken parts that may cut the Solar Bright membrane or prevent a watertight seal. This includes the clamping ring and strainer basket.
 - c. Replace all drain bolts or clamps used to hold the drain compression ring to the drain bowl.
 - d. Solar Bright non-reinforced 60 mil membrane shall be used for flashing the drain assembly. Drain assemblies and basins or "sumps" must be free of any asphalt or coal tar pitch residue prior to installation.
 - e. The drain target sheet should be sized and installed to provide for a minimum of 12 inch of exposed 60 mil on all sides of the drain.

3.09 FINAL INSPECTION

- A. UPON COMPLETION OF ROOFING MAINTENANCE WORK, MEET WITH INSTALLER, INSTALLER OF ASSOCIATED WORK, OWNER, ROOFING SYSTEM MANUFACTURER'S REPRESENTATIVE, AND OTHER REPRESENTATIVES DIRECTLY CONCERNED WITH PERFORMANCE OF ROOFING SYSTEM.
- B. WALK ROOF SURFACE AREAS OF THE BUILDING, INSPECT PERIMETER BUILDING EDGES AS WELL AS FLASHING OF ROOF PENETRATIONS, WALLS, CURBS AND OTHER EQUIPMENT. LIST ALL ITEMS REQUIRING CORRECTION OR COMPLETION AND FURNISH COPY OF LIST TO EACH PARTY IN ATTENDANCE.
- C. AT THE MANUFACTURER'S DISCRETION A THERMOGRAPHIC SCAN OF THE ROOF DURING FINAL INSPECTION MAY BE PERFORMED TO DETERMINE THE PRESENCE OF DAMP OR WET MATERIALS INSTALLED. THE THERMOGRAPHIC SCAN SHALL BE PROVIDED AT A PRICE NEGOTIATED BETWEEN THE CONTRACTOR AND THE OWNER AND PAID FOR BY THE OWNER BY MEANS OF A CHANGE ORDER.
- D. IF CORE CUTS VERIFY THE PRESENCE OF DAMP OR WET MATERIALS, THE CONTRACTOR SHALL BE REQUIRED TO REPLACE THE DAMAGED AREAS AT HIS OWN EXPENSE.
- E. REPAIR OR REPLACE (AS REQUIRED) DETERIORATED OR DEFECTIVE WORK DISCOVERED AT TIME OF INSPECTION TO A CONDITION FREE OF DAMAGE AND DETERIORATION AT TIME OF SUBSTANTIAL COMPLETION AND ACCORDING TO WARRANTY REQUIREMENTS.
- F. THE CONTRACTOR SHALL NOTIFY THE OWNER UPON COMPLETION OF CORRECTIONS.
- G. FOLLOWING THE FINAL INSPECTION, ACCEPTANCE WILL BE MADE IN WRITING BY THE MATERIAL MANUFACTURER.

3.10 FINAL DOCUMENTATION AND REPORTING

- A. SUBMIT FINAL DOCUMENTATION OF PROCEDURES AND RECOMMENDATIONS TO THE OWNER FOR RECORD.

END OF SECTION

SECTION 07 1400
FLUID-APPLIED WATERPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fluid applied membrane waterproofing.
- B. Drainage panels and Protection boards.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete substrate.
- B. Section 07 9005 - Joint Sealers: Sealant for joints in substrates.

1.03 REFERENCE STANDARDS

- A. ASTM C836/C836M - Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use With Separate Wearing Course; 2012.
- B. ASTM C1306 - Standard Test Method for Hydrostatic Pressure Resistance of a Liquid-Applied Waterproofing Membrane; 2008.
- C. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension; 2006a (Reapproved 2013).
- D. ASTM D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact; 2013.
- E. ASTM D2240 - Standard Test Method For Rubber Property--Durometer Hardness; 2005 (Reapproved 2010).
- F. ASTM D2939 - Standard Test Methods for Emulsified Bitumens Used As Protective Coatings; 2003.
- G. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers; 2009.
- H. ASTM E96/E96M - Standard Test Methods For Water Vapor Transmission of Materials; 2014.
- I. ASTM E154/E154M - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover; 2008a (Reapproved 2013).
- J. ICC-ES AC29 - Acceptance Criteria for Cold, Liquid-Applied, Below-Grade, Exterior Dampproofing and Waterproofing Materials; ICC Evaluation Service, Inc.; 2011.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for membrane.
- C. Certificate: Certify that products meet or exceed specified requirements.
- D. Warranty:
 - 1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
 - 2. Submit installer's certification that installation complies with all warranty conditions for the waterproof membrane.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacture of fluid-applied waterproofing membranes with three years experience.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for waterproofing failing to resist penetration of water .

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Polyurethane Waterproofing Manufacturers:
 - 1. Carlisle Coatings & Waterproofing, Inc: www.carlisle-ccw.com.
 - 2. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com

2.02 WATERPROOFING APPLICATIONS

- A. Polyurethane Waterproofing: Use at elevator pit.
 - 1. Cover with protection board.

2.03 MEMBRANE AND FLASHING MATERIALS

- A. Polyurethane Waterproofing: Cold-applied one or two component polyurethane, complying with ASTM C836/C836M.
 - 1. Cured Thickness: 60 mils (1.5 mm), minimum.
 - 2. Suitable for installation over concrete substrates.
 - 3. VOC Content: None.
 - 4. Tensile Strength: 400 psi (2.758 MPa), measured in accordance with ASTM D412.
 - 5. Ultimate Elongation: 180 percent, measured in accordance with ASTM D412.
 - 6. Hardness: 30, measured in accordance with ASTM D2240, using Type A durometer.
 - 7. Adhesion: greater than 150 psi (1.03 MPa), measured in accordance with ASTM D4541.
 - 8. Brittleness Temperature: -50 F (-44 C), measured in accordance with ASTM D746.
 - 9. Products:
 - a. Carlisle Coatings & Waterproofing, Inc.; CCW 525: www.carlisle-ccw.com.
 - b. Carlisle Coatings & Waterproofing, Inc.; CCW 703 Liqueiseal: www.carlisle-ccw.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACCESSORIES

- A. Protection Board: Type capable of preventing damage to waterproofing due to backfilling and construction traffic.
 - 1. Use one of the following:
- B. Drainage Panel: Drainage layer with geotextile filter fabric on earth side.
 - 1. Composition: Dimpled polystyrene core; polypropylene filter fabric.
 - a. Products:
 - 1) Mar-flex Waterproofing & Building Products; Geo-Mat Plus: www.mar-flex.com.
 - 2) Substitutions: See Section 01 6000 - Product Requirements.
- C. Counterflashings: As recommended by membrane and protection board manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify substrate surfaces are free of frozen matter, dampness, loose particles, cracks, pits, projections, penetrations, or foreign matter detrimental to adhesion or application of waterproofing system.
- C. Verify that substrate surfaces are smooth, free of honeycomb or pitting, and not detrimental to full contact bond of waterproofing materials.
- D. Verify that items that penetrate surfaces to receive waterproofing are securely installed.

3.02 PREPARATION

- A. Protect adjacent surfaces not designated to receive waterproofing.
- B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions. Vacuum substrate clean.
- C. Do not apply waterproofing to surfaces unacceptable to manufacturer.

- D. Seal cracks and joints with sealant using methods recommended by sealant manufacturer.
- E. Install cant strips at inside corners.

3.03 INSTALLATION

- A. Apply waterproofing in accordance with manufacturer's instructions to specified minimum thickness.
- B. Seal membrane and flashings to adjoining surfaces. Install termination bar at all edges. Install counterflashing over all exposed edges.

3.04 INSTALLATION - DRAINAGE PANEL AND PROTECTION BOARD

- A. Place drainage panel directly against membrane, butt joints, place to encourage drainage downward. Scribe and cut boards around projections, penetrations, and interruptions.
- B. Place protection board directly against drainage panel; butt joints. Scribe and cut boards around projections, penetrations, and interruptions.

END OF SECTION

SECTION 07 2100
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Batt insulation and vapor retarder in exterior wall, ceiling, and roof construction.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Field-applied termiticide for concrete slabs and foundations.
- B. Section 05 5400 - Cold-Formed Metal Framing: Board insulation as wall sheathing.
- C. Section 06 1000 - Rough Carpentry: Supporting construction for batt insulation.
- D. Section 07 2500 - Weather Barriers: Separate air barrier and vapor retarder materials.
- E. Section 07 5420 - Membrane Roofing: Insulation specified as part of roofing system.
- F. Section 07 8400 - Firestopping: Insulation as part of fire-rated through-penetration assemblies.
- G. Section 09 2116 - Gypsum Board Assemblies: Acoustic insulation inside walls and partitions.

1.03 REFERENCE STANDARDS

- A. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2011.
- B. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2014.
- C. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.
- D. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- F. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.
- G. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation in Metal Framed Walls: Batt insulation with integral vapor retarder.
- B. Insulation in Wood Framed Walls: Batt insulation with separate vapor retarder.
- C. Insulation in Wood Framed Ceiling Structure: Batt insulation with separate vapor retarder.

2.02 BATT INSULATION MATERIALS

- A. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 - 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 - 3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 - 4. Formaldehyde Content: Zero.
 - 5. Thermal Resistance: R value, as indicated in Drawings
 - 6. Facing: Aluminum foil, flame spread 25 rated; one side.
 - 7. Manufacturers:
 - a. CertainTeed Corporation: www.certainteed.com.
 - b. Johns Manville: www.jm.com.
 - c. Owens Corning Corp: www.owenscorning.com.
 - 8. Substitutions: See Section 01 6000 - Product Requirements.

2.03 ACCESSORIES

- A. Sheet Vapor Retarder: Black polyethylene film for above grade application, 10 mil (0.25 mm) thick.
- B. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch (50 mm) wide.
- C. Tape joints of rigid insulation in accordance with roofing and insulation manufacturers' instructions.
- D. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.
- E. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation and adhesive.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- E. Install with factory applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.
- F. Staple or nail facing flanges in place at maximum 6 inches (150 mm) on center.
- G. Tape insulation batts in place.
- H. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.
- I. At wood framing, place vapor retarder on warm side of insulation by stapling at 6 inches (150 mm) on center. Lap and seal sheet retarder joints over member face.
- J. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over member face.
- K. Tape seal tears or cuts in vapor retarder.

- L. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.

END OF SECTION

SECTION 07 2500
WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water-Resistive Barrier: Under exterior wall cladding, over sheathing or other substrate; not air tight or vapor retardant.
- B. Vapor Retarders: Materials to make exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls water vapor-resistant and air tight.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Vapor retarder under concrete slabs on grade.
- B. Section 05 5400 - Cold-Formed Metal Framing: Water-resistive barrier under exterior cladding.
- C. Section 06 1000 - Rough Carpentry: Water-resistive barrier under exterior cladding.
- D. Section 07 2100 - Thermal Insulation: Vapor retarder installed in conjunction with batt insulation.
- E. Section 07 6200 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.
- F. Section 07 9005 - Joint Sealers: Sealant materials and installation techniques.
- G. Section 09 2116 - Gypsum Board Assemblies: Water-resistive barrier under exterior cladding.

1.03 DEFINITIONS

- A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.
- B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.
- C. Vapor Retarder: Air tight barrier made of material that is relatively water vapor impermeable, to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.
 - 1. Water Vapor Permeance: For purposes of conversion, $57.2 \text{ ng}/(\text{Pa s sq m}) = 1 \text{ perm}$.
- D. Water-Resistive Barrier: Water-shedding barrier made of material that is moisture-resistant, to the degree specified, intended to be installed to shed water without sealed seams.

1.04 REFERENCE STANDARDS

- A. AATCC Test Method 127 - Water Resistance: Hydrostatic Pressure Test; 2013.
- B. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.
- C. ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers; ICC Evaluation Service, Inc.; 2013.
- D. ICC-ES AC148 - Acceptance Criteria for Flexible Flashing Materials; ICC Evaluation Service, Inc.; 2011.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on material characteristics.
- C. Shop Drawings: Provide drawings of special joint conditions.
- D. Manufacturer's Installation Instructions: Indicate preparation.

PART 2 PRODUCTS

2.01 WEATHER BARRIER ASSEMBLIES

- A. Water-Resistive Barrier: Provide on exterior walls under exterior cladding.
 - 1. Under Portland cement stucco, use two separate layers of building paper.

2.02 WATER-RESISTIVE BARRIER MATERIALS (NEITHER AIR BARRIER NOR VAPOR RETARDER)

- A. Building Paper: Asphalt-saturated Kraft building paper complying with requirements of ICC-ES AC38 Grade D.
 - 1. Water Penetration Resistance: Withstand a water head of 21 inches (55 cm), minimum, for minimum of 5 hours, when tested in accordance with AATCC 127.
- B. Plastic Sheet: Polymeric-based sheet complying with requirements of ICC-ES AC38 Grade D with 60-minute water-resistance; do not use polyethylene sheet.

2.03 ACCESSORIES

- A. Flexible Flashing: Self-adhesive sheet flashing complying with ASTM D1970/D1970M, except slip resistance requirement is waived if not installed on a roof.
 - 1. Composition: Any material that meets physical requirements of ASTM D1970/D1970M with exceptions indicated.
- B. Flexible Flashing: Sheathing fabric saturated with air barrier coating and complying with the applicable requirements of ICC-ES AC148.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and conditions are ready to accept the work of this section.

3.02 PREPARATION

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

3.03 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Water-Resistive Barriers: Install continuous barrier over surfaces indicated, with sheets lapped to shed water but with seams not sealed.
- C. Mechanically Fastened Sheets - On Exterior:
 - 1. Install sheets shingle-fashion to shed water, with seams generally horizontal.
 - 2. Overlap seams as recommended by manufacturer but at least 6 inches.
 - 3. Overlap at outside and inside corners as recommended by manufacturer but at least 12 inches (305 mm).
 - 4. Install water-resistive barrier over jamb flashings.
 - 5. Install air barrier and vapor retarder UNDER jamb flashings.
 - 6. Install head flashings under weather barrier.
 - 7. At openings to be filled with frames having nailing flanges, wrap excess sheet into opening; at head, seal sheet over flange and flashing.
- D. Openings and Penetrations in Exterior Weather Barriers:
 - 1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches (125 mm) onto weather barrier and at least 6 inches (150 mm) up jambs; mechanically fasten stretched edges.
 - 2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with at least 4 inches (100 mm) wide; do not seal sill flange.
 - 3. At openings to be filled with non-flanged frames, seal weather barrier to all sides of opening framing, using flashing at least 9 inches (230 mm) wide, covering entire depth of framing.

4. At head of openings, install flashing under weather barrier extending at least 2 inches (50 mm) beyond face of jambs; seal weather barrier to flashing.
5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

3.04 FIELD QUALITY CONTROL

- A. Do not cover installed weather barriers until required inspections have been completed.

3.05 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.
- B. Do not leave paper- or felt-based barriers exposed to weather for longer than one week.

END OF SECTION

SECTION 07 4243
COMPOSITE WALL PANELS

P1 GENERAL

1.01 SECTION INCLUDES

- A. Omega-Lite aluminum-faced composite panels, attachments and sealants.

1.02 RELATED SECTIONS

- A. Section 05 12 00 – Structural Steel Framing.
- B. Section 06 10 00 – Rough Carpentry.
- C. Section 07 21 00 – Thermal Insulation.
- D. Section 07 62 00 – Sheet Metal, Flashing and Trim.
- E. Section 07 90 05 – Joint Sealants.
- F. Section 08 41 13 - Aluminum Framed Entrances and Storefront.
- G. Section 09 21 16 – Gypsum Board Assemblies.

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM) B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
- B. American Society for Testing and Materials (ASTM) C481 - Laboratory Aging of Sandwich Constructions.
- C. American Society for Testing and Materials (ASTM) E72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
- D. American Society for Testing and Materials (ASTM) E84 - Surface Burning Characteristics of Building Materials.
- E. American Society for Testing and Materials (ASTM) E283 - Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors.
- F. American Society for Testing and Materials (ASTM) E289 - Linear Thermal Expansion of Rigid Solids with Interferometry.
- G. American Society for Testing and Materials (ASTM) E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors.
- H. American Society for Testing and Materials (ASTM) E331 - Water Penetration for Exterior Windows, Curtain Walls, and Doors.
- I. American Society for Testing and Materials (ASTM) D1781 - Climbing Drum Peel for Adhesives.
- J. American Society for Testing and Materials (ASTM) - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- K. American Architectural Manufacturers Association (AAMA) 501 – Water Penetration using Dynamic Pressure.
- L. American Architectural Manufacturers Association (AAMA) 605.2 - Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
- M. American Architectural Manufacturers Association (AAMA) TIR-a11 - Maximum Allowable Deflection of Framing Systems for Building Cladding Components at Design Wind Loads.

1.04 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Design system to accommodate movement of components without buckling, failure of joint seals, undue stress on fasteners, or other detrimental effects when subjected to temperature and humidity ranges reasonably anticipated.

2. Design system to accommodate tolerances of structure.
- B. Performance Requirements:
 1. Submit test data witnessed by an independent testing agency for the following requirements:
 - a. Structural tests for wind loads by "Chamber Method" in compliance with ASTM E72.
 - 1) Standard test design loading: 20 psf (960 Pa) positive and negative wind load.
 - 2) Design panel system to withstand code imposed design loads and a deflection limit of L/180 shall apply to positive load pressures only.
 - 3) Design panel system to withstand code imposed design loads and a deflection limit of L/175 shall apply to positive load pressures only.
 - b. Air Infiltration: 0.06 cfm per square foot (32 lps per square meter) air leakage under a static pressure of 1.56 psf (7.65 kg per square meter) when tested in accordance with ASTM E283.
 - c. Water Penetration: No uncontrolled water penetration through the standard vertical panel and sealed joints at a static pressure of 6.24 psf (30.5 kg per square meter) when tested in accordance with ASTM E331.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01 30 00.
- B. Manufacturer's data sheets on each product to be used, including:
 1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.
- C. Shop Drawings: Submit shop drawings showing layout, flashings, drainage, ventilation, vapor barriers, vapor retarders, profiles and product components, including anchorage, accessories, finish colors, patterns and textures.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 3 inches (76 mm) by 5 inches (128 mm) representing actual product, color, and patterns.
- F. Quality Assurance Submittals: Submit the following:
 1. Test reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 2. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria, and physical requirements.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction, approving acceptable installer and approving application method.
- B. Installer Qualifications:
 1. Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
 2. Panel Installer shall assume responsibility for all components of the exterior panel system including, but not limited to attachment to sub-construction, panel to panel joinery, panel to dissimilar material joinery, and joint seal associated with the panel system.
- C. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store panels horizontally, off-the-ground, in manufacturer's unopened packaging until ready for installation.

- B. Examine delivered materials upon receipt to insure that no damage has occurred during shipment. Store metal-faced composite wall panels horizontally, covered with a suitable weather tight and ventilated covering. Store metal-faced composite wall panels to ensure dryness, with a positive slope for drainage of water. Do not store metal-faced composite wall panels in contact with other materials that might cause staining, denting, or other surface damage. DO NOT allow storage space to exceed 120 degrees F (49 degrees C).
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.08 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.09 WARRANTY

- A. Finish Warranty: Commencing on Date of Substantial Completion.
 - 1. Provide 10-year written warranty with economy or standard finish color coated metal finish covering color fading, chalking, and film integrity.
 - 2. Provide 20-year written warranty with PVDF fluoropolymer finish color coated metal finish covering color fading, chalking, and film integrity.
 - 3. Finish coating shall not peel, blister, chip, crack or check.
 - 4. Chalking, fading or erosion of finish measured by the following tests:
 - a. Finish coating shall not chalk in excess of 8 numerical ratings when measured in accordance with ASTM D659.
 - b. Finish coating shall not change color or fade in excess of 8 NBS units as determined by ASTM D2244.
- B. Material and Installation Warranty: Commencing on Date of Substantial Completion.
 - 1. When installed as directed by Laminators Incorporated, panels covered by this warranty are warranted not to delaminate (separate) at any Laminators produced glue line for a period of five years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: Laminators Incorporated; 3255 Penn St., Hatfield, PA 19440. ASD. To be distributed by Architectural Building Products – 295 Main St. Ste. #1082 - Buffalo, NY 14203 – Michael Mantione Tel: 1-800-870-7595 ext. 204 mike@abp-distributors.com <mailto:mike@abp-distributors.com> , www.abp-distributors.com <http://www.abp-distributors.com>
- B. Or equal
- C. Substitutions: Permitted.
- D. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

2.02 OMEGA-LITE ALUMINUM-FACED COMPOSITE PANELS

- A. Omega-Lite Composite Panels as manufactured by Laminators Incorporated.
 - 1. Panel Construction: Finished aluminum sheet over a corrugated polyallomer (CPA) core with backer sheet.
 - 2. Panel Facing: Smooth face, minimum 0.021 inch (0.53 mm) thick, ASTM B209 aluminum sheet.
 - 3. Panel Backing: Random painted aluminum sheet, minimum 0.013 inch (0.33 mm) thick, ASTM B209 aluminum sheet.
 - 4. Panel Thickness: 6 mm (1/4 inch).
 - 5. Fire Test Performance: ASTM E84: Class A.
 - 6. Bond Test Performance: ASTM C481-A Cyclic Aging: Pass.
 - 7. Finish: Choose an item.

8. Finish Colors: Click here to enter text.

B. Aluminum Composite Panel Installation System:

1. Installation: Clip and Caulk.

2.03 ACCESSORIES

A. Manufacturer's Sealants and Accessories: Provide manufacturer's recommended sealants and accessories for product installation.

B. Flashing: Fabricate flashing materials from 0.030 inch (0.76 mm) minimum thickness aluminum sheet painted to match the adjacent curtain wall/panel system where exposed. Provide a 12 inch (305 mm) wide lap strap under the flashing at abutted conditions and seal lapped surfaces with a full bed of non-hardening sealant.

2.04 FABRICATION

A. Panels shall be fabricated and finished as required to provide material construction and performance as specified and as required by manufacturer to comply with warranty provisions.

1. Tolerances: Length and Width: plus or minus 1/16 inch (1.6mm). Squareness (Diagonals): equal within 1/8 inch (3.2mm).

2.05 P3 EXECUTION

2.06 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Examine substrates, areas, and conditions, with substrate installer present, for compliance with requirements for structural soundness, installation tolerances, metal panel supports, and other conditions affecting performance of work.

1. Examine primary and secondary wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances listed below.

a. 1/4 inch (6 mm) in any 20 feet (6 m) length vertically or horizontally.

b. 1/2 inch (12 mm) in any building elevation.

2. Examine solid wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required.

3. For the record, prepare written report, endorsed by panel installer and substrate installer, listing remedy for conditions detrimental to performance of work.

C. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before metal panel installation.

D. Proceed with installation only after all unsatisfactory conditions have been corrected.

E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

2.07 INSTALLATION

A. Comply with manufacturer's installation guides and product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation type selected.

B. Work shall be done and completed in a thorough and workmanlike manner by mechanics skilled in their various trades.

C. Caulk Installation:

1. Use only approved sealants as described in Laminators Incorporated Installation Guidelines.

2. The sealant manufacturer's instructions shall be followed in preparing and installing sealants.

3. Joints to receive sealant shall be clean, dry and free from dust, grit and contaminants.

4. The sealant shall completely fill the glazing pockets.

2.08 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.

2.09 CLEANING AND PROTECTION

- A. Protection: Protect installed product and finish surfaces from damage during construction.
- B. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.
- C. Protect installed products until completion of project.
- D. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 5420
MEMBRANE ROOFING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes a mechanically attached Solar Bright 60 Evaloy KEE single ply roofing system.
- B. Related Work Specified Elsewhere:
 - 1. Membrane Roofing Preparation: Section 07 59 01
 - 2. Metal Roof Decks: Refer to Division 05 Section - Metal Decking.
 - 3. Rough Carpentry: Section 06 10 00 - Rough Carpentry.
 - 4. Weather Barrier: Section 07 25 00
 - 5. Sheet Metal Flashing and Trim: Section 07 62 00 - Sheet Metal Flashing and Trim.
 - 6. Sheet Metal Roof Accessories: Section 07 71 00 - Roof Specialties.
 - 7. Roofing Maintenance: 07 01 51 - Maintenance of Membrane Roofing.
 - 8. Unit Skylights: Section 08 62 00 - Skylights.

1.03 SUBMITTALS

- A. Product Data: Provide manufacturer's technical product data for each type of roofing product specified. Include data substantiating that materials comply with specified requirements. Samples: Submit two (2) samples of the following:
 - 1. Membrane
 - 2. Fasteners
 - 3. Insulation
- B. Specimen Warranty: Provide an unexecuted copy of the warranty specified for this Project, identifying the terms and conditions required of the Manufacturer and the Owner.
- C. Design Loads: Submit copy of manufacturer's minimum design load calculations according to ASCE 7-05, In no case shall the design loads be taken to be less than those detailed in Design and Performance Criteria article of this specification.
- D. Certificates: Cool Roofing certified by Cool Roof Rating Council.
- E. Shop Drawings: For roofing system. Include plans, elevations, sections, details and attachments to other Work.
- F. Samples: If specifically requested for specified products; required for alternate products.
- G. Installer Qualifications: Provide evidence that installers meet the requirements of Article 1.4.
- H. Closeout Submittals:
 - 1. O & M Manuals: Maintenance instructions.
 - 2. Guarantee: Provide completed form per Article 1.5.
 - 3. Manufacturer's weekly inspection reports noting issues, corrections, and final inspection photos.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Minimum of 5 years of experience on similar work; knowledge and understanding of standards referenced herein; skill necessary to perform in compliance with this specification. Installers failing to demonstrate the required experience, knowledge, or skill shall be removed from the project.
 - 2. Factory trained and approved applicator.

3. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress. Maintain proper supervision of workmen.
 4. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer.
- B. Testing Characteristics: UL Class A roof; I-90 wind uplift.
- C. Applicator-Manufacturer Review: Provide Drawings and Specifications review by Applicator with agent of roofing manufacturer; obtain manufacturer's agreement that specified system is proper for application shown.
- D. Manufacturers Participation:
1. Pre-Application Job-Site Conference: Arranged by Applicator, with a minimum of 1 week advance notice; for review of storage, handling, protection, surface preparation, materials and application specifications; attended by applicator, his foreman, Architect, inspector, and manufacturer's agent.
 2. Source Quality Control: Manufacturer shall have in place a documented, standardized quality control program such as ISO-9001.
 3. When the Project is in progress, the roofing system manufacturer will provide the following:
 - a. Report progress and quality of the work as observed.
 - b. Provide job site inspections a minimum of two (2) days a week throughout the course of construction.
 - c. Provide electronic inspection reports submitted weekly to the Owner and/or Architect.
 - d. Report to the Architect and/or Owner in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
 - e. Confirm after completion that manufacturer has observed no application procedures in conflict with the specifications other than those that may have been previously reported and corrected.

1.05 WARRANTY

- A. Manufacturer: Provide 15 year "No Dollar Limit" warranty on manufacturers form. Warranty shall period shall begin on date of acceptance of roofing by Owner.
- B. Manufacturer will provide the following services at years 2, 5, 10, & 15 at no cost to the owner.
1. Inspection by a technical service representative and delivery of a written inspection report documenting roof conditions.
 2. General rooftop housekeeping, subject to limits but generally including removal of incidental debris.
- C. Provide one warranty by a single approved manufacturer for standing seam roof areas, membrane roof areas, wall panel system, and transitions between the material types.
- D. Installer: Provide in required form for a period of two (2) years from date of acceptance by Owner.

PART 2 PRODUCTS

2.01 KEE SINGLE-PLY ROOFING

- A. Acceptable Products:
1. Basis of Design: Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this section.
 2. The design is based upon roofing systems by The Garland Company Inc./CI, Local representative Richard Jones (800) 762-8225 ext. 720
 - a. Solar Bright 60 Membrane (ASTM D 751)
 - b. Membrane Thickness: (ASTM D 751) 60 mil nominal.
 - c. Breaking Strength (ASTM D 751): 515 lbf/in
 - d. Tearing Strength (ASTM D 751): 275 lbf/in
 - e. Factory Seam Strength (ASTM D 751) 90 lbf

- f. Solar Reflectivity (ASTM E 903) 81%
- g. Emissivity (ASTM E 903) 95%
- B. Alternate Products: Owner and Architect Approved Equal
- C. Parapet Wall Covering: 0.060 inch thick.

2.02 UNDERLAYMENT

- A. Slip Sheet: N/A

2.03 NAILERS

- A. Douglas Fir; No. 2 or better, pressure treated; no creosote or asphalt preservatives allowed.

2.04 ROOF BOARD INSULATION

- A. Roof Insulation base layer 4' x 4' max dimension: Hunter Panels or equal, (ASTM C 1289) polyisocyanurate rigid insulation board
 - 1. Thickness: Per all project documents
 - 2. R-Factor: Per all project documents
 - 3. Attachment Method: Mechanically fastened
- B. Roof Insulation top layer: Dens Dek or equal roof board 4' x 8' max dimension.
 - 1. Thickness: ½"inch
 - 2. Attachment Method: Mechanically fastened
- C. Tapered Insulation: Tapered Hunter Panels or equal insulation board to be used as required for tapered insulation system.
 - 1. Field Slope: 1/4 inch per foot minimum.
 - 2. Sump Slope: 1/8 inch per foot minimum.
 - 3. Cricket Slope: 1/8 inch per foot minimum.
 - 4. Attachment Method: Mechanically fastened

2.05 FASTENERS

- A. Heavy duty #15 threaded fastener with a #3 Phillips drive used with Fastening Plate to secure Mechanically Fastened Roofing Systems. It is used on minimum 22 gauge steel decks or minimum 15/32" CDX plywood decks. It is also designed to offer an optimum combination of driving performance, back-out and corrosion resistance with excellent pullout performance.
- B. Fastening Plate: A 2-3/8" diameter metal barbed fastening plate used with HP-X, CD-10 or HD 14-10 Fasteners for membrane or insulation securement. This plate can be used for membrane or insulation securement on Mechanically Fastened Roofing Systems.
- C. Insulation Fastening Plate: A nominal 3-inch metal plate used for insulation attachment in conjunction with the appropriate fastener.
- D. Nails: SFS 2-1/4 inch long wood deck fastener with domed convex stress plate, or No. 14 1-5/8 inch long fastener with 2 inch round metal barbed stress plate.

2.06 ACCESSORIES

- A. Solar Bright 60 membrane shall be used for all flashing requirements to match the field membrane and warranty expectations selected for the roofing system.
- B. Solar Bright 60 Inside Corners: Pre-molded corner flashing for inside corners. 80 mil thickness. Color - White.
- C. Solar Bright Outside Corners: Pre-molded corner flashing for outside corners. 80 mil thickness. Color - White.
- D. Solar Bright T-Joint Covers: 40 mil thick non-reinforced PVC flashing cut into a 4.5 inch (114mm) diameter circle used to seal step-offs at splice intersections.
- E. Solar Bright Pipe Flashings: A pre-molded flashing and clamping ring used for pipe penetrations. Available for 1 inch to 6 inch (25 - 152mm) diameter pipes.
- F. Solar Bright Split Pipe Seals: Pre-fabricated flashing consisting of 80 mil reinforced Membrane for pipes 1 inch to 6 inch (25 - 152mm) in diameter. A split (cut) and overlap tab are

incorporated to allow the pipe seal to be opened and wrapped around the pipe when it is not possible to pull a standard pipe flashing over a round penetration.

- G. Solar Bright Non-Reinforced Flashing: 80 mil thick rolls 12 inches and 24 inches wide. Used for inside/outside corners and field fabricated pipe flashings when use of pre-molded accessories is not feasible.
- H. Solar Bright Heat Weldable Walkway Rolls: offering superior tear, puncture and weather resistance and designed to protect membrane in those areas exposed to repetitive foot traffic or other hazards. Walkway material may be heat welded to membrane using an automated heat welder or hand held heat welder. Walkway Rolls are 36 inches (914mm) wide by 60 feet (18.3 M) long and are nominal 80 mils thick.
- I. Single ply Coated Sheet Metal: Provide where flashing, gravel stops and sheet metal are in contact with Single -ply roofing membrane.

2.07 SOLVENT, SEALANT, AND ADHESIVES

- A. As recommended by manufacturer.
- B. SolarBright VOC Bonding Adhesive: Solvent-based contact adhesive that allows bonding of membrane to various porous and non-porous substrates.
 - 1. Base: Synthetic Rubber.
 - 2. Color: Pale Yellow.
 - 3. Solids: 24.2 percent.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- D. Do not commence Work until all other work trades have completed jobs that require them to traverse the deck on foot or with equipment.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Do not apply wet roofing, on wet application surface, or when temperature of deck less than 50 degrees F.
- B. Provide entire roof system including treated wood nailers, Single-ply coated sheet metal, and coordination of items such as roof drains, sumps, jacks, etc.
- C. Protect adjoining materials from stains particularly around perimeter of building; prevent debris from clogging roof drains.
- D. Deck surface swept clean and dry; keep free of loose and foreign materials.

3.03 INSTALLATION

- A. Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 1. Install insulation or membrane underlayment over the substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch (6 mm). Stagger joints both horizontally and vertically if multiple layers are provided.
 - 2. Secure insulation to the substrate with the required mechanical fasteners or insulation adhesive in accordance with the manufacturer's current application guidelines.
 - 3. Securely attach insulation to the roof deck for Adhered or Mechanically Fastened Roofing Systems. Attachment must have been successfully tested to meet or exceed the

calculated uplift pressure required by Factory Mutual (FM I-90) & the International Building Code (ASCE-7) or ANSI/SPRI WD-1.

- B. Application; Mechanically attached system over roof deck.
1. It will be the responsibility of the roofing contractor to initiate and maintain a QC program to govern all aspects of the installation of the Roofing System.
 2. The project foreman and or supervisor will be responsible for the daily execution of the QC program which will include but is not limited to the supervision, inspection and probing of all heat welding incorporated within the Roofing System.
 3. If inconsistencies in the quality of the application of the composite, membrane and/or welds are found, all work shall cease until corrective actions are taken to ensure the continuity the installation.
 4. Unroll and position membrane without stretching. Provide and secure both perimeter and field membrane sheets in accordance with the manufacturer's most current specifications and details.
 5. Secure the membrane with the required fasteners and plates centered over the pre-printed marks approximately 1 1/2 inches (39mm) from the edge of the membrane sheet.
 6. Install adjoining membrane sheets in the same manner in accordance with the manufacturer's current application requirements.
 7. Attachment Schedule:
 - a. Field (Zone 1) Fastener Density: 12 inches on center
 - b. Perimeter (Zones 2 and 3) Fastener Density: 6 inches on center
 - c. Perimeter (Half-width) Sheets: 2
 - d. Parapet Wall Covering: Install as shown, extend to full height of parapet; lap under parapet cap flashing and over wall substrate 2 inches minimum on the back side of the wall. Secure in place 9" on center on the outside face to assure a completely watertight installation.
 - e. Walkway: Per manufacturer's instructions and as shown on drawings. If drawings do not show walkways a minimum of the service side of all HVAC units will have walkway installed.
- C. Fasteners:
1. General: Per manufacturer's recommendation; fastening length and pattern based on performance values supplied by the fastener/disc manufacturer and conforming to Factory Mutual I-90 fastening pattern.
 2. Walkway Fastening: Provide 2 inch continuous heat weld strip around perimeter of membrane.
- D. Hot Air Welding
1. All field seams exceeding 10 feet in length shall be welded with an approved automatic
 2. welder.
 3. All field seams must be clean and dry prior to initiating any field welding.
 4. Remove foreign materials from the seams (dirt, oils, etc.) with Acetone or authorized alternative. Use CLEAN WHITE COTTON cloths and allow approximately five minutes for solvents to dissipate before initiating the automatic welder. Do not use denim or synthetic rags for cleaning.
 5. All welding shall be performed only by qualified personnel to ensure the quality and continuity of the weld.
 6. Contaminated areas within a seam will inhibit proper welding and will require a
 7. membrane patch
- E. Hand Welding
1. The lap or seam area of the membrane should be intermittently tack welded to hold the membrane in place.
 2. The back "interior" edge of the membrane shall be welded first, with a thin, continuous weld to concentrate heat along the exterior edge of the lap during the final welding pass.
 3. The nozzle of the hand held hot air welder shall be inserted into the lap at a 45° angle to the lap. Once the polymer on the material begins to flow, a hand roller shall be use to apply

pressure at a right angle to the tip of the hand welder. Properly welded seams shall utilize a 1-1/2 inch wide nozzle, to create a homogeneous weld, a minimum of 1-1/2 inches in width.

4. Smaller nozzles may be used for corners, and other field detailing, maintaining a minimum 1 inch weld.

F. Automatic Machine Welding

1. Follow all manufacturers' instructions for the safe operation of the automatic welder.
2. Follow local code requirements for electric supply, grounding and surge protection.
3. The use of a dedicated, portable generator is highly recommended to ensure a consistent electrical supply, without fluctuations that can interfere with weld consistency.
4. Properly welded seams shall utilize a 1-1/2 inch wide nozzle, to create a homogeneous weld, a minimum of 1-1/2 inches in width.

G. Inspection

1. The job foreman and/or supervisor shall initiate daily inspections of all completed work which shall include, but is not limited to the probing of all field welding with a dull pointed instrument to assure the quality of the application and ensure that any equipment or operator deficiencies are immediately resolved.
2. Ensure that all aspects of the installation (sheet layout, attachment, welding, flashing details, etc.) are in strict accordance with the most current Solar Bright Roofing Systems Specifications and Details.
3. Excessive patching of field seams because of inexperienced or poor workmanship will not be accepted at time of FINAL INSPECTION FOR WARRANTY ACCEPTANCE.

H. Metal Flashings:

1. General: Fabricate and install per Section 07601 - FLASHING AND SHEET METAL, as shown and per manufacturer's recommendations. Install PVC coated metal flashing at intersections of roofs with sloped or vertical surfaces, roof interruptions and penetrations.
2. Base Flashing: Extend up vertical surfaces 6 inches, minimum, and onto the horizontal roof surfaces not less than 3 inches, unless otherwise noted. Provide PVC coated metal flashing with 2 inches minimum overlap of roofing membrane; heat weld in the horizontal plane, with subsequent sealing of seams with sealant.
3. All perimeter edge details are to be fabricated from Garland/CI SolarBright Clad Metal.
4. Ensure all fascia extend a minimum of 2 inch lower than the bottom of the wood nailers.
5. Fasten all metal flashing to wood nailers or approved substrate with approved fasteners 8 inches on center.
6. Break and install Solar Bright Clad metal in accordance with approved details, ensuring proper attachment, maintaining 1/2 inch expansion joints and the installation of a minimum 2 inch bond breaker tape prior to sealing the joint.
7. Solidly weld Solar Bright Clad expansion joints with a 6 inch strip of Solar Bright membrane welded to the Solar Bright Clad, covering the bond breaker tape (cover plates are optional).

I. Roof Drains

1. Flash all roof drains in accordance with Solar Bright roof drain details.
2. Replace all worn or broken parts that may cut the Solar Bright membrane or prevent a watertight seal. This includes the clamping ring and strainer basket.
3. Replace all drain bolts or clamps used to hold the drain compression ring to the drain bowl.
4. Solar Bright non-reinforced 60 mil membrane shall be used for flashing the drain assembly. Drain assemblies and basins or "sumps" must be free of any asphalt or coal tar pitch residue prior to installation.
5. The drain target sheet should be sized and installed to provide for a minimum of 12 inch of exposed 60 mil on all sides of the drain.

3.04 FIELD QUALITY CONTROL

- A. Perform field inspection and testing as required under provisions of Division 01 Section Quality Requirements & manufacturers recommendations.

- B. Heat weld test cuts will be required. One (1) test cut per 5,000 square feet will be required.
- C. Correct defects or irregularities discovered during field inspection.
- D. Require attendance of roofing materials manufacturers' representatives at site during installation of the roofing system a minimum of two (2) days per week. A copy of the specification should also be on site at all times.

3.05 CLEANING

- A. Keep premises free from accumulation of waste and debris. At completion of installation remove surplus materials and debris.
- B. At completion clean exposed surfaces in a manner that will not damage finish.

3.06 FINAL INSPECTION

- A. At completion of roofing installation and associated work, meet with Contractor, Architect, installer, installer of associated work, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of roofing system.
- B. Walk roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party in attendance.
- C. The roofing system manufacturer reserves the right to request a thermographic scan of the roof during final inspection to determine if any damp or wet materials have been installed. The thermographic scan shall be provided by the Roofing Contractor.
- D. If core cuts verify the presence of damp or wet materials, the [Roofing] Contractor shall be required to replace the damaged areas at his own expense.
- E. Repair or replace deteriorated or defective work found at time above inspection as required to a produce an installation which is free of damage and deterioration at time of Substantial Completion and according to warranty requirements
- F. Notify the Contractor, Architect, & Owner upon completion of corrections.
- G. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.

END OF SECTION

SECTION 07 5901
MEMBRANE REROOFING PREPARATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Existing roof tear-off.
 - 2. Removal of existing base flashings.

1.03 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site and disposed of legally.

1.04 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.
- B. Existing Membrane Roofing System: Built-up asphalt roofing membrane, surfacing, and components and accessories between deck and roofing membrane.
- C. Substrate Board: Rigid board or panel products placed over the roof deck that serve as thermal barriers, provide a smooth substrate, or serve as a component of a fire-resistance-rated roofing system.
- D. Roof Tear-Off: Removal of existing membrane roofing system from deck.
- E. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and reinstalled.

1.05 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning membrane roofing removal. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.06 PROJECT CONDITIONS

- A. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.
- B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not block required exits or path from required exit to public right-of-way. Coordinate with requirements of authorities having jurisdiction.
- C. Owner assumes no responsibility for condition of areas to be reroofed.
- D. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering into existing roofing system or building.
- E. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner.

PART 3 EXECUTION

2.01 PREPARATION

- A. Coordinate with Owner to shut down air intake equipment in the vicinity of the Work. Cover air intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.
- B. During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.
- C. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.
 - 1. If roof drains will be temporarily blocked or unserviceable due to roofing system removal or partial installation of new membrane roofing system, provide alternative drainage method to remove water and eliminate ponding. Do not permit water to enter into or under existing membrane roofing system components that are to remain.

2.02 ROOF TEAR-OFF

- A. Remove loose aggregate from aggregate-surfaced built-up bituminous roofing.
- B. Roof Tear-Off: Remove existing roofing membrane and other membrane roofing system components down to the deck.
 - 1. Remove any existing roof insulation.
- C. Hazardous Materials have been identified in portions of the existing roofing system where roofing is designated to be removed. Refer to the appendix of the Project Manual for additional information and requirements.

2.03 DECK REMOVAL / REPLACEMENT

- A. Remove existing plywood substrate as directed by owner or owner's representative. Replacement of damaged or dryrot sheathing shall be performed on a per square foot basis.

2.04 EXISTING BASE FLASHINGS

- A. Remove existing base flashings around parapets, curbs, walls, and penetrations.
 - 1. Clean substrates of contaminants such as sheet materials, dirt, and debris.

2.05 DISPOSAL

- A. Collect and place demolished materials in containers. Dispose of demolished materials daily. Do not allow demolished materials to accumulate on-site.
- B. Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION

SECTION 07 6200
SHEET METAL FLASHING AND TRIM

PART 1 — GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Provide all labor, equipment, and materials to fabricate and install the following.
 - 1. Coping cap at parapets.
- B. Related Work Specified Elsewhere:
 - 1. Section 06 10 00 Section Rough Carpentry
 - 2. Section 07 54 20 Section Membrane Roofing

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (galvanized) or Zinc-Iron Alloy-Coated (galvannealed) by the Hot-Dip Process.
 - 2. ASTM A792 Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy Coated by the Hot-Dip Process.
 - 3. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 4. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 5. ASTM D692 Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures.
- B. American National Standards Institute and Single Ply Roofing Institute (ANSI/SPRI)
 - 1. ANSI/SPRI ES-1 Testing and Certification Listing of Shop Fabricated Edge Metal.
- C. Warnock Hersey International, Inc., Middleton, WI (WH)
- D. Factory Mutual Research Corporation (FMRC)
- E. Underwriters Laboratories (UL)
- F. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
 - 1. 1993 Edition Architectural Sheet Metal Manual
- G. National Roofing Contractors Association (NRCA)
 - 1. Roofing and Waterproofing Manual
- H. American Society of Civil Engineers (ASCE)
 - 1. ASCE 7-05 Minimum Design Loads for Buildings and Other Structures.

1.04 SUBMITTALS FOR REVIEW

- A. Product Data:
 - 1. Provide manufacturer's specification data sheets for each product.
 - 2. Metal material characteristics and installation recommendations.
 - 3. Submit color chart prior to material ordering and/or fabrication so that equivalent colors to those specified can be approved.
- B. Samples: Submit two (2) samples, illustrating typical metal edge, coping, gutters, fascia extenders for material and finish.
- C. Shop Drawings
 - 1. For manufactured and ANSI/SPRI approved shop fabricated gravel stops, fascia, scuppers, and all other sheet metal fabrications.
 - 2. Indicate material profile, jointing pattern, jointing details, fastening methods, flashing, terminations, and installation details.
 - 3. Indicate type, gauge and finish of metal.

- D. Specimen Warranty: Provide an unexecuted copy of the warranty specified for this Project, identifying the terms and conditions required of the Manufacturer and the Owner.

1.05 SUBMITTALS FOR INFORMATION

- A. Design Loads: Any material submitted as equal to the specified material must be accompanied by a report signed and sealed by a professional engineer licensed in the state in which the installation is to take place. This report shall show that the submitted equal meets the wind uplift and perimeter attachment requirements according to ASCE 7-05 and ANSI/SPRI ES-1. Substitution requests submitted without licensed engineer approval will be rejected for non-conformance.
- B. Factory Mutual Research Corporation's (FMRC) wind uplift resistance classification: The roof perimeter flashing shall conform to the requirements as defined by the FMRC Loss Prevention Data Sheet 1-49.
- C. A letter from an officer of the manufacturing company certifying that the materials furnished for this project are the same as represented in tests and supporting data.:
- D. Mill production reports certifying that the steel thicknesses are within allowable tolerances of the nominal or minimum thickness or gauge specified.
- E. Certification of work progress inspection. Refer to Quality Assurance Article below.
- F. Certifications:
 - 1. Submit roof manufacturer's certification that metal fasteners furnished are acceptable to roof manufacturer.
 - 2. Submit roof manufacturer's certification that metal furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.

1.06 CONTRACT CLOSEOUT SUBMITTALS

- A. General: Comply with Requirements of Section 01 78 00 - Closeout Submittals.
- B. Special Project Warranty: Provide specified warranty for the Project, executed by the authorized agent of the Manufacturer.
- C. Roofing Maintenance Instructions. Provide a manual of manufacturer's recommendations for maintenance of installed roofing systems.
- D. Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

1.07 QUALITY ASSURANCE

- A. Engage an experienced roofing contractor specializing in sheet metal flashing work with a minimum of five (5) years experience.
- B. Maintain a full-time supervisor/foreman who is on the job-site at all times during installation. Foreman must have a minimum of five (5) years experience with the installation of similar system to that specified.
- C. Source Limitation: Obtain components from a single manufacturer. Secondary products which cannot be supplied by the specified manufacturer shall be approved in writing by the primary manufacturer prior to bidding.
- D. Upon request fabricator/installer shall submit work experience and evidence of financial responsibility. The Owner's representative reserves the right to inspect fabrication facilities in determining qualifications.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened containers or packages with labels intact and legible.
- B. Stack pre-formed and pre-finished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

- C. Prevent contact with materials which may cause discoloration or staining.

1.09 PROJECT CONDITIONS

- A. Determine that work of other trades will not hamper or conflict with necessary fabrication and storage requirements for pre-formed metal edge system.

1.10 DESIGN AND PERFORMANCE CRITERIA

- A. Thermal expansion and contraction:
 - 1. Completed metal edge flashing system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.

1.11 WARRANTIES

- A. Owner shall receive one (1) warranty from manufacturer of roofing materials covering all of the following criteria. Multiple warranties are not acceptable.
 - 1. Pre-finished metal material shall require a written twenty (20)-year non-prorated warranty covering fade, chalking and film integrity. The material shall not show a color change greater than 5 NBS color units per ASTM D2244 or chalking excess of 8 units per ASTM D659. If either occurs material shall be replaced per warranty, at no cost to the Owner.
 - 2. Changes: Changes or alterations in the edge metal system without prior written consent from the manufacturer shall render the system unacceptable for a warranty.
 - 3. Warranty shall commence on date of substantial completion or final payment, whichever is agreed by contract.
 - 4. The Contractor shall provide the Owner with a notarized written warranty assuring that all sheet metal work including caulking and fasteners to be watertight and secure for a period of two years from the date of final acceptance of the building. Warranty shall include all materials and workmanship required to repair any leaks that develop, and make good any damage to other work or equipment caused by such leaks or the repairs thereof.
 - 5. Installing roofing contractor shall be responsible for the installation of the edge metal system in general accordance with the membrane manufacturer's recommendations.
 - 6. Installing contractor shall certify that the edge metal system has been installed per the manufacturer's printed details and specifications.
 - 7. One manufacturer shall provide a single warranty for all accessory metal for flashings, metal edges and copings, along with the warranty for metal roof areas, membrane roof areas, and any transitions between two different material types.

PART 2 — PRODUCTS

2.01 PRODUCTS, GENERAL

- A. Basis of Design: Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this Section. Comply with all manufacturer and contractor/fabricator quality and performance criteria specified in Part 1.
- B. Substitutions: Products proposed as equal to the products specified in this Section shall be submitted in accordance with Bidding Requirements and Division 01 provisions.
 - 1. Proposals shall be accompanied by a copy of the manufacturer's standard specification section. That specification section shall be signed and sealed by a professional engineer licensed in the state in which the installation is to take place. Substitution requests containing specifications without licensed engineer certification shall be rejected for non-conformance.
 - 2. Include a list of three (3) projects of similar type and extent, located within a one hundred mile radius from the location of the project. In addition, the three projects must be at least five (5) years old and be available for inspection by the Architect, Owner or Owner's Representative.
 - 3. Equivalency of performance criteria, warranty terms, submittal procedures, and contractual terms will constitute the basis of acceptance.

4. The Owner's decision regarding substitutions will be considered final. Unauthorized substitutions will be rejected.

2.02 ACCEPTABLE MANUFACTURERS

- A. The design is based upon roofing systems engineered and manufactured by
The Garland Company
3800 East 91st Street
Cleveland, Ohio 44105
Telephone: (800) 762-8225 ext. 720
Website: www.garlandco.com

2.03 MATERIALS

- A. General: Product designations for the materials used in this section shall be based on performance characteristics of the R-MER Edge System manufactured by the Garland Company, Cleveland, OH, and shall form the basis of the contract documents.
- B. Materials:
 1. Minimum gauge of steel or thickness of Aluminum to be specified in accordance with Architectural Sheet Metal Manual, Sheet Metal and Air Conditioning Contractor's National Association, Inc. recommendations as well as ANSI SPRI ES1 thickness for the specific wall width.
 2. Unexposed base metal material:

R-MER EDGE COPING CHAIRS

ZINC-COATED STEEL, ASTM A653, COATING DESIGNATION G-90, IN THICKNESS OF 0.0635 NOM./ 16 GAUGE, 36" TO 48" BY COIL LENGTH, CHEMICALLY TREATED, COMMERCIAL OR LOCK-FORMING QUALITY.

- C. Finishes:
 1. Exposed surfaces for coated panels:
 - a. Steel Finishes: fluorocarbon finish. Epoxy primer baked both sides, .2-.25 mils thickness as approved by finish coat manufacturer.
Weathering finish as referred by National Coil Coaters Association (NCCA).

PROPERTY	TEST METHOD	FLUOROCARBON*
Pencil	ASTM D3363	HB-H
Hardness	NCCA II-2	
Bend	ASTM D-4145	O-T
NCCA II-19		
Cross-Hatch	ASTM D3359	no loss of
Adhesion		adhesion
Gloss	ASTM D523	25+/-5%
(60° angle)		
Reverse	ASTM D2794	no cracking or
Impact		loss of
adhesion		
Nominal	ASTM D1005	
Thickness		
Primer	0.2 mils	
Topcoat	0.8 mils	
TOTAL	1.0 mils	

* Subject to minimum quantity requirements
 - b. Color shall be as specified
 2. Exposed and unexposed surfaces for anodized aluminum flashing, fascia, and coping cap, shall be as shipped from mill.

2.04 RELATED MATERIALS AND ACCESSORIES

- A. Metal Primer: Zinc chromate type.

- B. Plastic Cement: ASTM D 4586
- C. Sealant: Specified in Section 07900 or on drawings.
- D. Underlayment: ASTM D2178, No15 asphalt saturated roofing felt.
- E. Slip Sheet: Rosin sized building paper.
- F. Fasteners:
 - 1. Corrosion resistant screw fastener as recommended by metal manufacturer. Finish exposed fasteners same as flashing metal.
 - 2. Fastening shall conform to Factory Mutual requirements or as stated on section details, whichever is more stringent.
- G. Gutter and Downspout Anchorage Devices: Material as specified for system.

PART 3 — EXECUTION

3.01 EXECUTION, GENERAL

- A. Refer to Division 07 Section Common Work Results for Thermal and Moisture Protection.

3.02 PROTECTION

- A. Isolate metal products from dissimilar metals, masonry or concrete with bituminous paint, tape, or slip sheet. Use gasketed fasteners where required to prevent corrosive reactions.

3.03 GENERAL

- A. Secure fascia to wood nailers at the bottom edge with a continuous cleat.
- B. Fastening of metal to walls and wood blocking shall comply with building code standards.
- C. All accessories or other items essential to the completeness of sheet metal installation, whether specifically indicated or not, shall be provided and of the same material as item to which applied.
- D. Allow sufficient clearances for expansion and contraction of linear metal components. Secure metal using fasteners as required by the system. Exposed face fastening will be rejected.

3.04 INSPECTION

- A. Verify that curbs are solidly set and nailing strips located.
- B. Perform field measurements prior to fabrication.
- C. Coordinate work with work of other trades.
- D. Verify that substrate is dry, clean and free of foreign matter.
- E. Commencement of installation shall be considered acceptance of existing conditions.

3.05 MANUFACTURED SHEET METAL SYSTEMS

- A. Furnish and install manufactured fascia and coping cap systems in strict accordance with manufacturer's printed instructions.
- B. Provide factory-fabricated accessories including, but not limited to, fascia extenders, miters, scuppers, joint covers, etc. Refer to Source limitation provision in Part 1.

3.06 SHOP-FABRICATED SHEET METAL

- A. Metal work shall be shop fabricated to configurations and forms in accordance with recognized sheet metal practices.
- B. Hem exposed edges.
- C. Angle bottom edges of exposed vertical surfaces to form drip.
- D. Lap corners with adjoining pieces fastened and set in sealant.
- E. Form joints for gravel stop fascia system, coping cap with a 3/8" opening between sections. Back the opening with an internal drainage plate formed to the profile of fascia piece.
- F. Install sheet metal to comply with referenced ANSI/SPRI, SMACNA and NRCA standards.

3.07 FLASHING MEMBRANE INSTALLATION

- A. Snap-On Coping Cap Detail
 - 1. Install Miters first.
 - 2. Position base flashing of the Built-Up and/or Modified Roofing membrane over the wall edge covering nailers completely, fastening eight (8) inches on center. Install membrane and cap sheet with proper material and procedure according to manufacturer's recommendations.
 - 3. Install minimum sixteen (16) gauge, sixteen (16) inch long by specified width anchor chair at [Contact Garland Representative] feet on center.
 - 4. Install six (6) inch wide splice plate by centering over sixteen (16) inch long by specified width anchor chair. Apply two beads of sealant to either side of the splice plate's center. Approximately two (2) inches from the coping cap joint. Install Coping Cap by hooking outside hem of coping on outside face of anchor chair. Press downward on inside edge of coping until "snap" occurs and hem is engaged on the entire chair.

3.08 CLEANING

- A. Clean installed work in accordance with the manufacturer's instructions.
- B. Replace damaged work than cannot be restored by normal cleaning methods.

3.09 CONSTRUCTION WASTE MANAGEMENT

- A. Remove and properly dispose of waste products generated. Comply with requirements of authorities having jurisdiction

3.10 FINAL INSPECTION

- A. At completion of installation and associated work, meet with Contractor, Architect, installer, installer of associated work, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of roofing system.
- B. Inspect work and flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party in attendance.
- C. Repair or replace deteriorated or defective work found at time above inspection as required to a produce an installation which is free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- D. Notify the [Owner] upon completion of corrections.
- E. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.
- F. Immediately correct roof leakage during construction. If the Contractor does not respond within twenty-four (24) hours, the Owner will exercise rights to correct the Work under the terms of the Conditions of the Contract.

3.11 DEMONSTRATION AND TRAINING

- A. At a time and date agreed to by the Owner, instruct the Owner's facility manager, or other representative designated by the Owner, on the following procedures:
 - 1. Troubleshooting procedures.
 - 2. Notification procedures for reporting leaks or other apparent roofing problems.
 - 3. Maintenance.
 - 4. The Owner's obligations for maintaining the warranty in effect and force.
 - 5. The Manufacturer's obligations for maintaining the warranty in effect and force.

END OF SECTION

SECTION 07 7100
ROOF SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured roof specialties, including copings, fascias, gravel stops, and vents.
- B. Roof control and expansion joint covers.

1.02 RELATED REQUIREMENTS

- A. Section 07 7200 - Roof Accessories: Manufactured curbs, roof hatches, and snow guards.
- B. Section 07 9005 - Joint Sealers.

1.03 REFERENCE STANDARDS

- A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels; 2013.
- B. SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems; Single Ply Roofing Industry; 2011. (ANSI/SPRI/FM 4435/ES-1)

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.
- C. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.
- D. Samples: Submit two [2], [12x12] inch in size, illustrating component shape, finish, and color.
- E. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members, and perimeter conditions requiring special attention.

PART 2 PRODUCTS

2.01 COMPONENTS

- A. Roof Edge Flashings: Factory fabricated to sizes required; mitered, welded corners; concealed fasteners.
 - 1. Configuration: Fascia, cant, and edge securement for roof membrane;
 - 2. Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/ES-1 RE-1 and RE-2 to positive and negative design wind pressure as defined by applicable code.
 - 3. Material: Formed steel sheet, galvanized, 24 gage, 0.024 inch (0.6 mm) thick, minimum.
- B. Copings: Factory fabricated to sizes required; mitered, welded corners; concealed fasteners.
 - 1. Configuration: Concealed continuous hold down cleat at both legs; internal splice piece at joints of same material, thickness and finish as cap; concealed stainless steel fasteners.
 - 2. Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/ES-1 RE-3 to positive and negative design wind pressure as defined by applicable code.
 - 3. Material: Formed steel sheet, galvanized, 24 gage, 0.024 inch (0.6 mm) thick, minimum.
- C. Control and Expansion Joint Covers: Composite construction of 4 inch (100 mm) wide flexible EPDM flashing of white color with closed cell urethane foam backing, each edge seamed to aluminum sheet metal flanges, designed for nominal joint width of 1 inch (25 mm). Include special formed corners, tees, intersections, and wall flashings, each sealed watertight.
- D. Pipe and Penetration Flashing: Base of rounded aluminum, compatible with sheet metal roof systems, and capable of accomodating pipes sized between 0.375 inches (9.5 mm) and 12 inches (30.5 cm).

2.02 FINISHES

- A. Baked Enamel: Pigmented Organic Coating System, AAMA 2603; polyester baked enamel finish system; color as scheduled.

END OF SECTION

SECTION 07 7200
ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured curbs, equipment rails, and pedestals.
- B. Roof hatches, manual and automatic operation, including smoke vents.

1.02 RELATED REQUIREMENTS

- A. Section 05 3100 - Steel Decking.
- B. Section 07 6200 - Sheet Metal Flashing and Trim: Roof accessory items fabricated from sheet metal.
- C. Section 07 7100 - Roof Specialties: Other manufactured roof items.
- D. Section 07 7236 Automatic Smoke Vents

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Maintenance requirements.
 - 5. For smoke hatches, submit independent laboratory acoustical test report indicating STC rating.(ASTM E-90, E-413)
- C. Shop Drawings: Submit detailed layout developed for this project. Show dimensioned location and number for each type of roof accessory.
 - 1. Non-penetrating Rooftop Supports: Submit design calculations for loadings and spacings.
 - 2. Submit shop drawings sealed and signed by a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- D. Warranty Documentation:
 - 1. Submit manufacturer warranty.
 - 2. Ensure that forms have been completed in Owner's name and registered with manufacturer.
 - 3. Submit documentation that roof accessories accessories are acceptable to roofing manufacturer, and do not limit the roofing warranty.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products under cover and elevated above grade.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURED CURBS

- A. Manufactured Curbs, Equipment Rails, and Other Roof Mounting Assemblies:
 - 1. AES Industries Inc.: www.aescurb.com.

2. The Pate Company: www.patecurbs.com.
 3. Roof Products & Systems (RPS) by Commercial Products Group of Hart & Cooley, Inc: www.rpscurbs.com.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Manufactured Curbs, Equipment Rails, and Other Roof Mounting Assemblies: Factory-assembled hollow sheet metal construction with fully mitered and welded corners, integral counterflashing, internal reinforcing, and top side and edges formed to shed water.
1. Sheet Metal: Hot-dip zinc coated steel sheet complying with ASTM A653/A653M, SS Grade 33 (230); G60 (Z180) coating designation; 18 gage, 0.048 inch (1.21 mm) thick.
 2. Roofing Cants: Provide integral sheet metal roofing cants dimensioned to begin slope at top of roofing insulation; 1:1 slope; minimum cant height 4 inches (200 mm).
 3. Manufacture curb bottom and mounting flanges for installation directly on roof deck, not on insulation; match slope and configuration of roof deck.
 4. Provide the layouts and configurations shown on the drawings.
- C. Curbs Adjacent to Roof Openings: Provide curb on all sides of opening, with top of curb horizontal for equipment mounting.
1. Provide preservative treated wood nailers along top of curb.
 2. Insulate inside curbs with 1-1/2 inch (38 mm) thick fiberglass insulation.
 3. Height Above Finished Roof Surface: 6 inches (152 mm), minimum.
 4. Height Above Roof Deck: 14 inches (356 mm), minimum.
- D. Equipment Rails: Two-sided curbs in straight lengths, with top horizontal for equipment mounting.
1. Provide preservative treated wood nailers along top of rails.
 2. Height Above Finished Roof Surface: 6 inches (152 mm), minimum.
 3. Height Above Roof Deck: 14 inches (356 mm), minimum.
- E. Pipe, Duct, and Conduit Mounting Pedestals: Vertical posts, minimum 8 inches (400 mm) square unless otherwise indicated.
1. Provide sliding channel welded along top edge with adjustable height steel bracket, manufactured to fit item supported.
 2. Height Above Finished Roof Surface: 6 inches (152 mm), minimum.
 3. Height Above Roof Deck: 14 inches (356 mm), minimum.

2.02 ROOF HATCHES, MANUAL AND AUTOMATIC OPERATION

- A. Manufacturers - Sound Rated Roof Hatches:
1. Bilco Co.: www.bilco.com.
 2. Milcor by Commercial Products Group of Hart & Cooley, Inc: www.milcorinc.com.
- B. Manufacturers - Roof Hatches:
1. Babcock-Davis: www.babcockdavis.com.
 2. Bilco Company; Type S (ladder access, standard size, solid cover): www.bilco.com.
 3. Dur-Red Products: www.dur-red.com.
 4. Milcor by Commercial Products Group of Hart & Cooley, Inc: www.milcorinc.com.
 5. Portals Plus: www.portalsplus.com.
 6. Metal Roof Innovations, Ltd. S-5! Attachment Solutions; S-5! Utility System: www.s-5.com.
- C. Roof Hatches: Factory-assembled steel frame and cover, complete with operating and release hardware.
1. Style: Provide flat metal covers unless otherwise indicated.
 2. Mounting: Provide frames and curbs suitable for mounting on flat roof deck.
 3. Sound Rated Hatches: Minimum STC of 45.
 4. For Ladder Access: Single leaf; 30 by 36 inches (762 by 914 mm).
- D. Frames/Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
1. Material: Galvanized steel, 14 gage, 0.0747 inch (1.90 mm) thick.
 2. Finish: Factory prime paint.

3. Insulation: 1 inch (25 mm) rigid glass fiber, located on outside face of curb.
4. Curb Height: As indicated on drawings.
- E. Metal Covers: Flush, insulated, hollow metal construction.
 1. Capable of supporting 40 psf (1.92 kPa) live load.
 2. Material: Galvanized steel; outer cover 14 gage, 0.0747 inch (1.90 mm) thick, liner 22 gage, 0.03 inch (0.76 mm) thick.
 3. Finish: Factory prime paint.
 4. Insulation: 1 inch (25 mm) rigid glass fiber.
 5. Gasket: Neoprene, continuous around cover perimeter.
- F. Hardware: Steel, zinc coated and chromate sealed, unless otherwise indicated or required by manufacturer.
 1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf (475 kPa) load.
 2. Hinges: Heavy duty pintle type.
 3. Hold open arm with vinyl-coated handle for manual release.
 4. Latch: Upon closing, engage latch automatically and reset manual release.
 5. Manual Release: Pull handle on interior.
 6. Locking: Padlock hasp on interior.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing weather integrity.
- B. Install frame and cover assembly plumb and square.

3.04 CLEANING

- A. Clean installed work to like-new condition.

3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 7236
AUTOMATIC SMOKE VENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Work Included: Factory-fabricated double-leaf automatic smoke vents.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's product data.
- B. Shop Drawings: Submit shop drawings including profiles, accessories, location, fusible links, adjacent construction interface, and dimensions.
- C. Warranty: Submit executed copy of manufacturer's standard warranty.

1.03 QUALITY ASSURANCE

- A. Manufacturer: A minimum of 5 years experience manufacturing similar products.
- B. Installer: A minimum of 2 years experience installing similar products.
- C. Manufacturer's Quality System: Registered to ISO 9001:2008 Quality Standards including in-house engineering for product design activities.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in manufacturer's original packaging. Store materials in a dry place, protected, well vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

1.05 WARRANTY

- A. Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

1.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Acceptable Products:
 - 1. Basis of Design: Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this section.
 - 2. The design is based upon: The Bilco Company, P.O. Box 1203, New Haven, CT 06505, 1-800-366-6530, Fax: 1-203-933-8478, Web: www.bilco.com.
 - a. Type ACDSH-STC 45 Double Leaf Automatic Roof Fire Vent.
 - b. Membrane Thickness: (ASTM D 751) 60 mil nominal.
 - c. Breaking Strength (ASTM D 751): 515 lbf/in
 - d. Tearing Strength (ASTM D 751): 275 lbf/in
 - e. Factory Seam Strength (ASTM D 751) 90 lbf
 - f. Solar Reflectivity (ASTM E 903) 81%
 - g. Emissivity (ASTM E 903) 95%
 - 3. Alternate Products:
 - a. Milcor : ULP STC 45
 - b. Nystrom SVX
- B. Lifting mechanisms: Corrosion resistant gas springs open covers automatically against a 10 lb/ft² (49Kg/m²) snow/wind load. Gas springs shall have built in dampers to assure a controlled

rate of opening and automatically lock the covers in the full open position. A solenoid release mechanism (120vac) shall be provided to allow the covers to be closed.

- C. Latch mechanism: Shall be the Bilco Thermolatch solenoid positive hold/release mechanism with a separate latching point for each cover controlled by a single UL listed 165°F (74°C) fusible link on the exterior. Fusible link shall be curb mounted on a non-hinged end to allow the latching mechanism to be easily reset from the roof level.
- D. Hardware: Corrosion resistant gas springs and hot dip galvanized steel stop cables. All other hardware is zinc plated/chromate sealed.
- E. Hatches shall operate manually by exterior pull handle and by electrical power to solenoid release and by fusible link for heat at 165 degrees or more.
- F. Finish: Factory finish shall be alkyd base red oxide primer.

2.02 SOURCE QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and approved submittals. Locate units level, plumb, and in proper alignment with adjacent work.
 1. Test units for proper function and adjust until proper operation is achieved.
 2. Test fusible link and install replacement fusible link after testing.
 3. Repair finishes damaged during installation.
 4. Restore finishes so no evidence remains of corrective work.

3.03 SYSTEM STARTUP

- A. Prepare and start equipment and systems in accordance with manufacturers' instructions and recommendations.
- B. Adjust for proper operation within manufacturer's published tolerances.

3.04 ADJUSTING AND CLEANING

- A. Clean exposed surfaces using methods acceptable to the manufacturer which will not damage finish.

3.05 CLOSEOUT ACTIVITIES

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.
- B. See Section 01 7900 - Demonstration and Training, for additional requirements.
- C. Demonstrate proper operation of equipment to Owner's designated representative.

3.06 PROTECTION

- A. Protect installed automatic smoke vent from subsequent construction operations.

END OF SECTION

SECTION 07 8400
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.
- B. Firestopping of all joints and penetrations in fire-resistance rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.
- C. Fire Barrier Pillow at Cable trays

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 09 2116 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

1.03 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a.
- B. ASTM E1966 - Standard Test Method for Fire Resistive Joint Systems; 2007 (Reapproved 2011).
- C. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2013.
- D. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2013.
- E. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- F. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.
- G. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.
- H. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Underwriters Laboratories Inc.; 2004.
- I. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- C. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Installer Qualification: Submit qualification statements for installing mechanics.

1.05 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
 - 1. Listing in the current-year classification or certification books of UL, FM, or ITS (Warnock Hersey) will be considered as constituting an acceptable test report.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section and:
 - 1. With minimum 3 years documented experience installing work of this type.

1.06 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 FIRESTOPPING - GENERAL REQUIREMENTS

- A. Manufacturers:
 - 1. 3M Fire Protection Products: www.3m.com/firestop.
 - 2. Hilti, Inc: www.us.hilti.com.
 - 3. Specified Technologies, Inc: www.stifirestop.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Firestopping: Any material meeting requirements.
- C. Firestopping Materials with Volatile Content: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.
- D. Mold Resistance: Provide firestopping materials with mold and mildew resistance rating of 0 as determined by ASTM G21.
- E. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.
- F. Fire Ratings: See Drawings for required systems and ratings.

2.02 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. Head-of-Wall Firestopping at Joints Between Non-Rated Floor and Fire-Rated Wall: Use any system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of floor or wall, whichever is greater.
- B. Floor-to-Floor, Wall-to-Wall, and Wall-to-Floor Joints, Except Perimeter, Where Both Are Fire-Rated: Use any system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
- C. Through Penetration Firestopping: Use any system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.

2.03 FIRESTOPPING FOR FLOOR-TO-FLOOR, WALL-TO-FLOOR, AND WALL-TO-WALL JOINTS

- A. Gypsum Board Walls:
 - 1. Wall to Wall Joints:
 - a. 2 Hour Construction: UL System WW-D-0067; Hilti CP 606 Flexible Firestop Sealant.
 - b. 1 Hour Construction: UL System WW-D-0067; Hilti CP 606 Flexible Firestop Sealant.
 - 2. Top of Wall Joints at Concrete Over Metal Deck, Wall Parallel to Ribs:
 - a. 1 Hour Construction: UL System HW-D-0049; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
 - 3. Top of Wall Joints at Concrete Over Metal Deck, Wall Perpendicular to Ribs, Cut to Fit Ribs:
 - a. 1 Hour Construction: UL System HW-D-0045; Hilti CP 606 Flexible Firestop Sealant.

2.04 FIRESTOPPING PENETRATIONS THROUGH CONCRETE AND CONCRETE MASONRY CONSTRUCTION

- A. Penetrations Through Floors or Walls By:
 - 1. Multiple Penetrations in Large Openings:
 - a. 3 Hour Construction: UL System C-AJ-8110; Hilti CFS-BL Firestop Block.
 - b. 2 Hour Construction: UL System C-AJ-8143; Hilti FS-ONE MAX Intumescent Firestop Sealant.

2. Uninsulated Metallic Pipe, Conduit, and Tubing:
 - a. 3 Hour Construction: UL System C-AJ-1184; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 2 Hour Construction: UL System C-AJ-1226; Hilti FS-ONE MAX Intumescent Firestop Sealant.
3. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
 - a. 2 Hour Construction: UL System System C-AJ-2167; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 2 Hour Construction: UL System C-AJ-2109; Hilti CP 643N/644 Firestop Collar.
4. Cable Trays with Electrical Cables:
 - a. 3 Hour Construction: UL System C-AJ-4035; 3M Fire Barrier Pillow , tested in accordance with ASTM E 84
 - b. 2 Hour Construction: UL System C-AJ-4071; 3m Fire Barrier Pillow.
5. HVAC Ducts, Uninsulated:
 - a. 3 Hour Construction: UL System C-AJ-7051; Hilti FS-ONE MAX Intumescent Firestop Sealant.

2.05 FIRESTOPPING PENETRATIONS THROUGH GYPSUM BOARD WALLS

- A. Penetrations By:
 1. HVAC Ducts, Insulated:
 - a. 2 Hour Construction: UL System W-L-7156; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 1 Hour Construction: UL System W-L-7156; Hilti FS-ONE MAX Intumescent Firestop Sealant.

2.06 FIRESTOPPING SYSTEMS

- A. Firestopping at Uninsulated Metallic Pipe and Conduit Penetrations, of diameter 4 inches (100 mm) or less: Caulk or putty.
- B. Firestopping at Combustible Pipe and Conduit Penetrations, of diameter 4 inches (100 mm) or less: Any material meeting requirements.
- C. Firestopping at Cable Tray Penetrations: Any material meeting requirements.
- D. Firestopping at Cable Penetrations, not in Conduit or Cable Tray: Caulk or putty.
- E. Firestopping at Control Joints (without Penetrations): Any material meeting requirements.
 1. Between top of fire rated walls and bottom of slab above: UL Design No. _____, F Rating 1-1/2 hour.
- F. Firestopping Between Top of Partition Wall and [sheathing]: Fiber firestopping with smoke seal coating; UL Design No. [____], and F Rating [____] as indicated in drawings. [_____].

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

END OF SECTION

SECTION 07 9005
JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sealants and joint backing.
- B. Precompressed foam sealers.
- C. Hollow gaskets.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 07 2500 - Weather Barriers: Sealants required in conjunction with air barriers and vapor retarders:
- C. Section 07 8400 - Firestopping: Firestopping sealants.
- D. Section 08 8000 - Glazing: Glazing sealants and accessories.
- E. Section 09 2116 - Gypsum Board Assemblies: Acoustic sealant.
- F. Section 09 3000 - Tiling: Sealant used as tile grout.

1.03 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants; 2010.
- B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- E. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2005 (Reapproved 2010).
- F. ASTM D2628 - Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for concrete Pavements; 1991 (Reapproved 2011).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with other sections referencing this section.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating sealant chemical characteristics.

1.06 QUALITY ASSURANCE

- A. Maintain one copy of each referenced document covering installation requirements on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- C. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years documented experience and approved by manufacturer.

1.07 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Gunnable and Pourable Sealants:
 - 1. Adhesives Technology Corporation: www.atc.ws.
 - 2. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - 3. Bostik Inc: www.bostik-us.com.
 - 4. Dow Corning Corporation: www.dowcorning.com.
 - 5. Pecora Corporation: www.pecora.com.
 - 6. The QUIKRETE Companies: www.quikrete.com.
 - 7. Tremco Global Sealants: www.tremcosealants.com.
 - 8. Sherwin-Williams Company: www.sherwin-williams.com.
 - 9. Substitutions: See Section 01 6000 - Product Requirements.
- B. Preformed Compressible Foam Sealers:
 - 1. EMSEAL Joint Systems, Ltd: www.emseal.com.
 - 2. Tremco Global Sealants: www.tremcosealants.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SEALANTS

- A. Sealants and Primers - General: Provide products having volatile organic compound (VOC) content as specified in Section 01 6116.
- B. General Purpose Exterior Sealant: Polyurethane; ASTM C920, Grade NS, Class 25 minimum; Uses M, G, and A; single component.
 - 1. Color: Match adjacent finished surfaces.
 - 2. Applications: Use for:
 - a. Control, expansion, and soft joints in masonry.
 - b. Joints between concrete and other materials.
 - c. Joints between metal frames and other materials.
 - d. Other exterior joints for which no other sealant is indicated.
 - 3. Polyurethane Products:
 - a. Bostik Inc: www.bostik-us.com.
 - b. Pecora Corporation; DynaTrol II General Purpose One Part Polyurethane Sealant: www.pecora.com.
 - c. The QUIKRETE Companies; QUIKRETE® Polyurethane Non-Sag Sealant: www.quikrete.com.
 - d. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- C. General Purpose Exterior Sealant: Acrylic, solvent release curing; ASTM C920, Grade NS, Class 12-1/2, Uses M, G, and A; single or multi- component.
 - 1. Color: Match adjacent finished surfaces.
 - 2. Applications: Use for:
 - a. Control, expansion, and soft joints in masonry.
 - b. Joints between concrete and other materials.
 - c. Joints between metal frames and other materials.
 - d. Other exterior joints for which no other sealant is indicated.
 - 3. Products:
 - a. Sherwin-Williams Company; Shermax Urethanized Elastomeric Sealant: www.sherwin-williams.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- D. Exterior Expansion Joint Sealer: Precompressed foam sealer; urethane with water-repellent;
 - 1. Color: Black.
 - 2. Size as required to provide weathertight seal when installed.
 - 3. Provide product recommended by manufacturer for traffic-bearing use.

4. Applications: Use for:
 - a. Exterior wall expansion joints.
5. Products:
 - a. EMSEAL Joint Systems, Ltd: www.emseal.com.
 - b. Tremco Global Sealants: www.tremcosealants.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- E. Exterior Expansion Joint Sealer: ASTM D2628, hollow neoprene (polychloroprene) compression gasket.
 1. Black color.
 2. Applications: Use for:
 - a. Exterior wall expansion joints.
- F. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
 1. Color: Match adjacent finished surfaces.
 2. Applications: Use for:
 - a. Interior wall and ceiling control joints.
 - b. Joints between door and window frames and wall surfaces.
 - c. Other interior joints for which no other type of sealant is indicated.
 3. Products:
 - a. Bostik Inc: www.bostik-us.com.
 - b. Pecora Corporation; AC-20 + Silicone Acrylic Latex Caulking Compound: www.pecora.com.
 - c. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - d. Sherwin-Williams Company; 850A Acrylic Latex Caulk: www.sherwin-williams.com.
 - e. Tremco Global Sealants: www.tremcosealants.com.
 - f. Substitutions: See Section 01 6000 - Product Requirements.
- G. Bathtub/Tile Sealant: White silicone; ASTM C920, Uses I, M and A; single component, mildew resistant.
 1. Products:
 - a. Bostik Inc: www.bostik-us.com.
 - b. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - c. Pecora Corporation; 898NST Sanitary Silicone Sealant - Class 50: www.pecora.com.
 - d. Tremco Global Sealants: www.tremcosealants.com.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- H. Acoustical Sealant for Exposed Locations:
 1. Application: Use for exposed location only:
 - a. Acoustical sealant shall be non-skinning, non-hardening, flexible sealant specifically designed for sealing gypsum wallboard. Sealant shall be capable of spanning 1/2-inch wide by 3/8-inch deep gaps. Synthetic rubber based products comply with ASTM Standard D-217 and acrylic latex based products comply with ASTM Standard C-834.
 2. Products:
 - a. Pecora AC-20 FTR (800-523-6688)
 - b. USG acoustical sealant
 - c. or approved equivalent.
- I. Acoustical Sealant for Concealed Locations:
 1. Applications: Use for airtight seal at all wall penetrations and at the perimeter of sound-rated partitions, floors and ceilings.
 - a. Sealant bead between top stud runner and structure and between bottom stud track and floor.
 - b. Acoustical sealant shall be non-skinning, non-hardening, flexible sealant specifically designed for sealing gypsum wallboard. Sealant shall be capable of spanning 1/2-inch wide by 3/8-inch deep gaps. Synthetic rubber based products comply with

ASTM Standard D-217 and acrylic latex based products comply with ASTM Standard C-834.

2. Products:
 - a. Bostik Inc: www.bostik-us.com.
 - b. Pecora Corporation; BA-98: www.pecora.com.
 - c. Tremco Global Sealants: www.tremcosealants.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- J. Type [5] - Acoustical Sheet Sealants
 1. Application: Sheet caulking for junction boxes (non-rated):
 2. Products:
 - a. Lowry's Electrical Box Sealer (800-7722521)
 - b. Tremco sheet caulking (800-321-7906)
 3. Application: Sheet caulking for junction boxes (Rated):
 4. Products:
 - a. Putty Pads™ by Hevi-duty/Nelson (800-331-7325)
 - b. Specified Technologies, Inc. (800-992-1180)
 - c. HILTI CP-617 (800879-8000)
- K. Concrete Floor Joint Filler: Self-leveling, pourable, semi-rigid sealant intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
 1. Composition: , Single or multi-part, 100 percent solids by weight.
 2. Hardness: 85 after 7 days, when tested in accordance with ASTM D2240 Shore A.
 3. Color: Concrete gray.
 4. Joint Width: 1/8 inch (3 mm).
 5. Joint Width, Maximum: 1/4 inch (6 mm).
 6. Applications: Use for:
 - a. Control joints in concrete slabs and floors not filled with filler placed in form.
 - b. joints in concrete slabs and floors.
 7. Products:
 - a. Nox-Crete; DynaFlex 502: www.nox-crete.com
 - b. W.R. Meadows, Inc; Rezi-Weld Flex: www.wrmeadows.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- L. Interior Floor Joint Sealant: Polyurethane, self-leveling; ASTM C920, Grade P, Class 25, Uses T, M and A; single component.
 1. Approved by manufacturer for wide joints up to 1-1/2 inches.
 2. Color: Match adjacent finished surfaces.
- M. Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C920, Class 25, Uses T, I, M and A; single component.
 1. Color: Gray.
 2. Applications: Use for:
 - a. Joints in sidewalks and vehicular paving.
 3. Products:
 - a. Pecora Corporation; NR-201 Self-Leveling Traffic and Loop Sealant: www.pecora.com.
 - b. Sherwin-Williams Company; Stampede 1SL Polyurethane Sealant: www.sherwin-williams.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- N. Expanding Foam Sealant:(UL Class 1 fire retardant)
 1. Application:for multiple pipe or conduits penetrate sound - rated construction, and as detailed.
 2. Products: Polycell expanding foam
 - a. Macklanburg Duncan (800-348-3571)
 - b. Great Stuff Pro – Gaps & Cracks by Dow (800-800-3626)

3.

2.03 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Install bond breaker where joint backing is not used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- G. Tool joints concave.
- H. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch (3 to 6 mm) below adjoining surface.
- I. Compression Gaskets: Avoid joints except at ends, corners, and intersections; seal all joints with adhesive; install with face 1/8 to 1/4 inch (3 to 6 mm) below adjoining surface.
- J. Concrete Floor Joint Filler: Install concrete floor joint filler per manufacturer's written instructions. After floor joint filler is fully cured, shave joint filler flush with top of concrete slab.

3.02 USAGE

- A. Use acoustical sealant to form an airtight seal at all penetrations and perimeter of sound-rated partitions, floors and ceilings. Comply with Section 09 21 16, Gypsum Board and ASTM C919. Use backer-rod where gaps to be sealed exceed 3/8-inch.
- B. Use sheet caulking to seal the back and sides of all junction boxes (4 gang and smaller) recessed in sound-rated partitions.
- C. Apply acoustical sealant as a continuous bead along gypsum board face layer at all head and sill conditions of sound-rated partitions and around the perimeter of resilient ceilings.
- D. Apply expanding foam sealant where detailed and where multiple pipes or conduits penetrate sound-rated construction.

3.03 CLEANING

- A. Clean adjacent soiled surfaces.

3.04 PROTECTION

- A. Protect sealants until cured.

END OF SECTION

SECTION 07 9513
EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Expansion joint cover assemblies for floor, wall, ceiling, and soffit surfaces.

1.02 RELATED REQUIREMENTS

- A. Section 03 1000 - Concrete Forming and Accessories: Placement of joint cover assembly frames in formwork.
- B. Section 03 3000 - Cast-in-Place Concrete: Expansion and contraction joints in exterior concrete joints.
- C. Section 07 7100 - Roof Specialties: Roof expansion and control joint covers.
- D. Section 07 9200 - Joint Sealants: Sealing expansion and control joints using gunnable and pourable sealants.
- E. Section 09 2116 - Gypsum Board Assemblies: Gypsum board control joint trim.
- F. Section 07 9005 - Joint Sealers: Expansion and control joint finishing utilizing a sealant and bond breaker.
- G. Section 09 2116 - Gypsum Board Assemblies: Placement of expansion joint assemblies in gypsum board walls and ceilings.

1.03 REFERENCE STANDARDS

- A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- B. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- C. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles; 2010.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide joint assembly profiles, profile dimensions, anchorage devices and available colors and finish.
- C. Shop Drawings: Indicate joint and splice locations, miters, layout of the work, effected adjacent construction and anchorage locations.
- D. Samples: Submit two sample 4 inch long, illustrating profile, dimension, color, and finish selected.
- E. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 for additional provisions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Expansion Joint Cover Assemblies:
 - 1. Inpro: www.inprocorp.com.
 - 2. MM Systems Corp: www.mmsystemscorp.com. (BOD)
 - 3. Construction Specialties www.c-sgroup.com
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 EXPANSION JOINT COVER ASSEMBLY APPLICATIONS

- A. Roof to Roof/ Roof to Wall Joints Subject to Thermal or Seismic Movement:
 - 1. Products:
 - a. MM Systems Corp: RX-W and RXH Series.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- B. Interior Floor Joints Subject to Seismic Movement:
 - 1. Products:
 - a. MM Systems Corp. Model HFP-4-2 at doors-- and HSC-C-1200 at walls.
 - b. InPro Corporation.316 Series, flush- minimal single sightline.
 - c. Provide Pro-Flex Fire Barrier Blanket at all fire rated conditions as noted on Drawings.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- C. Interior Fire-Rated Wall/Ceiling Joints Subject to Seismic Movement:
 - 1. Products:
 - a. MM Systems Corp.ASC and ASCL series.
 - b. Inpro; 223/233/243 Series (for gwb, narrow sightline, pop-out): www.inprocorp.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
 - d. Provide Pro-Flex Fire Barrier Blanket at all fire rated conditions as noted on Drawings.
- D. Exterior Wall Joints Subject to Seismic Movement:
 - 1. Products:
 - a. MM Systems Corp: Series - VSS- wall to wall and wall corner conditions.
 - b. Inpro; 615 Series (flush, compression gasket): www.inprocorp.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
 - d. Provide Pro-Flex Fire Barrier Blanket at all fire rated conditions as noted on Drawings.

2.03 EXPANSION JOINT COVER ASSEMBLIES

- A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.
 - 1. Joint Dimensions and Configurations: As indicated on drawings.
 - 2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
 - 3. Joint Cover Styles: As indicated on drawings.
 - 4. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
 - 5. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.
- B. Floor Joint Covers: Coordinate with indicated floor coverings.
- C. Resilient Seal Type Covers: Having flat exposed surface without crevices that could collect dirt; designed to withstand expected movement without extrusion of seal from joint assembly; for floors, provide style that is flush with top of floor covering; for exterior joints, weathertight.
- D. Covers In Gypsum Board Assemblies: Provide style with anchoring wings that can be completely covered by joint compound.
- E. Covers In Fire Rated Assemblies: Provide cover assembly having fire rating equivalent to that of assembly into which it is installed.
 - 1. Acceptable Evaluation Agencies: UL, ULC, and Intertek.

2.04 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper; or ASTM B308/B308M, 6061 alloy, T6 temper.
 - 1. Exposed Finish Outdoors: Natural anodized.
 - 2. Exposed Finish at Floors: Mill finish or natural anodized.
- B. Resilient Seals:
 - 1. For Ceilings: Any resilient material, flush, pleated, or hollow gasket.

2. For Pedestrian Traffic Applications: EPDM rubber, Neoprene, or Santoprene; no PVC; Shore A hardness of 40 to 50 Durometer.
- C. Anchors and Fasteners: As recommended by cover manufacturer.
- D. Backing Paint for Aluminum Components in Contact with Cementitious Materials: Asphaltic type.
- E. Provide Pro-Flex Fire Barrier Blanket at slab at all fire rated conditions.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install components and accessories in accordance with manufacturer's instructions.
- B. Align work plumb and level, flush with adjacent surfaces.
- C. Rigidly anchor to substrate to prevent misalignment.

END OF SECTION

SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated steel doors and frames.
- B. Steel frames for wood doors.
- C. Fire-rated steel doors and frames.
- D. Thermally insulated steel doors.
- E. Sound-rated steel doors and frames.
- F. Steel glazing frames.

1.02 RELATED REQUIREMENTS

- A. Section 08 7100 - Door Hardware.
- B. Section 08 8000 - Glazing: Glass for doors and borrowed lites.
- C. Section 09 9113 - Exterior Painting: Field painting.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.
- C. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames; 2007 (R2011).
- D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
- G. ASTM C1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus; 2011.
- H. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- I. ASTM E413 - Classification for Rating Sound Insulation; 2010.
- J. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014. (ANSI/BHMA A156.115)
- K. ICC A117.1 - Accessible and Usable Buildings and Facilities; International Code Council; 2009 (ANSI).
- L. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 2007.
- M. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.
- N. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.
- O. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- P. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.
- D. Shop Drawings showing all dimensions, edge conditions and accessories for sound-rated doors. Manufacturer to verify all specified hardware is compatible with acoustical rating (i.e. seals).
- E. Submit independent laboratory acoustical test report indicating STC rating (ASTM E-90, E-413) for single and double door openings.
- F. Samples: Submit two samples of metal, 2 x 2 inches (50 x 50 mm) in size showing factory finishes, colors, and surface texture.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Maintain at the project site a copy of all reference standards dealing with installation.
- C. Door manufacturer's representative to provide field inspection services.
- D. Doors may be selected for in situ verification testing of the acoustical performance (ASTM E-336). Provide in situ adjustments as required to achieve a minimum Noise Isolation Class (NIC) rating (ASTM-E413) five points less than the specified STC rating. Contractor shall remedy all defects without additional expense to the Owner.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store in accordance with NAAMM HMMA 840.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Steel Doors and Frames:
 - 1. De La Fontaine Inc Hollow Metal Doors: www.delafontaine.com.
 - 2. De La Fontaine Inc; Windstorm-Resistant Steel Door and Frame; door style: www.delafontaine.com.
 - 3. De La Fontaine Inc; Hollow Metal Frame Profile: www.delafontaine.com.
 - 4. Republic Doors: www.republicdoor.com.
 - 5. Steelcraft, an Allegion brand: www.allegion.com/us.
 - 6. Technical Glass Products; SteelBuilt Window & Door Systems: www.tgpamerica.com.
 - 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Sound-rated door, frame and gasket assemblies
 - 1. Noise Barriers LLC (847-843-0500)
 - 2. Industrial Acoustics Company (718-931-8000).
 - 3. Manufacturer to provide all specified hardware for sound-rated doors.

2.02 DOORS AND FRAMES

- A. Requirements for All Doors and Frames:
 - 1. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 2. Door Top Closures: Flush with top of faces and edges.
 - 3. Door Edge Profile: Beveled on both edges.
 - 4. Door Texture: Smooth faces.

5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
 6. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
 7. Galvanizing for Units in Wet Areas: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness
 8. Finish: Factory primed, for field finishing.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 STEEL DOORS

- A. Exterior Doors:
1. Grade: ANSI/SDI A250.8 (SDI-100); Level 1 - Standard-Duty, Physical Performance Level C, Model 1 - Full Flush.
 2. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
 3. Texture: Smooth faces.
 4. Insulating Value: U-value of 0.50, when tested in accordance with ASTM C1363.
 5. Weatherstripping: Separate, see Section 08 7100.
 6. Finish: Factory primed, and field finished.
- B. Interior Doors, Non-Fire-Rated:
1. Grade: ANSI/SDI A250.8 (SDI-100); Level 1 - Standard-Duty, Physical Performance Level C, Model 1 - Full Flush.
 2. Core: Kraftpaper honeycomb.
 3. Thickness: 1-3/4 inch (44.5 mm).
 4. Texture: Smooth faces.
 5. Finish: Factory primed, for field finishing.
- C. Interior Doors, Fire-Rated:
1. Grade: ANSI/SDI A250.8 (SDI-100); Level 1 - Standard-Duty, Physical Performance Level C, Model 1 - Full Flush.
 2. Fire Rating: As indicated on Door and Frame Schedule, tested in accordance with UL 10C ("positive pressure").
 - a. Provide units listed and labeled by UL (Underwriters Laboratories) - UL (BMD).
 - b. Attach fire rating label to each fire rated unit.
 3. Core: Mineral board.
 4. Texture: Smooth faces.
 5. Finish: Factory primed, for field finishing.
- D. Interior Smoke and Draft Control Doors (Indicated as "S" on Drawings): Same fire rated construction as the fire-rated doors, and the following:
1. Maximum Air Leakage: 3.0 cfm/sq ft (0.01524 cu m/sec/sq m) of door opening at 0.10 inch w.g. (24.9 Pa) pressure, when tested in accordance with UL 1784 at both ambient and elevated temperatures.
 2. Gasketing: No added gasketing or seals allowed.
 3. Label: UL "S" label.
- E. Interior Doors, Sound-Rated:
1. Grade: ANSI/SDI A250.8 (SDI-100); Level 1 - Standard-Duty, Physical Performance Level C, Model 2 - Seamless.
 2. Acoustic Rating of Assembled Door, Frame, and Seals: STC of 35, calculated in accordance with ASTM E413, tested in accordance with ASTM E90.
 3. Core: Polyurethane.

4. Texture: Smooth faces.
5. Finish: Factory primed, for field finishing.
6. Sound Seals: Integral, concealed in door and/or frame.
7. Force to Open and Close and Latch: Not more than 5 lbs (22.2 N).
8. Door leaf is to be 2-1/2-inches thick minimum with face sheets of 16 gage (minimum) steel. No exposed welds or fasteners are to be on door faces. 1-3/4-inch thick doors are only acceptable at STC 43 conditions.
9. Acoustical gaskets are to be an integral part of the door frame and comprised of dual magnetic seals, offset in tandem. At fire-rated conditions, dual seals are required, one magnetic and one neoprene bulb. Single magnetic seals are only acceptable for STC 43 doors. Single compression seals and/or seal-stops applied to flush frames are not acceptable.
10. Door frame is to be a split frame, 16 gage steel (minimum). Size door frame with gaskets to have a minimum 36-inch horizontal clearance and 84-inch vertical clearance, unless otherwise noted.
11. Hinges are to be cam-lift.
12. Door to be pre-hung at the factory.

2.04 STEEL FRAMES

- A. General:
 1. Comply with the requirements of grade specified for corresponding door, except:
 - a. Frames for Wood Doors: Comply with frame requirements in accordance with ANSI/SDI A250.8 (SDI-100), Level 1, 18 gage, 0.042 inch (1.0 mm), minimum thickness.
 - b. Frames for Sound-Rated Wood Doors: Comply with frame requirements in accordance with ANSI/SDI A250.8 (SDI-100), Level 1, 18 gage, 0.042 inch (1.0 mm), minimum thickness.
 2. Finish: Same as for door.
- B. Exterior Door Frames: Fully welded.
 1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
 2. Finish: Completely factory finished.
 3. Weatherstripping: Separate, see Section 08 7100.
- C. Interior Door Frames, Non-Fire-Rated: Knockdown type.
 1. Finish: Factory primed, for field finishing.
- D. Interior Door Frames, Fire-Rated: Knockdown type.
 1. Fire Rating: Same as door, labeled.
 2. Finish: Factory primed, for field finishing.
- E. Sound-Rated Door Frames: Fully welded type.
 1. Finish: Factory primed, for field finishing.
- F. Frames for Interior Glazing or Borrowed Lights: Construction and face dimensions to match door frames, and as indicated on drawings.

2.05 ACCESSORY MATERIALS

- A. Glazing: As specified in Section 08 8000, factory installed.
- B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
- C. Astragals for Double Doors: Specified in Section 08 7100.
 1. Fire-Rated Doors: Steel, shape as required to accomplish fire rating.
- D. Sound-Rated Door - Threshold: Reese BAP 14 or Pemko 14/1A
- E. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

- F. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

2.06 FINISH MATERIALS

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Factory Finish: Complying with ANSI/SDI A250.3, manufacturer's standard coating.
 - 1. Color: As indicated on drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.

3.02 INSTALLATION

- A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.
- B. In addition, install fire rated units in accordance with NFPA 80.
- C. STC ratings: As scheduled
- D. Fill sound-rated door frames as indicated by the manufacturer.
- E. Coordinate frame anchor placement with wall construction.
- F. Install all sound-rated doors, frames and gasket assemblies plumb and square.
- G. Sound-Rated Door - Coordinate all gaskets with other hardware to provide a continuous perimeter seal. Provide shim to mount automatic closers as required to clear gaskets.
- H. Sound-Rated Door - Apply and adjust all gaskets to form an airtight seal with latching and closure forces in compliance with code requirements and the American Disabilities Act.
- I. Sound-Rated Door - Install the threshold's horizontal surface 1/4 inch above the finish surface on the swing-side of the doors.
- J. Install in conformance with manufacturer's directions.
- K. Coordinate installation of hardware.
- L. Coordinate installation of glazing.
- M. Touch up damaged factory finishes.

3.03 TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 in (1.5 mm) measured with straight edge, corner to corner.

3.04 ADJUSTING

- A. Adjust for smooth and balanced door movement.
- B. Adjust sound control doors so that seals are fully engaged when door is closed.

END OF SECTION

SECTION 08 1416
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush wood doors; flush configuration; fire rated, non-rated, and acoustical.

1.02 RELATED REQUIREMENTS

- A. Section 06 2000 - Finish Carpentry: Wood door frames.
- B. Section 08 1113 - Hollow Metal Doors and Frames.
- C. Section 08 8000 - Glazing.
- D. Section 09 2116 - Gypsum Board Assemblies: Bullet-resistant sheathing and wallboard for bullet-resistant partitions and walls.
- E. Section 09 9123 - Interior Painting: Field finishing of doors.

1.03 REFERENCE STANDARDS

- A. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- B. ASTM E413 - Classification for Rating Sound Insulation; 2010.
- C. ASTM E1408 - Standard Test Method for Laboratory Measurement of the Sound Transmission Loss of Door Panels and Door Systems; 1991 (Reapproved 2000).
- D. AWI (QCP) - Quality Certification Program, www.awiqcp.org; current edition at www.awiqcp.org.
- E. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- F. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.
- G. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association; 2012.
- H. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
- D. Specimen warranty.
- E. Test Reports: Show compliance with specified requirements for the following:
 - 1. Sound-retardant doors and frames; sealed panel tests are not acceptable.
 - 2. Submit independent laboratory acoustical test report indicating STC rating (ASTM E-90, E-413).
- F. Samples: Submit two samples of door construction, 4 by 4 inch in size cut from top corner of door.
- G. Samples: Submit two samples of door veneer, 4 by 4 inch in size illustrating wood grain, stain color, and sheen.
- H. Manufacturer's Installation Instructions: Indicate special installation instructions.
- I. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
 - 1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
- C. Quality Certification: Provide AWI (QCP) inspection report and quality certification of completed work.
 - 1. Provide labels or certificates indicating that the work complies with requirements of AWI/AWMAC/WI (AWS) grade or grades specified.
 - 2. Prior to delivery to the site provide shop drawings with certification labels.
 - 3. Provide labels on each product when required by certification program.
 - 4. Upon completion of installation provide certificate certifying that the installation and products meet the specified requirements.
 - 5. Arrange and pay for inspections required for certification.
 - 6. Replace, repair, or rework all work for which certification is refused.
- D. Quality Assurance: Doors with an STC rating shall bear manufacturer's label designating sound retardant construction.
- E. Doors may be selected for in site verification testing of the acoustical performance (ASTM E-336). Provide adjustments as required to achieve a minimum Noise Isolation Class (NIC) rating (ASTM E-413) five points less than the specified STC rating. Contractor shall remedy all defects without additional expense to the Owner.
- F. Installed Fire Rated Door and Transom Panel Assembly: Conform to NFPA 80 for fire rated class as indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for the life of the installation.
- C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 DOORS AND PANELS

- A. All Doors: See drawings for locations and additional requirements.
 - 1. Quality Level: Custom Grade, Standard Duty performance, in accordance with AWI/AWMAC/WI (AWS).
 - 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches (44 mm) thick unless otherwise indicated; flush construction.
 - 1. Provide solid core doors at all locations.
 - 2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with NFPA 252 or UL 10B - Negative (Neutral) Pressure; Underwriters Laboratories Inc. (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
 - 3. Sound Retardant Doors: Minimum STC as indicated on drawings, calculated in accordance with ASTM E413, tested in accordance with ASTM E90.

4. Wood veneer facing for field transparent finish where indicated on drawings.

2.02 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.
- B. Fire Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.
- C. Sound Resistant Doors: Equivalent to Type particleboard core (PC) construction with core as required to achieve STC rating specified; plies and faces as indicated.

2.03 DOOR FACINGS

- A. Veneer Facing for Transparent Finish: Red oak, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.

2.04 ACCESSORIES

- A. Sound gaskets for solid-core doors
 1. Bulb at head and jamb stop: Pemko S88
 2. Head and jambs: Pemko 29310 CS
 3. Automatic Door Bottom: Pemko 434ARL
 4. Threshold: Pemko 14/1A
 5. Astragals: Pemko 355CS and 313AN
- B. Acoustical Door gaskets at STC 45, 1-3/4-inch-thick doors:
 1. Bulb at head and jamb stop: Pemko S88
 2. Head and jambs: Pemko 379 CS
 3. Automatic Door Bottom: Pemko 434ARL
 4. Threshold: Pemko 14/1A
 5. Astragals: Pemko 355CS and 313AN
- C. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.

2.05 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
- C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- E. Provide edge clearances in accordance with the quality standard specified.

2.06 FACTORY FINISHING - WOOD VENEER DOORS

- A. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade specified and as follows:

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
 1. Install fire-rated doors in accordance with NFPA 80 requirements.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Field-Finished Doors: Trimming to fit is acceptable.
 1. Adjust width of non-rated doors by cutting equally on both jamb edges.
 2. Trim maximum of 3/4 inch (19 mm) off bottom edges.

3. Trim fire-rated doors in strict compliance with fire rating limitations.
- D. Use machine tools to cut or drill for hardware.
- E. Coordinate installation of doors with installation of frames and hardware.
- F. Coordinate installation of glazing.
- G. Apply and adjust all gaskets to form an airtight seal with latching and closure forces in compliance with handicapped code requirements, and the American Disabilities Act.
- H. Install the threshold's horizontal surface 1/4 inch above the finish surface on the swing-side of the doors.
- I. Install door louvers plumb and level.
- J. Coordinate all gaskets at sound-rated doors with other hardware to provide a continuous perimeter seal. Provide shim to mount automatic closers as required to clear gaskets.
- K. Fill metal door frames at openings with an STC rating of 40 or greater with gypsum plaster. Fill metal door frames with mineral wool at sound-rated openings with an STC rating less than 40, and at "sound gasketed" door frames.

3.02 TOLERANCES

- A. Conform to specified quality standard for fit and clearance tolerances.
- B. Conform to specified quality standard for telegraphing, warp, and squareness.

3.03 SCHEDULE - SEE DRAWINGS

END OF SECTION

SECTION 08 3100
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall access door and frame units.
- B. Ceiling access door and frame units.
- C. Brush-seal wall pass through access panel

1.02 RELATED REQUIREMENTS

- A. Section 08 7100 - Door Hardware: Mortise cylinder and core hardware.
- B. Section 09 9000 - Painting and Coating

1.03 REFERENCE STANDARDS

- A. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- B. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Shop Drawings: Indicate exact position of all access door units.
- D. Samples: Submit two access units, 4x4 inch (____by____ mm) in size illustrating frame configuration.
- E. Manufacturer's Installation Instructions: Indicate installation requirements.

PART 2 PRODUCTS

2.01 ACCESS DOOR AND PANEL APPLICATIONS

- A. Walls, Unless Otherwise Indicated:
 - 1. Size: 12 by 12 inch (305 by 305 mm), unless otherwise indicated.
- B. Fire Rated Walls: See drawings for wall fire ratings.
 - 1. Material: Steel.
 - 2. Size: 12 by 12 inch (305 by 305 mm), unless otherwise indicated.
 - 3. Insulated, double wall door panel.
 - a. 1-1/2-inch-thick minimum mineral wool insulation
 - 4. Tool-operated spring or cam lock; no handle.
 - 5. Continuopus Hinge
- C. Ceilings, Unless Otherwise Indicated: .
 - 1. Size in Lay-in Grid Ceilings: To match grid module.
 - 2. Size in Other Ceilings: 12 by 12 inch (305 by 305 mm), unless otherwise indicated.
 - 3. Standard duty, hinged door.
 - 4. Tool-operated spring or cam lock; no handle.
- D. Fire Rated Ceilings: See drawings for ceiling fire ratings.
 - 1. Material: Steel.
 - 2. Size: 12 by 12 inch (305 by 305 mm), unless otherwise indicated.
 - 3. Insulated, double skin door panel.
 - a. 1-1/2-inch-thick minimum mineral wool insulation.
 - 4. Standard duty, hinged door.
 - 5. Tool-operated spring or cam lock; no handle.
- E. Removable Access Panels: Where indicated, at drinking fountains and at Rest Rooms..

1. Material: Steel.
 2. Size: 12 by 12 inch (305 by 305 mm), unless otherwise indicated.
 3. Tool-operated catches.
- F. Brush-seal wall pass through access panel, Interior:
1. Size: 36 by 36 inch (915 by 915 mm).

2.02 WALL AND CEILING UNITS

- A. Manufacturers:
1. Babcock-Davis; B-ITK SFB: www.babcockdavis.com.
 2. Milcor by Commercial Products Group of Hart & Cooley, Inc; ____: www.milcorinc.com.
 3. Cool Balance wall seal, Product: CB11 for wall installation.
- B. Access Doors: Factory fabricated door and frame units, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies that units are to be installed in.
1. Door Style: Single thickness with rolled or turned in edges.
 2. Frames: 16 gage, 0.0598 inch (1.52 mm), minimum.
 3. Double-Skinned Hollow Steel Door Panels: 16 gage, 0.059 inch (1.52 mm), minimum, on both sides and each edge.
 4. Units in Fire Rated Assemblies: Fire rating as required by applicable code for the fire rated assembly that access doors are being installed.
 - a. Provide products listed by ITS (DIR) or UL (FRD) as suitable for the purpose indicated.
 5. Steel Finish: Primed.
 6. Primed and Factory Finish: Polyester powder coat; color _____.
 7. Size: As indicated on the drawings.
 8. Hardware:
 - a. Hardware for Fire Rated Units: As required for listing.
 - b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings. Secure rigidly in place.
- C. Position units to provide convenient access to the concealed work requiring access.

END OF SECTION

**SECTION 08 3323
OVERHEAD COILING DOORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Overhead coiling doors and shutters, operating hardware, fire-rated, non-fire-rated, and exterior, manual and electric operation.
- B. Wiring from electric circuit disconnect to operator to control station.

1.02 RELATED REQUIREMENTS

- A. Section 09 9000 - Painting and Coating
- B. Section 26 2726 - Wiring Devices
- C. Section 26 0531 - Conduit
- D. Section 26 6113 - Fire Alarm System

1.03 REFERENCE STANDARDS

- A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2014.
- B. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated 600 2000 Volts; National Electrical Manufacturers Association; 2000 (R2008).
- C. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.
- D. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide general construction, electrical equipment, component connections, and details.
- C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
- D. Samples: Submit two slats, [4x4] inch in size illustrating shape, color and finish texture.
- E. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment, and alignment procedures.
- F. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.05 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Overhead Coiling Doors:
 - 1. The Cookson Company: www.cooksondoor.com. (Basis of Design)
 - 2. Wayne-Dalton, a Division of Overhead Door Corporation: www.wayne-dalton.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 COILING DOORS

- A. Exterior Coiling Doors: At Loading Dock: Steel slat curtain.
 - 1. Capable of withstanding positive and negative wind loads of 20 psf (940 Pa), without undue deflection or damage to components.

2. Sandwich slat construction with insulated core of mineral wool type insulation; insulation minimum R 5.3 value: 0.50 BTU/hr sq ft deg F (2.84 W/sq m deg K)
 3. Nominal Slat Size: 2 inches (50 mm) wide x required length.
 4. Finish: Primed.
- B. Fire-Rated Coiling Doors : Steel slat curtain; conform to NFPA 80.
1. 1-1/2 hour fire rating.
 2. Provide products listed and labeled by UL (BMD) as suitable for the purpose specified and indicated.
 3. Oversized Openings: Provide certificate of compliance from authority having jurisdiction indicating approval of fire rated units and operating hardware assembly.
 4. Nominal Slat Size: 2 inches (50 mm) wide x required length.
 5. Finish: Primed.
 6. Release Mechanism: Fire alarm system activated with automatically governed closing speed.
 7. Electric operation.

2.03 MATERIALS

- A. Curtain Construction: Interlocking slats.
1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
 2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
 3. Weatherstripping: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.
- B. Stainless Steel Slats: Conforming to ASTM A 666, Type 304, rollable temper.
- C. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.
- D. Hardware:
1. Lock Cylinders: Specified in Section 08 7100.
 2. Latching: Inside mounted, adjustable keeper, spring activated latch bar with feature to keep in locked or retracted position.
 3. Latch Handle: Interior and exterior handle.
- E. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb (10 kg) nominal force to operate.

2.04 ELECTRIC OPERATION

- A. Electric Operators:
1. Motor Rating: 1/3 hp (250 W); continuous duty.
 2. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
 3. Controller Enclosure: NEMA 250, Type 1.
 4. Opening Speed: 12 inches per second (300 mm/s).
 5. Brake: Adjustable friction clutch type, activated by motor controller.
 6. Manual override in case of power failure.
- B. Control Station: Standard three button (OPEN-STOP-CLOSE) momentary control for each operator.
1. 24 volt circuit.
- C. Safety Edge: Located at bottom of curtain, full width, electro-mechanical sensitized type, wired to stop operator upon striking object, hollow neoprene covered.

END OF SECTION

SECTION 08 4113

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes Kawneer Architectural Aluminum Storefront Systems, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of storefront units.
 - 1. Types of Kawneer Aluminum Storefront Systems include:
 - a. Trifab® 601T Storefront System – 2" x 6" (50.8 mm x 152.4 mm) nominal dimension; Thermal; Center Plane; Screw Spline Fabrication.
 - b. Trifab® 450 Storefront System – 2" x 4.5" (50.8 mm x 152.4 mm) nominal dimension; non-Thermal; Center Plane; Screw Spline Fabrication.
- B. Related Sections:
 - 1. Division 079005 "Joint Sealants" for joint sealants installed as part of the aluminum storefront system system

1.03 DEFINITIONS

- A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufacturers Association (AAMA) – AAMA Glossary (AAMA AG).

1.04 PERFORMANCE REQUIREMENTS

- A. General Performance: Aluminum-framed storefront system shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
 - 1. Design Wind Loads: Determine design wind loads applicable to the Project from basic wind speed indicated in miles per hour, according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
- B. Storefront System Performance Requirements:
 - 1. Wind loads: Provide storefront system; include anchorage, capable of withstanding wind load design pressures of 30 lbs./sq. ft. inward and 30 lbs./sq. ft. outward. The design pressures are based on the 2013 CBC Building Code.
 - 2. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft² (0.3 l/s · m²) at a static air pressure differential of 6.24 psf (300 Pa) with interior seal, or, rate shall not exceed 0.06 cfm/ft² (0.3 l/s · m²) at a static air pressure differential of 1.57 psf (75 Pa) without interior seal. CSA A440 Fixed Rating.
 - 3. Air Exfiltration: The test specimen shall be tested in accordance with ASTM E 283. Air exfiltration rate shall not exceed 0.045 cfm/ft of crack (0.25 l/s · m of crack) at a static air pressure differential of 1.57 psf (75 Pa). CSA A440 Fixed Rating.
 - 4. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 10 psf (500 Pa) as defined in AAMA 501. CSA A440 B5 Rating.
 - 5. Uniform Load: A static air design load of 30 psf (1437 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur. CSA A440 C2 Rating.
 - 6. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than:

- a. Trifab® 601T – 0.35 (low-e) BTU/hr/ft²/°F. As determined per AAMA 507 or NFRC 100.
- b. Trifab® 450 – Clear glass no U factor.
7. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than:
 - a. Trifab® 601T – 69 frame and 70glass (low-e).
8. Condensation Resistance (I): When tested to CSA A-440.2, the condensation index shall not be less than:
 - a. 63 frame and 68glass (low-e).
9. Sound Transmission Class (STC) and Outdoor-Indoor Transmission Class (OITC): When tested to AAMA Specification 1801 and in accordance with ASTM E1425 and ASTM E90, the STC and OITC Rating shall not be less than:
 - a. Trifab® 601T – 37 (STC) and 31 (OITC)

1.05 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, hardware, finishes, and installation instructions for each type of aluminum frame storefront system indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, and attachments to other work, operational clearances and installation details.
- C. Samples for Verification: For aluminum framed storefront system and components required.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type of aluminum-framed storefront.
- E. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12" (300 mm) lengths of full-size components and showing details of the following:
 1. Joinery, including concealed welds.
 2. Anchorage.
 3. Expansion provisions.
 4. Glazing.
 5. Flashing and drainage.
- F. Other Action Submittals:
 1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.
- B. Manufacturer Qualifications: A manufacturer capable of providing aluminum framed storefront system that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.
- C. Source Limitations: Obtain aluminum framed storefront system through one source from a single manufacturer.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum framed storefront system and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements." Do not modify size and dimensional requirements.
 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup for type(s) of storefront elevation(s) indicated, in location(s) shown on Drawings.
- F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
- G. Structural-Sealant Glazing: Comply with ASTM C 1401, "Guide for Structural Sealant Glazing" for design and installation of structural-sealant-glazed systems.
- H. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of aluminum framed storefront openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

1.08 WARRANTY

- A. Manufactures Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty.
 1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design Product:
 1. Kawneer Company Inc.
 2. Trifab® 450 (non-Thermal) and Trifab® 601T (thermal) Storefront System Storefront System
 3. 2" x 6" and 2"x 4.5" (50.8 mm x 152.4 mm) System Dimensions
- B. Substitutions: Refer to Substitutions Section for procedures and submission requirements
 1. Pre-Contract (Bidding Period) Substitutions: Submit written requests ten (10) days prior to bid date.
 2. Post-Contract (Construction Period) Substitutions: Submit written request in order to avoid storefront installation and construction delays.
 3. Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.
 4. Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for storefront system performance criteria, and (2) has been engaged in the design, manufacturer and fabrication of aluminum storefronts for a period of not less than ten (10) years. (Company Name)
 5. Test Reports: Submit test reports verifying compliance with each test requirement required by the project.
 6. Samples: Provide samples of typical product sections and finish samples in manufacturer's standard sizes.
- C. Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.02 MATERIALS

- A. Aluminum Extrusions: Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.
- B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim hardware, anchors, and other components.
- C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

- D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
- E. Sealant: For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.
- F. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

2.03 STOREFRONT FRAMING SYSTEM

- A. Thermal Barrier (Trifab® 601T & 601UT):
 - 1. Trifab® 601T: Kawneer IsoLock® Thermal Break with a nominal 1/4" (6.4 mm) separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.
- D. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action
- E. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- F. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation.

2.04 GLAZING SYSTEMS

- A. Glazing: As specified in Division 08 Section "Glazing."
- B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.
- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
- D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
- E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:
 - 1. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
 - a. Color: Matching structural sealant.

2.05 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: As specified in Division 08 41 13 Section "Aluminum Framed Entrances."
- B. Entrance Door Hardware: As specified in Division 08 41 13 Section "Door Hardware."

2.06 ACCESSORY MATERIALS

- A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants."

2.07 FABRICATION

- A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fit joints; make joints flush, hairline and weatherproof.
 - 3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
 - 4. Physical and thermal isolation of glazing from framing members.
 - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 6. Provisions for field replacement of glazing.
 - 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- B. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- C. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
- D. Storefront Framing: Fabricate components for assembly using manufactures standard installation instructions.
- E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.08 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Factory Finishing:
 - 1. Kawneer Permanodic® AA-M10C22A31, AAMA 611, Architectural Class II Clear Anodic Coating (Color #17 Clear) (Standard).

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight framed aluminum storefront system installation.
 - 1. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76 mm) of opening.
 - 2. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum framed storefront system, accessories, and other components.
- B. Install aluminum framed storefront system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.
- D. Install aluminum framed storefront system and components to drain condensation, water penetrating joints, and moisture migrating within sliding door to the exterior.

- E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.03 FIELD QUALITY CONTROL

- A. Field Tests: Architect shall select storefront units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the contract amount.
 - 1. Testing: Testing shall be performed by a qualified independent testing agency. Refer to Testing Section for payment of testing and testing requirements. Testing Standard per AAMA 503, including reference to ASTM E 783 for Air Infiltration Test and ASTM E 1105 Water Infiltration Test.
 - a. Air Infiltration Tests: Conduct tests in accordance with ASTM E 783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft², whichever is greater.
 - b. Water Infiltration Tests: Conduct tests in accordance with ASTM E 1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 6.24 psf (300 Pa).

3.04 ADJUSTING, CLEANING, AND PROTECTION

- A. Clean aluminum surfaces immediately after installing aluminum framed storefronts. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION

SECTION 08 4229
AUTOMATIC ENTRANCES

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 08 4113 - Aluminum Framed Entrances and Storefronts

1.02 REFERENCE STANDARDS

- A. BHMA A156.10 - American National Standard for Power Operated Pedestrian Doors; Builders Hardware Manufacturers Association; 2011 (ANSI/BHMA A156.10).
- B. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate layout and dimensions; head, jamb, and sill conditions; elevations; components, anchorage, recesses, materials, and finishes, electrical characteristics and connection requirements.
 - 2. Identify installation tolerances required, assembly conditions, routing of service lines and conduit, and locations of operating components and boxes.
- C. Product Data: Provide data on system components, sizes, features, and finishes.
- D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and manufacturer's hardware and component templates.
- E. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.
- F. Maintenance Data: Include manufacturer's parts list and maintenance instructions for each type of hardware and operating component.
- G. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years of experience.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide two year manufacturer warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Swinging Automatic Entrance Door Assemblies:
 - 1. Substitutions: See Section 01 6000 - Product Requirements.

2.02 POWER OPERATED DOORS

- A. Power Operated Doors: Provide products that comply with the requirements of the authorities having jurisdiction; unless otherwise indicated, provide equipment selected for the actual weight of the doors and for light pedestrian traffic.

1. Swinging Door Operators: Fully adjustable for opening and closing speeds, checking speeds, and hold-open time; in the event of power failure, disengage operator allowing door to function as a door with a spring closer.
 2. Packaged Door Assemblies: Provide all components by single manufacturer, factory-assembled, including doors, frames, operators, actuators, and safeties.
- B. Swinging Doors with Full Power Operators: Comply with BHMA A156.10; safeties required.
1. Comply with UL 325; acceptable evidence of compliance includes current UL or ULC listing.

2.03 PACKAGED AUTOMATIC ENTRANCE DOOR ASSEMBLIES

- A. Swinging Automatic Door : Single-acting hinged, electric operation, extruded aluminum glazed door, with extruded tubular frame, and operator concealed overhead.
1. Operation: Full-power open, spring close operation.
 2. Actuator(s): As indicated on drawings.
 3. Hold Open: Toggle switch at inside head of doors; this is not a fire-rated door.
 4. Door and Frame Finish: Same as adjacent framing system.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work and dimensions are as indicated on shop drawings.
- B. Verify that electric power is available and is of the correct characteristics.

3.02 INSTALLATION

- A. Install equipment in accordance with manufacturer's instructions.

3.03 ADJUSTING

- A. Adjust door equipment for correct function and smooth operation.

3.04 CLEANING

- A. Remove temporary protection, clean exposed surfaces.

3.05 CLOSEOUT ACTIVITIES

- A. Demonstrate operation, operating components, adjustment features, and lubrication requirements.

END OF SECTION

SECTION 08 5113
ALUMINUM WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Extruded aluminum windows with fixed acoustical operating sash and glass.
- B. Factory glazing.
- C. Operating hardware.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Rough opening framing.
- B. Section 07 9005 - Joint Sealers: Perimeter sealant and back-up materials.
- C. Section 08 8000 - Glazing.

1.03 REFERENCE STANDARDS

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; American Architectural Manufacturers Association; 2012.
- B. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; American Architectural Manufacturers Association; 2012.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2013.
- D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.
- E. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- F. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- G. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- H. ASTM E1332 - Standard Classification for Rating Outdoor-Indoor Sound Attenuation; 2010a.
- I. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions.
- C. Shop Drawings: Indicate opening dimensions, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, anchorage locations, , and installation requirements.
- D. Samples: Submit one samples, 12 x 12 inch (300 x 300 mm) in size illustrating typical corner construction, accessories, and finishes.
- E. Submit a sample of operating hardware.
- F. Test Reports: Prior to submitting shop drawings or starting fabrication, submit test report(s) by independent testing agency showing compliance with performance requirements in excess of those prescribed by specified grade (ASTM E-90, E-413).
- G. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer and Installer Qualifications: Company specializing in fabrication of commercial aluminum windows of types required, with not fewer than three years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of AAMA CW-10.
- B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.07 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C).
- B. Maintain this minimum temperature during and 24 hours after installation of sealants.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fixed acoustical Aluminum Windows in Recording Studio :
 - 1. Acoustical Surfaces, Inc. ; Product: Studio Series Soundproof Interior Windows
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- B. 3-panel operable Aluminum Window and Projection Portal at Control Room:
 - 1. Fleetwood Windows & Doors; Product Norwood 3070-EX Standard Features:
www.fleetwoodusa.com.
 - 2. Projection Port Sound Control Window: Strong Cinema Products, a division of Ballantyne of Omaha, Inc. : Product: Double Glass THX Projection Port. #86015
www.strong-cinema.com
 - 3. Substitutions: See Section 01 600- Product Requirements

2.02 MATERIALS

- A. Provide 1-inch-thick laminated glass, unless otherwise indicated. Laminating inter-layer minimum thickness: 0.030 inches at Fixed window at Recording Studio and 3-Panel operable window at Control Room.
- B. Sound Transmission Class of the sliding glass window assembly: STC 50, Minimum.
- C. Sound Transmission Class of the fixed Acoustical window assembly: STC 50 Minimum.
- D. Acceptable manufacturers: Industrial Acoustics Co. Overy Manufacturing, Fleetwood Windows & Doors (800-736-7363), Wausau Windows (877-678-2983).

2.03 INSTALLATION

- A. Seal shim space at frame perimeter with acoustical sealant.
- B. Aluminum Projection Port Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.
 - 1. Frame Depth: 3-1/2 inches (88.9 mm).
 - 2. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.

- C. Performance Requirements: Provide products that comply with the following:
 - 1. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
 - 2. Air Leakage: Maximum of 0.1 cu ft/min/sq ft at 6.27 pounds per square foot (0.5 L/sec/sq m at 300 Pa) differential pressure, when tested in accordance with ASTM E283.
 - 3. Acoustical Performance: As noted above, when tested in accordance with ASTM E90 and E1332.
- D. Fixed, Non-Operable Type:
 - 1. Glazing: Double; clear; transparent.
 - 2. Interior Finish: Class I color anodized.
- E. Horizontal Sliding Type:
 - 1. Glazing: Double; clear; transparent.
 - 2. Interior Finish: Class I color anodized.

2.04 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.
- B. Concealed Steel Items: Profiled to suit mullion sections; galvanized in accordance with ASTM A123/A123M.

2.05 HARDWARE

- A. Pulls: Manufacturer's standard type.
- B. Bottom Rollers: Stainless steel, adjustable.
- C. Limit Stops: Resilient rubber.
- D. Provide glass fiber sound absorbing material in head, jamb and sills of window cavity.
- E. Comply with CBC 11B-229

2.06 FINISHES

- A. Class I Natural Finish or Anodized Plus Natural Anodized 2-step Finish:
 - 1. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils (0.018 mm) thick.
- B. Class I Color Anodized Finish: AAMA 611 AA-M12C22A44 Electrolytically deposited colored anodic coating not less than 0.7 mils (0.018 mm) thick; light bronze.
- C. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install windows in accordance with manufacturer's instructions.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Install one -inch thick rigid duct liner wrapped in black (8 oz./yd) duvetyn at the interior perimeter cavity between glazing.
- D. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- E. Install sill and sill end angles.
- F. Install glazing tilted at the angles indicated on the drawings.
- G. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- H. Coordinate attachment and seal of perimeter air barrier and vapor retarder materials.
- I. Install operating hardware not pre-installed by manufacturer.

3.02 TOLERANCES

- A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft (1.5 mm/m) non-cumulative or 1/8 inches per 10 ft (3 mm/3 m), whichever is less.

3.03 ADJUSTING

- A. Adjust hardware for smooth operation and secure weathertight closure.

3.04 CLEANING

- A. Remove protective material from factory finished aluminum surfaces.
- B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

END OF SECTION

SECTION 08 6200
UNIT SKYLIGHTS

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood framing for rough opening.
- B. Section 07 5420 - Membrane Roofing
- C. Section 07 6200 - Sheet Metal Flashing and Trim: Skylight counterflashing.
- D. Section 07 7200 - Roof Accessories: Manufactured curbs for installation of unit skylights.

1.02 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2010.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2010.
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.
- D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- E. ASTM D4479/D4479M - Standard Specification for Asphalt Roof Coatings - Asbestos-Free; 2007 (Reapproved 2012)e1.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide structural, thermal, and daylighting performance values.
- C. Shop Drawings: Indicate configurations, dimensions, locations, fastening methods, and installation details.
- D. Manufacturer's Installation Instructions: Indicate special procedures.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 3 years documented experience.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty, including coverage for leakage due to defective skylight materials or construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Unit Skylights:
 - 1. Wasco Products, Inc: www.wascoproducts.com.
 - 2. Kalwal; kalwal.com
 - 3. Sunoptics Prismatic Skylights, a Division of Acuity Brands: www.sunoptics.com.
 - 4. Velux America, Inc.; CM, fixed, curb mount, db dome, mill finish: www.veluxusa.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements and Section 01 2513 Product Options and Substitutions.

2.02 UNIT SKYLIGHTS

- A. Unit Skylights: Factory-assembled glazing in aluminum frame, free of visual distortion, and weathertight.
 - 1. Shape: Square dome.

2. Glazing: Double.
3. Operation: None; fixed.
4. Nominal Size: 4'_x 4' inches (1200 x 1200 mm).

2.03 COMPONENTS

- A. Double Glazing: Acrylic plastic with aerogel insulation between layers; factory sealed.
- B. Frames: ASTM B221 (ASTM B221M) Extruded aluminum thermally broken, reinforced and welded corner joints, integral curb frame mounting flange and counterflashing to receive roofing flashing system, with integral condensation collection gutter, glazing retainer; clear anodized finish.
- C. Support Curbs: ASTM B209 (ASTM B209M) Sheet aluminum, sandwich construction; 1 inch (25 mm) thick, 4 inches (100 mm) high; glass fiber insulation; with integral flange for anchorage to roof deck.

2.04 ACCESSORIES

- A. Anchorage Devices: Type recommended by manufacturer, exposed to view.
- B. Counterflashings: Same metal type and finish as skylight frame.
- C. Protective Back Coating: Zinc molybdate alkyd.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that openings and substrate conditions are ready to receive work of this section.

3.02 PREPARATION

- A. Apply protective back coating on aluminum surfaces of skylight units that will be in contact with cementitious materials or dissimilar metals.

3.03 INSTALLATION

- A. Install aluminum curb assembly, fastening securely to roof decking. Flash curb assembly into roof system.
- B. Place skylight units and mount secure to curb assembly. Install counterflashing as required.
- C. Apply sealant to achieve watertight assembly.

3.04 CLEANING

- A. Remove protective material from prefinished aluminum surfaces.
- B. Wash down exposed surfaces; wipe surfaces clean.
- C. Remove excess sealant.

END OF SECTION

**SECTION 08 7100
DOOR HARDWARE**

PART 1 - GENERAL

1.1 SUMMARY:

- A. Section Includes: Finish Hardware for door openings, except as otherwise specified herein.
1. Door hardware for steel (hollow metal) doors.
 2. Door hardware for aluminum doors.
 3. Door hardware for wood doors.
 4. Door hardware for other doors indicated.
 5. Keyed cylinders as indicated.
- B. Related Sections:
1. Division 6: Rough Carpentry.
 2. Division 8: Aluminum Doors and Frames
 3. Division 8: Hollow Metal Doors and Frames.
 4. Division 8: Wood Doors.
 5. Division 26 Electrical
 6. Division 28: Electronic Security
- C. References: Comply with applicable requirements of the following standards. Where these standards conflict with other specific requirements, the most restrictive shall govern.
1. Builders Hardware Manufacturing Association (BHMA)
 2. NFPA 101 Life Safety Code
 3. NFPA 80 -Fire Doors and Windows
 4. ANSI-A156.xx- Various Performance Standards for Finish Hardware
 5. UL10C – Positive Pressure Fire Test of Door Assemblies
 6. 2013 CBC – Accessible and Usable Buildings and Facilities
 7. DHI /ANSI A115.IG – Installation Guide for Doors and Hardware
 8. ICC – International Building Code
 9. 2013 CBC
- D. Intent of Hardware Groups
1. Should items of hardware not definitely specified be required for completion of the Work, furnish such items of type and quality comparable to adjacent hardware and appropriate for service required.
 2. Where items of hardware aren't definitely or correctly specified, are required for completion of the Work, a written statement of such omission, error, or other discrepancy to be submitted to Architect, prior to date specified for receipt of bids for clarification by addendum; or, furnish such items in the type and quality established by this specification, and appropriate to the service intended.
- E. Allowances
1. Refer to Division 1 for allowance amount and procedures.

- F. Alternates
 - 1. Refer to Division 1 for Alternates and procedures.
- 1.2 SUBSTITUTIONS:
 - A. Comply with Division 1.
- 1.3 SUBMITTALS:
 - A. Comply with Division 1.
 - B. Special Submittal Requirements: Combine submittals of this Section with Sections listed below to ensure the "design intent" of the system/assembly is understood and can be reviewed together.
 - C. Product Data: Manufacturer's specifications and technical data including the following:
 - 1. Detailed specification of construction and fabrication.
 - 2. Manufacturer's installation instructions.
 - 3. Wiring diagrams for each electric product specified. Coordinate voltage with electrical before submitting.
 - 4. Submit 6 copies of catalog cuts with hardware schedule.
 - 5. Provide 9001-Quality Management and 14001-Environmental Management for products listed in Materials Section 2.2
 - D. Shop Drawings - Hardware Schedule: Submit 6 complete reproducible copy of detailed hardware schedule in a vertical format.
 - 1. List groups and suffixes in proper sequence.
 - 2. Completely describe door and list architectural door number.
 - 3. Manufacturer, product name, and catalog number.
 - 4. Function, type, and style.
 - 5. Size and finish of each item.
 - 6. Mounting heights.
 - 7. Explanation of abbreviations and symbols used within schedule.
 - 8. Detailed wiring diagrams, specially developed for each opening, indicating all electric hardware, security equipment and access control equipment, and door and frame rough-ins required for specific opening.
 - E. Templates: Submit templates and "reviewed Hardware Schedule" to door and frame supplier and others as applicable to enable proper and accurate sizing and locations of cutouts and reinforcing.
 - 1. Templates, wiring diagrams and "reviewed Hardware Schedule" of electrical terms to electrical for coordination and verification of voltages and locations.
 - F. Samples:
 - 1. 1 sample of Lever and Rose/Escutcheon design, (pair).
 - 2. 3 samples of metal finishes
 - G. Contract Closeout Submittals: Comply with Division 1 including specific requirements indicated.

1. Operating and maintenance manuals: Submit 3 sets containing the following.
 - a. Complete information in care, maintenance, and adjustment, and data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Name, address, and phone number of local representative for each manufacturer.
 - d. Parts list for each product.
2. Copy of final hardware schedule, edited to reflect, "As installed".
3. Copy of final keying schedule
4. As installed "Wiring Diagrams" for each piece of hardware connected to power, both low voltage and 110 volts.
5. One set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

1.4 QUALITY ASSURANCE

A. Comply with Division 1.

1. Statement of qualification for distributor and installers.
2. Statement of compliance with regulatory requirements and single source responsibility.
3. Distributor's Qualifications: Firm with 3 years experience in the distribution of commercial hardware.
 - a. Distributor to employ full time Architectural Hardware Consultants (AHC) for the purpose of scheduling and coordinating hardware and establishing keying schedule.
 - b. Hardware Schedule shall be prepared and signed by an AHC.
4. Installer's Qualifications: Firm with 3 years experienced in installation of similar hardware to that required for this Project, including specific requirements indicated.
5. Regulatory Label Requirements: Provide testing agency label or stamp on hardware for labeled openings.
 - a. Provide UL listed hardware for labeled and 20 minute openings in conformance with requirements for class of opening scheduled.
 - b. Underwriters Laboratories requirements have precedence over this specification where conflict exists.
6. Single Source Responsibility: Except where specified in hardware schedule, furnish products of only one manufacturer for each type of hardware.

- ##### B. Review Project for extent of finish hardware required to complete the Work. Where there is a conflict between these Specifications and the existing hardware, notify the Architect in writing and furnish hardware in compliance with the Specification unless otherwise directed in writing by the Architect.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping: Comply with Division 1.

1. Deliver products in original unopened packaging with legible manufacturer's identification.
2. Package hardware to prevent damage during transit and storage.

3. Mark hardware to correspond with "reviewed hardware schedule".
4. Deliver hardware to door and frame manufacturer upon request.

B. Storage and Protection: Comply with manufacturer's recommendations.

1.6 PROJECT CONDITIONS:

- A. Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.
- B. Review Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

1.7 WARRANTY:

- A. Refer to Conditions of the Contract
- B. Manufacturer's Warranty:
 1. Closers: Ten years
 2. Exit Devices: Five Years
 3. Locksets & Cylinders: Three years
 4. All other Hardware: Two years.

1.8 OWNER'S INSTRUCTION:

- A. Instruct Owner's personnel in operation and maintenance of hardware units.

1.9 MAINTENANCE:

- A. Extra Service Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals Section.
 1. Special Tools: Provide special wrenches and tools applicable to each different or special hardware component.
 2. Maintenance Tools: Provide maintenance tools and accessories supplied by hardware component manufacturer.
 3. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra service materials.
- B. Maintenance Service: Submit for Owner's consideration maintenance service agreement for electronic products installed.

PART 2 - GENERAL

2.1 SUMMARY:

- A. Section Includes: Finish Hardware for door openings, except as otherwise specified herein.

1. Door hardware for steel (hollow metal) doors.
2. Door hardware for aluminum doors.
3. Door hardware for wood doors.
4. Door hardware for other doors indicated.
5. Keyed cylinders as indicated.
6. Wireless locking devices and components must be "Furnished and Installed" by Stanley certified technician.
7. Electric PAC locking devices and components must be "Furnished and Installed" by Stanley certified technician.

B. Related Sections:

1. Division 6: Rough Carpentry.
2. Division 8: Aluminum Doors and Frames
3. Division 8: Hollow Metal Doors and Frames.
4. Division 8: Wood Doors.
5. Division 26 Electrical
6. Division 28: Electronic Security

C. References: Comply with applicable requirements of the following standards. Where these standards conflict with other specific requirements, the most restrictive shall govern.

1. Builders Hardware Manufacturing Association (BHMA)
2. NFPA 101 Life Safety Code
3. NFPA 80 -Fire Doors and Windows
4. ANSI-A156.xx- Various Performance Standards for Finish Hardware
5. UL10C – Positive Pressure Fire Test of Door Assemblies
6. ANSI-A117.1 – Accessible and Usable Buildings and Facilities
7. DHI /ANSI A115.IG – Installation Guide for Doors and Hardware

D. Intent of Hardware Groups

1. Should items of hardware not definitely specified be required for completion of the Work, furnish such items of type and quality comparable to adjacent hardware and appropriate for service required.
2. Where items of hardware aren't definitely or correctly specified, are required for completion of the Work, a written statement of such omission, error, or other discrepancy to be submitted to Architect, prior to date specified for receipt of bids for clarification by addendum; or, furnish such items in the type and quality established by this specification, and appropriate to the service intended.

E. Allowances

1. Refer to Division 1 for allowance amount and procedures.

F. Alternates

1. Refer to Division 1 for Alternates and procedures.

2.2 SUBSTITUTIONS:

- A. Comply with Division 1.

2.3 SUBMITTALS:

- A. Comply with Division 1.
- B. Special Submittal Requirements: Combine submittals of this Section with Sections listed below to ensure the "design intent" of the system/assembly is understood and can be reviewed together.
- C. Product Data: Manufacturer's specifications and technical data including the following:
 - 1. Detailed specification of construction and fabrication.
 - 2. Manufacturer's installation instructions.
 - 3. Wiring diagrams for each electric product specified. Coordinate voltage with electrical before submitting.
 - 4. Submit 6 copies of catalog cuts with hardware schedule.
 - 5. Provide 9001-Quality Management and 14001-Environmental Management for products listed in Materials Section 2.2
- D. Shop Drawings - Hardware Schedule: Submit 6 complete reproducible copy of detailed hardware schedule in a vertical format.
 - 1. List groups and suffixes in proper sequence.
 - 2. Completely describe door and list architectural door number.
 - 3. Manufacturer, product name, and catalog number.
 - 4. Function, type, and style.
 - 5. Size and finish of each item.
 - 6. Mounting heights.
 - 7. Explanation of abbreviations and symbols used within schedule.
 - 8. Detailed wiring diagrams, specially developed for each opening, indicating all electric hardware, security equipment and access control equipment, and door and frame rough-ins required for specific opening.
- E. Templates: Submit templates and "reviewed Hardware Schedule" to door and frame supplier and others as applicable to enable proper and accurate sizing and locations of cutouts and reinforcing.
 - 1. Templates, wiring diagrams and "reviewed Hardware Schedule" of electrical terms to electrical for coordination and verification of voltages and locations.
- F. Samples: (If requested by the Architect)
 - 1. 1 sample of Lever and Rose/Escutcheon design, (pair).
 - 2. 3 samples of metal finishes
- G. Contract Closeout Submittals: Comply with Division 1 including specific requirements indicated.
 - 1. Operating and maintenance manuals: Submit 3 sets containing the following.
 - a. Complete information in care, maintenance, and adjustment, and data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Name, address, and phone number of local representative for each manufacturer.
 - d. Parts list for each product.

2. Copy of final hardware schedule, edited to reflect, "As installed".
3. Copy of final keying schedule
4. As installed "Wiring Diagrams" for each piece of hardware connected to power, both low voltage and 110 volts.
5. One set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

2.4 QUALITY ASSURANCE

A. Comply with Division 1.

1. Statement of qualification for distributor and installers.
2. Statement of compliance with regulatory requirements and single source responsibility.
3. Distributor's Qualifications: Firm with 3 years experience in the distribution of commercial hardware.
 - a. Distributor to employ full time Architectural Hardware Consultants (AHC) for the purpose of scheduling and coordinating hardware and establishing keying schedule.
 - b. Hardware Schedule shall be prepared and signed by an AHC.
4. Installer's Qualifications: Firm with 3 years experienced in installation of similar hardware to that required for this Project, including specific requirements indicated.
5. Regulatory Label Requirements: Provide testing agency label or stamp on hardware for labeled openings.
 - a. Provide UL listed hardware for labeled and 20 minute openings in conformance with requirements for class of opening scheduled.
 - b. Underwriters Laboratories requirements have precedence over this specification where conflict exists.
6. Single Source Responsibility: Except where specified in hardware schedule, furnish products of only one manufacturer for each type of hardware.

B. Review Project for extent of finish hardware required to complete the Work. Where there is a conflict between these Specifications and the existing hardware, notify the Architect in writing and furnish hardware in compliance with the Specification unless otherwise directed in writing by the Architect.

2.5 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping: Comply with Division 1.

1. Deliver products in original unopened packaging with legible manufacturer's identification.
2. Package hardware to prevent damage during transit and storage.
3. Mark hardware to correspond with "reviewed hardware schedule".
4. Deliver hardware to door and frame manufacturer upon request.

B. Storage and Protection: Comply with manufacturer's recommendations.

Hinges	Stanley	Bommer, McKinney
Continuous Hinges	Stanley	Select, ABH
Locksets	Best	
Cylinders	Best	
Exit Devices	Precision	Von Duprin,
Closers	Stanley D-4550	Dorma 8900, Norton 7500
Automatic Operators	Stanley D-4990	LCN 4640, Norton
Push/Pull Plates	Trimco	Hager, Rockwood
Push/Pull Bars	Trimco	Hager, Rockwood
Protection Plates	Trimco	Hager, Rockwood
Overhead Stops	ABH	Rixson, Glynn Johnson
Door Stops	Trimco	Hager, Rockwood
Flush Bolts	Trimco	ABH, Rockwood
Coordinator & Brackets	Trimco	ABH, Rockwood
Threshold & Gasketing	Zero	National Guard, Reese, Pemko

3.2 MATERIALS:

A. Hinges:

1. Template screw hole locations
2. Minimum of 2 permanently lubricated non-detachable bearings
3. Equip with easily seated, non-rising pins
4. Sufficient size to allow 180-degree swing of door
5. Furnish hinges with five knuckles and flush [concealed] bearings
6. Provide hinge type as listed in schedule.
7. Furnish 3 hinges per leaf to 7 foot 6 inch height. Add one for each additional 30 inches in height or fraction thereof.
8. Tested and approved by BHMA for all applicable ANSI Standards for type, size, function and finish
9. UL10C listed for Fire rated doors.

B. Geared Continuous Hinges:

1. Tested and approved by BHMA for ANSI A156.26-1996 Grade 1
2. Anti-spinning through fastener
3. UL10C listed for 3 hour Fire rating
4. Non-handed
5. Lifetime warranty
6. Provide Fire Pins for 3-hour fire ratings
7. Sufficient size to permit door to swing 180 degrees

3.3 MATERIALS:

A. Hinges: Shall be Five Knuckle Ball bearing hinges

1. Template screw hole locations
2. Bearings are to be fully hardened.
3. Bearing shell is to be consistent shape with barrel.

4. Minimum of 2 permanently lubricated non-detachable bearings on standard weight hinge and 4 permanently lubricated bearing on heavy weight hinges.
5. Equip with easily seated, non-rising pins.
6. Non Removable Pin screws shall be slotted stainless steel screws.
7. Hinges shall be full polished, front, back and barrel.
8. Hinge pin is to be fully plated.
9. Bearing assembly is to be installed after plating.
10. Sufficient size to allow 180-degree swing of door
11. Furnish five knuckles with flush ball bearings
12. Provide hinge type as listed in schedule.
13. Furnish 3 hinges per leaf to 7 foot 6 inch height. Add one for each additional 30 inches in height or fraction thereof.
14. Tested and approved by BHMA for all applicable ANSI Standards for type, size, function and finish
15. UL10C listed for Fire rated doors.

B. Geared Continuous Hinges:

1. Tested and approved by BHMA for ANSI A156.26-1996 Grade 1
2. Anti-spinning through fastener
3. UL10C listed for 3 hour Fire rating
4. Non-handed
5. Lifetime warranty
6. Provide Fire Pins for 3-hour fire ratings
7. Sufficient size to permit door to swing 180 degrees

C. BEST Cylindrical Type Locks and Latchsets using Stanley Wi-Q™ Technology

1. Certified by BHMA for ANSI A156.2, Series 4000, Operational Grade 1, Extra-Heavy Duty.
2. UL10C Listed.
3. Fit modified ANSI A115.2 door preparation
4. Locksets to have anti-rotational studs that are thru-bolted
5. Each lever to have independent spring mechanism controlling it
6. 2-3/4 inch (70mm) backset
7. 9/16 inch (14mm) throw latchbolt
8. Provide locksets with 7-pin removable and interchangeable core cylinders
9. Core face must be the same finish as the lockset
10. Functions and design as indicated below
11. Provide electric operation as defined and required
12. Provide Request to Exit (RQE) switch and Door Position switch
13. **Provide minimum of (10) cards in format type as specified per lock**

D. BEST EX Exit Device using Stanley Wi-Q™ Technology

1. Certified by BHMA for ANSI 156.3, Grade 1
2. Provide a deadlocking latchbolt
3. Non-fire rated exit devices shall have cylinder dogging.
4. Touchpad shall be "T" style
5. Exposed components shall be of architectural metals and finishes.
6. Lever design shall match lockset lever design
7. Provide strikes as required by application.

8. Fire exit devices to be listed for UL10C
9. UL listed for Accident Hazard
10. Provide Door Position Switch
11. Provide Request to Exit (RQE) switch and Door Position switch TRIM
12. UL Listed A Label for GYQS
13. Battery pack for primary power
14. Visible and audible user indicators
15. 2000 G's RMS shock resistance
16. Weatherproofed for exterior applications
17. Operating temperature of -22 to +140 degrees Fahrenheit

The system shall use a Stanley Wi-Q™ Technology Wireless Access Management System from Stanley or equivalent. The system shall consist of three major elements as described in the following document

E. Reader / Lock

1. Fit modified ANSI A115.2 door preparation
2. Integrated smart locking device with its own database.
3. Capability to make all decisions at the door.
4. Reader / Lock to be installed within the existing door ANSI cut out. There shall be no need to rout out the door to drive additional power through any electric transfer hinge. All requirements will be met within the reader / lock itself.
5. Wireless Reader shall use an AA battery pack; no AC power shall be required at the door.
6. The reader / lock shall also be able to operate as a fully stand alone intelligent device making all the decisions in real time. In the unlikely event that the reader/lock is offline from the host, it shall continue to operate, storing and recording accesses until it is re-connected and back online to the host. The wireless reader/ lock shall be offered in one of four modes.
 - i. As a self-contained cylindrical, reader / lock.
 - ii. As a self-contained mortise, reader / lock.
 - iii. As a supplemental exit device trim to be added to an existing exit devices.
 - iv. As a wireless access controller interfaced to a hardwired reader and ancillary door devices such as an electric locking device, Request to Exit (RQE) switch, a Door Switch Monitor and a Door lock sense input.
7. For cylindrical lock applications the wireless reader shall provide support for an integral Request to Exit (RQE) and Door Switch Monitor (DS).
8. For mortise lock applications the wireless reader shall provide support for an integral Request to Exit (RQE), Door Switch Monitor (DS), Door Latch Position Switch (LS), and Key Over-ride Sensor (KOS).
9. For exit device application the wireless reader shall provide support for an integral Request to Exit (RQE) switch, Door Position switch (DS) and Latchbolt Position switch (LS).
10. The reader / lock shall support as a minimum the following "reader" technologies:
 - i. Up to a 6-digit user defined PIN number of between 3 and 6 characters in length
 - ii. User defined Magnetic Stripe formats on either track 2 or track 3 of the Magnetic Stripe tracks
 - iii. Support for 125 KHz. HID and Indala compatible Proximity cards with variable bit formats such that multiple user defined bit formats can be supported at the reader
 - iv. Reader shall support a Dual Validation mode consisting of magnetic stripe and pin.
 - v. As standard, the reader shall support exterior applications

- vi. Each reader / lock shall have battery power to meet 100,000 lock / transactions
- vii. Each reader lock shall come with a minimum of 2,000 ID capacity, and be able to store locally, if offline, up to 99,000 transactions

F. Reader / Lock database

1. The reader shall support 2,000 unique ID's in its standard configuration and be expandable to 65,000. Expansion shall not require a field upgrade at the reader but rather a software key shall be downloaded from the host that shall increase the database size and support up to 65,000 cardholders. The reader shall support up to 99,000 transactions in the event the lock can not communicate to the portal gateway.
2. Up to 144 user-defined time zones shall be supported with up to 6 time intervals per time code.
3. Up to 32 types of unique user defined holidays shall be supported. Each holiday shall be capable of supporting a different time code.
4. A unique set of Access privileges shall be available for each cardholder per reader / lock
5. The memory allocation on the reader / lock shall be dynamic such that the user may maximize the size of the available memory to meet their requirements for either ID's or transaction storage
6. Time zones shall be able to cross midnight such that a shift beginning at 10:00 PM and ending at 9:00 AM the next morning, will be considered as a single time zone
7. The reader/lock shall be able to support an auto-enroll mode where the user may select a reader to be used to enroll a large group of cardholders. This shall be achieved by either bulk loading card ID numbers between a specific range or by presenting a card to a reader that then reads the card data and enrolls the card into the database.

G. Reader / Lock Operation Modes

1. The reader will support Access control for a single door with one reader and free egress on the same door
2. The reader will monitor a door position status such that it is able to detect door open and door locked and secure. In no event will a separate contact be required to be mounted to the frame of the door and wired back to a separate contact monitoring device. All alarm monitoring at the door / portal will be monitored by the reader / lock itself and shall not require any additional controller support
3. The reader shall report any access transaction with the date and time of the event in Hours: Minutes and Seconds
4. The reader locks database shall support up to 7 unique shunt times for specific groups of individuals and meet ADA compatibility requirements for extended shunt times for any single or groups of physically impaired cardholders
5. The reader will support an RQE (Request to Exit) status that will be reported separately as a separate auditable transaction. In the event that an attempt to exit is made, but the door /portal remains closed (secure), then the transaction will not be recorded as a valid RQE and will time out after the shunt time has expired
6. The reader/ lock shall support and transmit a signal if the power to the reader / lock drops below 10%
7. The reader shall support different operation modes based on time zones. Thus a reader may be in a Card only mode in the daytime, but require Card plus PIN after hours. This shall be fully user programmable from the host
8. The reader / lock shall be able to operate in a fully stand alone mode or as a distributed fully intelligent reader/ lock holding the transactions until they are polled
9. The reader / lock shall communicate via spread spectrum radio transmission at 2.4 GHZ

10. The reader / lock shall use as a standard, AES 128 bit encryption between to the nearest non-dedicated Portal Gateway. Portal Gateways shall provide redundant communications capability so that a wireless reader can report to another Portal Gateway if primary reporting path is lost
11. The reader / lock shall report multiple incorrect PIN attempts (greater than 3) as an alarm attempt
12. The proximity reader / lock shall be able to detect the presence of a proximity card, such that the cardholder shall not be required to orient their card in a specific manner to wake up the reader
13. The readers read / response time to an access request shall not exceed 250 Milliseconds worse case
14. Each reader lock shall have it's own unique MAC address.

H. Wireless Access Controller

1. The reader will support Access control for a single door with one reader and free egress on the same door
2. A wireless access controller shall be capable of interfacing with a token reader utilizing a standard Wiegand protocol to unlock various electrified locking hardware such as electric strikes, exit device trim, electro-magnetic locks and other low voltage applications. It shall also serve as a retrofit kit to replace an existing wired infrastructure with a local wireless reader PCB that has the ability to slave to a wired reader and local peripherals at the door
3. Support an existing Request to Exit switch (RQE), Door Position switch and Latchbolt Position switch (LS).
4. Support a locally powered locking device rated up to 4 AMPS at 12/24V DC
5. Auxiliary relay output will be available to drive other door related outputs. This relay shall be rated at 2 AMPS 12/24 V DC
6. The wireless access controller will also have the same feature set of software capabilities as the standard wireless reader for up to 65,000 ID's, 144 Time Zones, variable shunt times for different staff groups, and ADA compliance
7. The wireless access controller will be able to support any Wiegand card format from 16 to 128 bits and shall be able to serve as a log on or enrollment reader where an individual or group of individuals may "badge" into the system and the system will identify their card data so the card can be auto-enrolled
8. The wireless access controller shall provide wireless communications back to a Portal Gateway such that no separate controllers will be required for decision making. All door related decisions will be made at the wireless access controller local to the reader(s) it serves
9. All terminations to the wireless access controller shall be through plug in wired block terminals – no special tools will be required to install the unit(s)
10. The reader shall be able to operate in different modes such that it is able to serve as a smart I/O module supporting I/O functions either as ancillary services to it's primary role as an access control device or as it's sole role. In this mode the wireless access controller shall be able to provide the following:
 - i. As a wireless reader module with support for a dedicated Door Position switch (DS), Latchbolt Position switch (LS), Request to Exit (RQE), and key by pass override with two onboard relays, one rated at 4 Amps for 12/24V DC operation, the other at 2 Amps for 12/24V DC operation
 - ii. Wireless module with 4 supervised inputs, 4 non-supervised inputs, two onboard relays with one rated at 4 Amps for 12/24V DC operation, the other at 2 Amps for 12/24V DC operation

- iii. As a wireless module with 4 supervised inputs, two onboard relays with one rated at 4 Amps for 12/24V DC operation, the other at 2 Amps 12/24V DC operation plus 4 additional logic driven outputs. In this mode no wireless readers would be supported.
 11. Wireless Access Controller shall come standard with half wave dipole antennas and a ceiling mount omni directional antenna with 20' of cable and all required connectors
- I. Portal Gateways: The portal gateways shall operate in a non-dedicated mode such that any reader / lock shall be able to report to and through any portal gateway. The portal gateways shall accept data from any of the addressed readers and transmit bi-directional encrypted data to the host for archiving and data management. Each portal gateway shall have the following capabilities.
 1. Each portal gateway, in base configuration, shall support a minimum of 64 reader / locks in it's antenna range and via system options, be able to support up to 128 reader / locks in a maximum system configuration
 2. Each portal gateway shall have it's own unique MAC address such that, on boot up, the host will find and identify those portal gateways that belong to the system
 3. Every portal gateway shall encrypt the data using 128 BIT AES encryption and send and receive data via spread spectrum RF transmission to and from the host
 4. Nominal transmissions distances between the reader / locks and the portal gateway(s) shall be 250 feet line of sight. Extended range shall be available, if required, using standard commercially available high security RF transport sub-systems
 5. Each portal gateway shall, as an option, have the support of a stand-by power supply
 6. Each portal gateway shall support two transmission paths to the host. The user may elect to use standard Ethernet cabling between the portal gateway and the host using a cross over cable. Standard Ethernet using local hubs and routers.
 7. Each portal will have its own static IP address
 8. The portal Gateway shall support secure socket communications between the host(s) / server and any associated Portal Gateway. This shall be user selectable
 9. The portal gateway shall come standard with half wave dipole antennas and a ceiling mount omni directional antenna with 20' of cable and all required connectors.
- J. Hosts / Web Services: The Host's software will run on industry standard, commercially available, computer platforms offered from multiple PC vendors. There shall be no constraints on the PC platform if it meets the minimum specifications listed. The host, Stanley Wi-Q software and B.A.S.I.S., shall use Microsoft Windows 2003 Server as the operating system with a SQL Database and run on a standard, off the shelf computer platform with the following minimum operating specifications
 1. A Pentium 4 or equivalent with a 2.0 GHZ processor
 2. A minimum of 512MB RAM and 80GB hard disk shall be required for storage and data management
 3. A USB or Wireless hub with minimum of: 10/100BaseT
 4. The system shall have help screen support for all major functions
 5. The system shall support Multi byte character sets such that translations into non -standard ASCII characters above 128 are fully supported
 6. The system shall support web services such that non-administrative tasks shall be able to be serviced through a standard web browser
- K. Host Software:

1. Support, as standard, 64 readers expandable to unlimited number of readers
2. Requires a software key generated at the time of installation
3. Software shall have multiple levels of password protection, such that, Card ID files may restrict visible data to certain approved levels of users
4. The system shall support 100,000 card holders and be expandable to a virtually unlimited number of cardholders, depending on hard disk storage
5. The system web services will use industry standard tools and formats such as .NET, SOAP and XML
6. Software shall support canned reports that are pre-formatted and set up to handle most report tasks. This shall include:
 - i. All alarms at a reader / lock
 - ii. All accesses at a reader lock by date, by time
 - iii. All cardholders in a reader / lock
 - iv. All cardholders at a wireless reader during a certain time frame
7. The Stanley Wi-Q software shall support a system diagnostic mode that shall be able to monitor in real time the systems wireless reader/locks and Portal Gateways: most report tasks.
 - i. This diagnostics tool shall be within the standard Wi-Q application and not require the purchase of additional hardware or components.
8. The Diagnostic tool shall be able to address and monitor, as well as allow the user to select, at anytime, a diagnostic mode and capture statistical data on any one of these parameters:
 - i. Firmware in the wireless reader / lock
 - ii. Battery strength in the wireless reader / lock
 - iii. RF signal strength between the wireless reader / lock and it's closest associated Portal Gateway
 - iv. RF signal packet data strength
 - v. Beacon time
9. The Software shall support a standard interface to connect directly to BASIS software applications by Stanley. This interface will enable the end user to use BASIS for daily programming tasks.

L. Exit Devices:

1. Exit devices to meet or exceed BHMA for ANSI 156.3, Grade 1.
2. Exit devices to be tested and certified by UL or by a recognized independent laboratory for mechanical operational testing to 9 million cycles minimum with inspection confirming Grade 1 Loaded Forces have been maintained.
3. Exit devices chassis to be investment cast steel, zinc dichromate.
4. Exit devices to have stainless steel deadlocking $\frac{3}{4}$ " through latch bolt.
5. Exit devices to be equipped with sound dampening on touchbar.
6. Non-fire rated exit devices to have cylinder dogging.
7. Non-fire rated exit devices to have $\frac{1}{4}$ " minimum turn hex key dogging.
8. Touchpad to be "T" style constructed of architectural metal with matching metal end caps.
9. Touchbar assembly on wide style exit devices to have a $\frac{1}{4}$ " clearance to allow for vision frames.

10. All exposed exit device components to be of architectural metals and “true” architectural finishes.
 11. Provide strikes as required by application.
 12. Fire exit hardware to conform to UL10C and UBC 7-2. UL tested for Accident Hazard.
 13. Exit device to be heavy investment cast stainless steel with black powder coated finish.
 14. Exit devices to have field reversible handing.
 15. Provide heavy duty vandal resistant lever trim with heavy duty investment cast stainless steel components and extra strength shock absorbing overload springs. Lever shall not require resetting. Lever design to match locksets and latchsets.
 16. Provide 9001-Quality Management and 14001-Environmental Management.
 17. Vertical Latch Assemblies to have gravity operation, no springs.
 18. Approved Manufacturers
 - a. The following manufacturers will be approved contingent on meeting or exceeding the above performance criteria:
 - 1) Precision Manufactured by Stanley Security Solutions
- M. Door Closers shall:
1. Tested and approved by BHMA for ANSI 156.4, Grade 1
 2. UL10C certified.
 3. Provide 9001-Quality Management and 14001-Environmental Management.
 4. Closer shall have extra-duty arms and knuckles.
 5. Conform to 2013 CBC.
 6. Maximum 2 7/16 inch case projection with non-ferrous cover
 7. Separate adjusting valves for closing and latching speed, and backcheck
 8. Provide adapter plates, shim spacers and blade stop spacers as required by frame and door conditions.
 9. Full rack and pinion type closer with 1½“ minimum bore.
 10. Mount closers on non-public side of door, unless otherwise noted in specification.
 11. Closers shall be non-handed, non-sized and multi-sized.
 12. 5 pounds maximum effort to open door.
- N. Low Energy Operators shall:
1. Conform to ANSI/BHMA A156.19 as a low energy power opening device.
 2. Be listed under UL228, UL325, UL10B, UL10C, UBC 7.2 and FCC listed.
 3. Shall be non-handed.
 4. Be rated for door panels weighing up to 350 lbs (160 kg).
 5. The manual door closer within the Low Energy Operator shall be adjusted to meet Americans with Disabilities Act (ADA) 5 lbs opening force [Push-Side applications only]
 6. Operator shall be isolated from mounting plate with rubber mounts to mitigate the transmission of forces between the door and the operator.
 7. Shall have a position encoder to communicate with microprocessor.
 8. Incorporate a resettable powered operation counter that tracks both powered and non-powered cycling of the Operator.
 9. Incorporate the following adjustable settings:
 - i. Hold Open Timer, to 28 seconds
 - ii. Open Speed
 - iii. Backcheck Speed
 - iv. Vestibule Sequence Timer
 10. Include DIP switch controls for:

- i. On board diagnostics
 - ii. Power close
 - iii. Push and Go operation
 - iv. Time delay logic for electrified hardware components
 11. Include terminals for auxiliary controls including:
 - i. Activation devices; provide two discrete inputs
 - ii. Vestibule sequencing
 12. Control switches including:
 - i. Day/Night open (illuminated)
 - ii. Power On-Off
 13. Includes adhesive Low Energy Operator mounting templates.
 14. R-14 Aluminum Allow Materials
 15. For non-powered operation, the unit shall function as a standard door closer with adjustable spring force size 1 thru 6.
- O. Door Stops: Provide a dome floor or wall stop for every opening as listed in the hardware sets.
1. Wall stop and floor stop shall be wrought bronze, brass or stainless steel.
 2. Provide fastener suitable for wall construction.
 3. Coordinate reinforcement of walls where wall stop is specified.
 4. Provide dome stops where wall stops are not practical. Provide spacers or carpet riser for floor conditions encountered
- P. Over Head Stops: Provide a Surface mounted or concealed overhead when a floor or wall stop cannot be used or when listed in the hardware set.
1. Concealed overhead stops shall be heavy duty bronze or stainless steel.
 2. Surface overhead stops shall be heavy duty bronze or stainless steel.
- Q. Push Plates: Provide with four beveled edges ANSI J301, .050 thickness, size as indicated in hardware set. Furnish oval-head countersunk screws to match finish.
- R. Pulls with plates: Provide with four beveled edges ANSI J301, .050 thickness Plates with ANSI J401 Pull as listed in hardware set. Provide proper fasteners for door construction.
- S. Push Pull Bars: Provide ANSI J504, .1" Dia. Pull and push bar model and series as listed in hardware set. Provide proper fasteners for door construction.
- T. Kickplates: Provide with four beveled edges ANSI J102, 10 inches high by width less 2 inches on single doors and 1 inch on pairs of doors. Furnish oval-head countersunk screws to match finish.
- U. Mop plates: Provide with four beveled edges ANSI J103, 4 inches high by width less 1 inch on single doors and 1 inch on pairs of doors. Furnish oval-head countersunk screws to match finish.
- V. Door Bolts: Flush bolts for wood or metal doors.
1. Provide a set of Automatic bolts, Certified ANSI/BHMA 156.3 Type 25 for hollow metal label doors.
 2. Provide a set of Automatic bolts, Certified ANSI/BHMA 156.3 Type 27 at wood label doors.
 3. Manual flush bolts, Certified ANSI/BHMA 156.16 at openings where allowed local authority.
 4. Provide Dust Proof Strike, Certified ANSI/BHMA 156.16 at doors with flush bolts without thresholds.

- W. Coordinator and Brackets: Provide a surface mounted coordinator when automatic bolts are used in the hardware set.
 - 1. Coordinator, Certified ANSI/BHMA A1156.3 Type 21A for full width of the opening.
 - 2. Provide mounting brackets for soffit applied hardware.
 - 3. Provide hardware preparation (cutouts) for latches as necessary.
 - X. Seals: All seals shall be finished to match adjacent frame color. Seals shall be furnished as listed in schedule. Material shall be UL listed for labeled openings.
 - Y. Weatherstripping: Provide at head and jambs only those units where resilient or flexible seal strip is easily replaceable. Where bar-type weatherstrip is used with parallel arm mounted closers install weatherstrip first.
 - 1. Weatherstrip shall be resilient seal of (Neoprene, Polyurethane, Vinyl, Pile, Nylon Brush, Silicone)
 - 2. UL10C Positive Pressure rated seal set when required.
 - Z. Door Bottoms/Sweeps: Surface mounted or concealed door bottom where listed in the hardware sets.
 - 1. Door seal shall be resilient seal of (Neoprene, Polyurethane, Nylon Brush, Silicone)
 - 2. UL10C Positive Pressure rated seal set when required.
 - AA. Thresholds: Thresholds shall be aluminum beveled type with maximum height of ½” for conformance with ADA requirements. Furnish as specified and per details. Provide fasteners and screws suitable for floor conditions.
 - BB. Provide one wall mounted Telkee, Lund or MMF series key cabinet complete with hooks, index and tags to accommodate 50% expansion. Coordinate mounting location with architect.
 - CC. Silencers: Furnish silencers on all interior frames, 3 for single doors, 2 for pairs. Omit where any type of seals occur.
- 3.4 FINISH:
- A. Designations used in Schedule of Finish Hardware - 3.05, and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18 including coordination with traditional U.S. finishes shown by certain manufacturers for their products
 - B. Powder coat door closers to match other hardware, unless otherwise noted.
 - C. Aluminum items shall be finished to match predominant adjacent material. Seals to coordinate with frame color.
- 3.5 KEYS AND KEYING:
- A. Provide keyed brass construction cores and keys during the construction period. Construction control and operating keys and core shall not be part of the Owner's permanent keying system or

furnished in the same keyway (or key section) as the Owner's permanent keying system. Permanent cores and keys (prepared according to the accepted keying schedule) will be furnished to the Owner.

- B. Cylinders, removable and interchangeable core system: Best CORMAX™ Patented 7-pin.
- C. Permanent keys and cores: Stamped with the applicable key mark for identification. These visual key control marks or codes will not include the actual key cuts. Permanent keys will also be stamped "Do Not Duplicate."
- D. Transmit Grand Masterkeys, Masterkeys and other Security keys to Owner by Registered Mail, return receipt requested.
- E. Furnish keys in the following quantities:
 - 1. 1 each Grand Masterkeys
 - 2. 4 each Masterkeys
 - 3. 2 each Change keys each keyed core
 - 4. 15 each Construction masterkeys
 - 5. 1 each Control keys
- F. The Owner, or the Owner's agent, will install permanent cores and return the construction cores to the Hardware Supplier. Construction cores and keys remain the property of the Hardware Supplier.
- G. Keying Schedule: Arrange for a keying meeting, and programming meeting with Architect Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying and programming complies with project requirements. Furnish 3 typed copies of keying and programming schedule to Architect.

PART 4 - EXECUTION

4.1 EXAMINATION

- A. Verification of conditions: Examine doors, frames, related items and conditions under which Work is to be performed and identify conditions detrimental to proper and or timely completion.
 - 1. Do not proceed until unsatisfactory conditions have been corrected.

4.2 HARDWARE LOCATIONS:

- A. Mount hardware units at heights indicated in the following publications except as specifically indicated or required to comply with the governing regulations.
 - 1. Recommended Locations for Builder's Hardware for Standard Steel Doors and Frames, by the Door and Hardware Institute (DHI).
 - 2. Recommended locations for Architectural Hardware for flush wood doors (DHI).
 - 3. WDMA Industry Standard I.S.-1A-04, Industry Standard for Architectural wood flush doors. Per CBC 2013.

4.3 INSTALLATION:

- A. Install each hardware item per manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on the substrate. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- B. Conform to local governing agency security ordinance.
- C. Install Conforming to 2013 CBC Accessible and Usable Building and Facilities.
 - 1. Adjust door closer sweep periods so that from the open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the landing side of the door.
- D. Installed hardware using the manufacturers fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use "Riv-Nuts" or similar products.

4.4 FIELD QUALITY CONTROL AND FINAL ADJUSTMENT

- A. Contractor/Installers, Field Services: After installation is complete, contractor shall inspect the completed door openings on site to verify installation of hardware is complete and properly adjusted, in accordance with both the Contract Documents and final shop drawings.
 - 1. Check and adjust closers to ensure proper operation.
 - 2. Check latchset, lockset, and exit devices are properly installed and adjusted to ensure proper operation.
 - a. Verify levers are free from binding.
 - b. Ensure latchbolts and dead bolts are engaged into strike and hardware is functioning.
 - 3. Report findings, in writing, to architect indicating that all hardware is installed and functioning properly. Include recommendations outlining corrective actions for improperly functioning hardware if required.

4.5 SCHEDULE OF FINISH HARDWARE:

Manufacturer List

<u>Code</u>	<u>Name</u>
AB	ABH Manufacturing Inc.
BE	Best Access Systems
DJ	Don-Jo
NA	National Guard
PR	Precision
SD	Stanley Door Closers
SN	Securitron
ST	Stanley
STAN	Stanley

Finish List

<u>Code</u>	<u>Description</u>
AL	Aluminum
626	Satin Chromium Plated
628	Satin Aluminum, Clear Anodized
630	Satin Stainless Steel
689	Aluminum Painted
BLK	Black
GRAY	Gray
BLACK	Black
US26D	Chromium Plated, Dull
US32D	Stainless Steel, Dull

Option List

<u>Code</u>	<u>Description</u>
CD	CYLINDER DOGGING
FL	Fire Exit Hardware
S3	ANSI Strike Package
ELR	ELECTRIC LATCH RETRACTION
LBR	LESS BOTTOM ROD
PH2	Adapter Plate for Precision Devices
TDS	TOUCHBAR MONITORING DOUBLE SWITCH
WTDS	Weatherized Monitoring Double Switch
7/8"LTC	7/8" Lip-To-Center Strike
EPT Prep	EPT Prep (full mortise)

Hardware Sets

SET #01		
Prep	1 Continuous Hinge	661 UL 107" EPT
AL	ST	
107"	1 Continuous Hinge	661 UL
AL	ST	
	1 Exit Device	TDS 2602D
CD	630 PR	
	1 Exit Device	ELR TDS 2808
CD	630 PR	

	1	OMNILOCK Exit Device Trim	QAXOM-7 14 PDVW 626	
PH2	626	BE		
	2	Mortise Cylinders	1E-74	
PATD	626	BE		
	1	Low Energy Operator	CLD-	
4990	628	SD		
	1	Door Closer	CLD-4550 EDA w/ Drop	
Plate	689	SD		
	1	Power Transfer	CEPT-	
10	SN			
	1	Power		
Supply	ELR151		PR	
	1	Wiring & Riser Diagrams	COORDINATE WITH RELATED	
TRADES	STAN			
	2	Actuators	CL4163	630
		SD		
	1	Controller Key		
Pad	WACPAD		STAN	
	1	Wireless Access Controller	WQX-WAC-C-	
B	BE			
	1	Prox		
Reader	5355EGK00		BLK	STAN

NOTE: 115VAC Needed at the opening.

SET #02 NOT USED

SET #03 NOT USED

SET #04

	4	Hinges	FBB179 4 1/2 X 4	
1/2	US26D	ST		
	1	Classroom Lock	9K3-7R14C	
PATD	626	BE		
	1	Door Closer	CLD-4551	
T	689	SD		
	1	Mop Plate	90 Series 4" x 1" LDW x CSK	
B4E	630	DJ		
	1	Kick Plate	90 Series 10" x 2" LDW x CSK	
B4E	630	DJ		
	1	Wall		
Stop	1407	630	DJ	
	1	Set of Gasketing	5050 B @ Head &	
Jambs	NA			

NOTE: Classroom Lock permits locking the bathroom in the event of emergency plumbing problems. Egress is always free.

SET #05

	3	Hinges	FBB179 4 1/2 X 4	
1/2	US26D	ST		

	1	Push Plate	73 8" X
16"	630	DJ	
	1	Pull	
Plate	7120	630	DJ
	1	Door Closer	CLD-4551
T	689	SD	
	1	Mop Plate	90 Series 4" x 1" LDW x CSK
B4E	630	DJ	
	1	Kick Plate	90 Series 10" x 2" LDW x CSK
B4E	630	DJ	
	1	Wall	
Stop	1407	630	DJ
	1	Set of Gasketing	5050 B @ Head &
Jambs	NA		

SET #06

	6	Hinges	FBB191 4 1/2 X 4 1/2
NRPUS32DST			
	1	Exit Device	FL 2208 X 4908D
LBR	630	PR	
	1	Exit Device	FL 2201
LBR	630	PR	
	1	Rim Cylinder	12E-72
PATD	626	BE	
	2	Door Closers	CLD-4550
EDA	689	SD	
	2	Kick Plates	90 Series 10" x 2" LDW x CSK
B4E	630	DJ	
	2	Wall	
Stops	1407	630	DJ
	1	Weatherstrip	161 NA @ Head &
Jambs	NA		
	1	Drip Cap	R201A WOD Plus
4"	NA		
	2	Set of Meeting Stiles	600
A	NA		
	2	Door Bottoms	200
NA	NA		
	1	Saddle	
Threshold	425		AL NA

SET #07

	3	Hinges	FBB179 4 1/2 X 4
1/2 US26D		ST	
	1	Passage Latch	9k3-
ON14C626		BE	
	1	Door Closer	CLD-4551
T	689	SD	
	1	Mop Plate	90 Series 4" x 1" LDW x CSK
B4E	630	DJ	
	1	Kick Plate	90 Series 10" x 2" LDW x CSK
B4E	630	DJ	

1 Wall
 Stop 1407 630 DJ
 1 Set of Gasketing 5050 B @ Head &
 Jambs NA

SET #08

NOTE: All Hardware by Door Supplier.

SET #09

3 Hinges FBB179 4 1/2 X 4
 1/2 US26D ST
 1 Classroom Lock 9K3-7R14C
 PATD 626 BE
 1 Door Closer CLD-4551
 REG 689 SD
 1 Mop Plate 90 Series 4" x 1" LDW x CSK
 B4E 630 DJ
 1 Kick Plate 90 Series 10" x 2" LDW x CSK
 B4E 630 DJ
 1 Wall
 Stop 1407 630 DJ
 1 Set of Gasketing 5050 B @ Head &
 Jambs NA
 1 Weatherstrip 161 NA @ Head &
 Jambs NA
 1 Door Bottom 200
 NA NA
 1 Saddle
 Threshold425 AL NA

NOTE: Gasketed for Sound Attenuation.

SET #10

3 Hinges FBB168 5 X 4
 1/2 US26D ST
 1 Storeroom Lock 9K3-7D 7/8" LTC S3
 CORMAX626 BE
 1 Door Closer CLD-4551
 REG 689 SD
 1 Mop Plate 90 Series 4" x 1" LDW x CSK
 B4E 630 DJ
 1 Kick Plate 90 Series 10" x 2" LDW x CSK
 B4E 630 DJ
 1 Wall
 Stop 1407 630 DJ
 1 Set of Gasketing 5050 B @ Head &
 Jambs NA

SET #11

6 Hinges FBB179 4 1/2 X 4 1/2
 NRPUS26DST

	1	Exit Device	FL 2208 X 4908D	
LBR	630	PR		
	1	Exit Device	FL 2201	
LBR	630	PR		
	1	Rim Cylinder	12E-72	
PATD	626	BE		
	2	Magnetic Door		
Holder	2100		US32D	AB
	2	Door Closers	CLD-4550	
EDA	689	SD		
	2	Mop Plates	90 Series 4" x 1" LDW x CSK	
B4E	630	DJ		
	2	Kick Plates	90 Series 10" x 2" LDW x CSK	
B4E	630	DJ		
	1	Set of Gasketing	5050 B @ Head &	
Jambs	NA			
	2	Set of Meeting Stiles	600	
A	NA			

NOTE: Electromagnetic Door Holders are tied into the Fire Alarm. In the event of an alarm condition the Magnetic Holders will release allowing the doors to close and latch. Power Supply, Relay, and Connections by Security Contractor.

SET #12

	6	Hinges	FBB179 4 1/2 X 4	
1/2 US26D		ST		
	2	Door		
Pulls	21	630	DJ	
	2	Push Plates	73 8" X	
16"	630	DJ		
	2	Pull		
Plates	7120	630	DJ	
	2	Door Closers	CLD-4550 H-	
EDA	689	SD		
	2	Wall		
Stops	1407	630	DJ	
	2	Door		
Silencers	1608		GRAY	DJ

SET #13

	6	Hinges	FBB179 4 1/2 X 4 1/2	
NRPUS26D		ST		
	1	Exit Device	FL 2208 X 4908D	
LBR	630	PR		
	1	Exit Device	FL 2201	
LBR	630	PR		
	1	Rim Cylinder	12E-72	
PATD	626	BE		
	2	Door Closers	CLD-4550	
EDA	689	SD		
	2	Mop Plates	90 Series 4" x 1" LDW x CSK	
B4E	630	DJ		

	2 Kick Plates	90 Series 10" x 2" LDW x CSK
B4E	630 DJ	
	2 Wall	
Stops	1407 630	DJ
	1 Set of Gasketing	5050 B @ Head &
Jambs	NA	
	2 Set of Meeting Stiles	600
A	NA	

SET #14

	6 Hinges	FBB179 4 1/2 X 4 1/2
NRPUS	26DST	
	1 Coordinator	2020 Series x Filler Bar x
Brackets	DJ	
	1 Set of Automatic Flush Bolts	1560 or 1562 (as
required)	626	DJ
	1 Dust Proof	
Strike	1570 626	DJ
	1 Storeroom Lock	9K3-7D14C
PATD	626 BE	
	2 Door Closers	CLD-4551
EDA	689 SD	
	2 Wall	
Stops	1407 630	DJ
	1 Set of Gasketing	5050 B @ Head &
Jambs	NA	
	1 Set of Meeting Stiles	600
A	NA	

NOTE: "Z" Astragal by Door Supplier.

SET #15

	3 Hinges	FBB191 4 1/2 X 4 1/2
NRPUS	32DST	
	1 Exit Device	2201 X 4901
CD	630 PR	
	1 Mortise Cylinder	1E-74
PATD	626 BE	
	1 Door Closer	CLD-4550
EDA	689 SD	
	1 Kick Plate	90 Series 10" x 2" LDW x CSK
B4E	630 DJ	
	2 Set of Gasketing	5050 B @ Head &
Jambs	NA	
	1 Drip Cap	R201A WOD Plus
4"	NA	
	1 Auto Door Bottom	423
N	NA	
	1 Threshold	896
S	AL NA	

NOTE: This is an STC-43 Door and Frame Assembly. Coordinate all Hardware with the

Door and Frame manufacturer to determine if it is compatible with the assembly.

SET #16

3 Hinges	FBB179 4 1/2 X 4 1/2	
NRPUS26DST		
1 Exit Device	FL 2108 X	
4908D 630 PR		
1 Door Closer	CLD-4550	
EDA 689 SD		
1 Kick Plate	90 Series 10" x 2" LDW x CSK	
B4E 630 DJ		
1 Wall		
Stop 1407 630	DJ	
1 Set of Gasketing	5050 B @ Head &	
Jambs NA		
1 Door Bottom	200	
NA NA		
1 Saddle		
Threshold425	AL	NA

NOTE: This is an STC-43 Door and Frame Assembly. Coordinate all Hardware with the Door and Frame manufacturer to determine if it is compatible with the assembly.

SET #17

1 Passage Latch	9k3-	
0N14C626 BE		

NOTE: Balance of Hardware by Gate Manufacturer.

SET #18 - STC-50

NOTE: This is an STC-50 Door and Frame Assembly. All Hardware by the Door and Frame Manufacturer.

SET #19 - STC-50

NOTE: This is an STC-50 Door and Frame Assembly. All Hardware by the Door and Frame Manufacturer.

SET #20

1 Padlock	11B-722L	
PATD 626 BE		

NOTE: Balance of Hardware by Door Manufacturer.

SET #21

NOTE: Existing Stage Sound Door to remain. Replace Door Sound Seals and Refurbish Hinges, Latches and Hardware.

SET #22

3 Hinges	FBB168 5 X 4	
1/2 US26D ST		
1 Classroom Lock	9K3-7R14C	
PATD 626 BE		
1 Door Closer	CLD-4550	
EDA 689 SD		
1 Kick Plate	90 Series 10" x 2" LDW x CSK	
B4E 630 DJ		
1 Wall		
Stop 1407 630	DJ	
3 Door		
Silencers1608	GRAY	DJ

SET #23 NOT USED

SET #24

3 Hinges	FBB179 4 1/2 X 4 1/2	
NRPUS26DST		
1 Storeroom Lock	9K3-7D14C	
PATD 626 BE		
1 Door Closer	CLD-4550	
EDA 689 SD		
1 Wall		
Stop 1407 630	DJ	
1 Set of Gasketing	5050 B @ Head &	
Jambs NA		

SET #25

3 Hinges	FBB179 4 1/2 X 4	
1/2 US26D ST		
1 Classroom Lock	9K3-7R14C	
PATD 626 BE		
1 Door Closer	CLD-4551	
T 689 SD		
1 Mop Plate	90 Series 4" x 1" LDW x CSK	
B4E 630 DJ		
1 Kick Plate	90 Series 10" x 2" LDW x CSK	
B4E 630 DJ		
1 Wall		
Stop 1407 630	DJ	
1 Set of Gasketing	5050 B @ Head &	
Jambs NA		

SET #26

3 Hinges	FBB179 4 1/2 X 4	
1/2 US26D ST		
1 Storeroom Lockset	9K3-7D14C	
PATD 626 BE		
1 Door Closer	CLD-4551	
REG 689 SD		
1 Wall		
Stop 1407 630	DJ	

1 Set of Gasketing Jambs NA	5050 B @ Head &	
SET #27		
6 Hinges NRPUS26DST	FBB179 4 1/2 X 4 1/2	
1 Coordinator BracketsDJ	2020 Series x Filler Bar x	
1 Set of Automatic Flush Bolts required)626	1560 or 1562 (as DJ	
1 Dust Proof Strike1570 626	DJ	
1 Storeroom Lock PATD 626 BE	9K3-7D14C	
2 Wall Stops1407 630	DJ	
2 Door Closers REG 689 SD	CLD-4551	
2 Door Silencers1608	GRAY	DJ
SET #28		
3 Hinges NRPUS26DST	FBB179 4 1/2 X 4 1/2	
1 Classroom Lock PATD 626 BE	9K3-7R14C	
1 Door Closer EDA 689 SD	CLD-4550	
1 Kick Plate B4E 630 DJ	90 Series 10" x 2" LDW x CSK	
1 Wall Stop 1407 630	DJ	
1 Drop Plate required)689	P45-180 (as SD	
1 Set of Gasketing Jambs NA	5050 B @ Head &	
SET #29		
3 Hinges 1/2 US26D ST	FBB179 4 1/2 X 4	
1 Passage Latch ON14C626 BE	9k3-	
1 Door Closer REG 689 SD	CLD-4551	
1 Mop Plate B4E 630 DJ	90 Series 4" x 1" LDW x CSK	
1 Kick Plate B4E 630 DJ	90 Series 10" x 2" LDW x CSK	
1 Wall Stop 1407 630	DJ	
1 Set of Gasketing Jambs NA	5050 B @ Head &	

SET #30

	3 Hinges	FBB179 4 1/2 X 4
1/2	US26D ST	
	1 Classroom Lock	9K3-7R14C
PATD	626 BE	
	1 Door Closer	CLD-4551
P	689 SD	
	1 Mop Plate	90 Series 4" x 1" LDW x CSK
B4E	630 DJ	
	1 Kick Plate	90 Series 10" x 2" LDW x CSK
B4E	630 DJ	
	1 Wall	
Stop	1407 630	DJ
	1 Set of Gasketing	5050 B @ Head &
Jambs	NA	

SET #31 - Operable Wall

NOTE: All Hardware by Operable Wall Manufacturer.

SET #32

	3 Hinges	FBB179 (size as
required)	US26D	ST
	1 Privacy Set	9K3-0L
S3	626 BE	
	1 Mop Plate	90 Series 4" x 1" LDW x CSK
B4E	630 DJ	
	1 Wall	
Stop	1407 630	DJ
	1 Set of Gasketing	5050 B @ Head &
Jambs	NA	

SET #33

NOTE: All Hardware by Dopor Manufacturer.

SET #34

	3 Hinges	FBB191 4 1/2 X 4 1/2
NRPUS	32DST	
	1 Exit Device	2108 X 4908D
CD	630 PR	
	1 Rim Cylinder	12E-72
PATD	626 BE	
	1 Mortise Cylinder	1E-74
PATD	626 BE	
	1 Door Closer	CLD-4550
EDA	689 SD	
	1 Kick Plate	90 Series 10" x 2" LDW x CSK
B4E	630 DJ	

	1 Weatherstrip	161 NA @ Head &	
Jambs	NA		
	1 Drip Cap	R201A WOD Plus	
4"	NA		
	1 Door Bottom	200	
NA	NA		
	1 Saddle Threshold	S205A (verify per	
details)	AL NA		

SET #35

	3 Hinges	FBB179 4 1/2 X 4	
1/2	US26D ST		
	1 Office Lock	9K3-7B15D PATD	
S3	626 BE		
	1 Wall		
Stop	1407 630	DJ	
	3 Door		
Silencers	1608	GRAY	DJ

SET #36

	3 Hinges	FBB179 4 1/2 X 4 1/2	
NRPUS	26DST		
	1 Dust Proof		
Strike	1570 626	DJ	
	2 Flush		
Bolts	1555 626	DJ	
	1 Storeroom Lock	9K3-7D14C	
PATD	626 BE		
	3 Door		
Silencers	1608	GRAY	DJ

NOTE: "Z" SAstragal by Door Supplier.

SET #37

	6 Hinges	FBB179 4 1/2 X 4 1/2	
NRPUS	26DST		
	1 Exit Device	FL 2201	
LBR	630 PR		
	1 Exit Device	FL TDS	
2208	630 PR		
	1 OMNILOCK Exit Device Trim	QAXOM-7 14 PDVW 626	
PH2	626 BE		
	1 Rim Cylinder	12E-72	
PATD	626 BE		
	2 Door Closers	CLD-4550	
EDA	689 SD		
	2 Wall		
Stops	1407 630	DJ	
	1 Power Transfer	CEPT-	
10	SN		
	1 Power		
Supply	ELR151	PR	

	2	Set of Gasketing	5050 B @ Head &
Jambs	NA		
	1	Set of Meeting Stiles	600
A	NA		
	2	Auto Door Bottoms	423
N	NA		
	1	Threshold	896
S	AL NA		

NOTE: This is an STC-43 Door and Frame Assembly. Coordinate all Hardware with the Door and Frame manufacturer to determine if it is compatible with the assembly.

SET #38

	3	Hinges	FBB179 4 1/2 X 4 1/2
NRPUS26DST			
	1	Exit Device	FL TDS
2108	630	PR	
	1	OMNILOCK Exit Device Trim	QAXOM-7 14 PDVW 626
PH2	626	BE	
	1	Door Closer	CLD-4550
EDA	689	SD	
	1	Kick Plate	90 Series 10" x 2" LDW x CSK
B4E	630	DJ	
	1	Wall	
Stop	1407	630	DJ
	1	Power Transfer	CEPT-
10	SN		
	1	Power	
SupplyELR151			PR
	1	Set of Gasketing	5050 B @ Head &
Jambs	NA		
	1	Auto Door Bottom	423
N	NA		
	1	Threshold	896
S	AL NA		

NOTE: This is an STC-43 Door and Frame Assembly. Coordinate all Hardware with the Door and Frame manufacturer to determine if it is compatible with the assembly.

SET #39

	3	Hinges	FBB179 4 1/2 X 4 1/2
NRPUS26DST			
	1	Office Lock	9K3-7B15D PATD
S3	626	BE	
	1	Door Closer	CLD-4550
EDA	689	SD	
	1	Kick Plate	90 Series 10" x 2" LDW x CSK
B4E	630	DJ	
	1	Wall	
Stop	1407	630	DJ
	1	Set of Gasketing	5050 B @ Head &
Jambs	NA		

NA	1 Door Bottom	200	
NA	1 Saddle		
Threshold	425	AL	NA
SET #40			
	6 Hinges	FBB179 4 1/2 X 4 1/2	
NRPUS	26DST		
	2 Flush		
Bolts	1555 626	DJ	
	1 Dust Proof		
Strike	1570 626	DJ	
	1 Storeroom Lock	9K3-7D14C	
PATD	626 BE		
	2 Door Closers	CLD-4550	
EDA	689 SD		
	2 Kick Plates	90 Series 10" x 2" LDW x CSK	
B4E	630 DJ		
	2 Wall		
Stops	1407 630	DJ	
	2 Door		
Silencers	1608	GRAY	DJ
SET #41			
	3 Hinges	FBB179 4 1/2 X 4 1/2	
NRPUS	26DST		
	1 Storeroom Lock	9K3-7D14C	
PATD	626 BE		
	1 Wall		
Stop	1407 630	DJ	
	3 Door		
Silencers	1608	GRAY	DJ
SET #42			
	3 Hinges	FBB179 4 1/2 X 4 1/2	
NRPUS	26DST		
	1 Classroom Lock	9K3-7R14C	
PATD	626 BE		
	1 Door Closer	CLD-4550	
EDA	689 SD		
	1 Kick Plate	90 Series 10" x 2" LDW x CSK	
B4E	630 DJ		
	1 Wall		
Stop	1407 630	DJ	
	2 Sets of Gasketing	5050 B @ Head &	
Jambs	NA		
	1 Auto Door Bottom	423	
N	NA		
	1 Threshold	896	
S	AL NA		

NOTE: This is an STC-43 Door and Frame Assembly. Coordinate all Hardware with the

Door and Frame manufacturer to determine if it is compatible with the assembly.

SET #43

	6 Hinges	FBB191 4 1/2 X 4 1/2
NRPUS32DST		
	1 Exit Device	2208 X 4908D CD
LBR 630 PR		
	1 Exit Device	2201 CD
LBR 630 PR		
	1 Rim Cylinder	12E-72
PATD 626 BE		
	2 Mortise Cylinders	1E-74
PATD 626 BE		
	2 Door Closers	CLD-4550
EDA 689 SD		
	2 Kick Plates	90 Series 10" x 2" LDW x CSK
B4E 630 DJ		
	2 Detention	
Stops1463	BLACK	DJ
	12 Drip Cap	16 A
4"ODWNA		
	2 Set of Meeting Stiles	600
A NA		
	2 Auto Door Bottoms	423
N NA		
	1 Threshold	896
S AL NA		

NOTE: This is an STC-43 Door and Frame Assembly. Coordinate all Hardware with the Door and Frame manufacturer to determine if it is compatible with the assembly.

SET #44

	3 Hinges	FBB179 4 1/2 X 4
1/2 US26D	ST	
	1 Classroom Lock	9K3-7R14C
PATD 626 BE		
	1 Door Closer	CLD-4551
T 689 SD		
	1 Mop Plate	90 Series 4" x 1" LDW x CSK
B4E 630 DJ		
	1 Kick Plate	90 Series 10" x 2" LDW x CSK
B4E 630 DJ		
	1 Wall	
Stop 1407	630	DJ
	1 Set of Gasketing	5050 B @ Head &
Jambs NA		

SET #45

NOTE: Existing Doors, Frames, and Hardware. Provide New Hardware to replace existing.

SET #46

	6 Hinges	FBB179 4 1/2 X 4 1/2
	NRPUS26DST	
	1 Dust Proof	
Strike	1570 626	DJ
	2 Set of Automatic Flush Bolts	1560 or 1562 (as
required)	626	DJ
	1 OMNILOCK	9KOM3-7DV 14 PDVW
B	626 BE	
	1 Coordinator	2020 Series x Filler Bar x
Brackets	DJ	
	2 Door Closers	CLD-4550
EDA	689 SD	
	2 Floor	
Stops	1440 626	DJ
	1 Set of Gasketing	5050 B @ Head &
Jambs	NA	

SET #47

	2 Continuous Hinges	661HD
UL	AL ST	
	1 Exit Device	2608 X 2908D
CD	630 PR	
	1 Exit Device	2602 X 2902D
CD	630 PR	
	3 Mortise Cylinders	1E-74
PATD	626 BE	
	2 Door Closers	CLD-4550 EDA w/ Drop
Plate	689 SD	

NOTE: Balance of Hardware by Aluminum Door Supplier.

SET #48

NOTE: Existing Doors. Frame, and Hardware. Re-use doors and Frame. Provide new Hardware.

SET #49

	3 Hinges	FBB179 4 1/2 X 4 1/2
	NRPUS26DST	
	1 Classroom Lock	9K3-7R14C
PATD	626 BE	
	1 Door Closer	CLD-4550
EDA	689 SD	
	1 Kick Plate	90 Series 10" x 2" LDW x CSK
B4E	630 DJ	
	1 Set of Gasketing	5050 B @ Head &
Jambs	NA	
	1 Auto Door Bottom	423
N	NA	
	1 Threshold	896
S	AL NA	

NOTE: This is an STC-43 Door and Frame Assembly. Coordinate all Hardware with the Door and Frame manufacturer to determine if it is compatible with the assembly.

SET #50

	3 Hinges	FBB191 4 1/2 X 4 1/2	
	NRPUS32DST		
	1 OMNILOCK	9KOM3-7DV 14 PDVW	
B	626 BE		
	1 Door Closer	CLD-4550	
EDA	689 SD		
	1 Kick Plate	90 Series 10" x 2" LDW x CSK	
B4E	630 DJ		
	1 Weatherized Shroud	OMD-	
	12911STAN		
	1 Backside Antenna		
Kit3114285	STAN		
	1 Latch Protector	NLP-	
110	630 DJ		
	1 Weatherstrip	161 NA @ Head &	
Jambs	NA		
	1 Drip Cap	16 A	
4"ODWNA			
	1 Door Bottom	200	
NA	NA		
	1 Saddle		
Threshold425		AL	NA

SET #51

	6 Hinges	FBB179 4 1/2 X 4 1/2	
	NRPUS26DST		
	2 Flush		
Bolts	1555 626	DJ	
	1 Dust Proof		
Strike	1570 626	DJ	
	1 Storeroom Lock	9K3-7D14C	
PATD	626 BE		
	2 Door Closers	CLD-4550	
EDA	689 SD		
	2 Wall		
Stops	1407 630	DJ	
	1 Set of Gasketing	5050 B @ Head &	
Jambs	NA		
	2 Door Bottoms	200	
NA	NA		
	1 Saddle		
Threshold425		AL	NA

SET #52

	3 Hinges	FBB179 4 1/2 X 4 1/2	
	NRPUS26DST		

	1	Exit Device	FL 2208 X 4908D
LBR	630	PR	
	1	Rim Cylinder	12E-72
PATD	626	BE	
	1	Door Closer	CLD-4550
EDA	689	SD	
	1	Kick Plate	90 Series 10" x 2" LDW x CSK
B4E	630	DJ	
	1	Wall	
Stop	1407	630	DJ
	1	Set of Gasketing	5050 B @ Head &
Jambs	NA		
	1	Auto Door Bottom	423
N	NA		
	1	Threshold	896
S	AL	NA	

NOTE: This is an STC-43 Door and Frame Assembly. Coordinate all Hardware with the Door and Frame manufacturer to determine if it is compatible with the assembly.

SET #53

	3	Hinges	FBB179 4 1/2 X 4 1/2
NRPUS26DST			
	1	Storeroom Lock	9K3-7D14C
PATD	626	BE	
	1	Door Closer	CLD-4550
EDA	689	SD	
	1	Kick Plate	90 Series 10" x 2" LDW x CSK
B4E	630	DJ	
	1	Wall	
Stop	1407	630	DJ
	1	Set of Gasketing	5050 B @ Head &
Jambs	NA		
	1	Door Bottom	200
NA	NA		
	1	Saddle	
Threshold	425		AL
			NA

SET #54

	3	Hinges	FBB179 4 1/2 X 4
1/2 US26D		ST	
	1	Exit Device	FL 2108 X
4908D	630	PR	
	1	Rim Cylinder	12E-72
PATD	626	BE	
	1	Door Closer	CLD-4550
EDA	689	SD	
	1	Wall	
Stop	1407	630	DJ
	1	Set of Gasketing	5050 B @ Head &
Jambs	NA		

	1 Door Bottom	200	
NA	NA		
	1 Saddle		
Threshold	425	AL	NA

SET #55

	3 Hinges	FBB179 4 1/2 X 4	
1/2 US26D	ST		
	1 Passage Latch	9k3-	
ON14C626	BE		
	1 Door Closer	CLD-4551	
T	689 SD		
	1 Kick Plate	90 Series 10" x 2" LDW x CSK	
B4E	630 DJ		
	1 Wall		
Stop	1407 630	DJ	
	1 Set of Gasketing	5050 B @ Head &	
Jambs	NA		
	1 Door Bottom	200	
NA	NA		
	1 Saddle		
Threshold	425	AL	NA

SET #56

	1 Continuous Hinge	661 UL 107" EPT	
Prep	AL ST		
	1 Continuous Hinge	661 UL	
107"	AL ST		
	1 Exit Device	TDS 2602D	
CD	630 PR		
	1 Exit Device	TDS 2808	
CD	630 PR		
	1 OMNILOCK Exit Device Trim	QAXOM-7 14 PDVW 626	
PH2	626 BE		
	2 Mortise Cylinders	1E-74	
PATD	626 BE		
	2 Door Closers	CLD-4550 EDA w/ Drop	
Plate	689 SD		
	1 Power Transfer	CEPT-	
10	SN		
	1 Power		
Supply	ELR151	PR	
	1 Wiring & Riser Diagrams	COORDINATE WITH RELATED	
TRADES	STAN		

SET #57

	9 Portal Gateways	WQX-PG-C-	
BP	BE		
	9 Power Supplies	WQD-12927-	
001	BE		

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	9 Splitters	WQD-12928-
001	BE	
	9 Antenna Kits 2.4 GHZ	WQD-
ACMOSTAN		

Opening List

<u>Opening</u>	<u>Hdw Set</u>	<u>Opening Label</u>
1200.1	01	
1200.2	47	
1200.3	47	
1203.1	04	20 min
1204.1	04	20 min
1204.2	05	
1205.1	06	120 min
1208.1	07	20 min
1208.2	08	
1210.1	09	
1210.2	09	
1211	10	20 min
1215.1	11	20 min
1215.2	12	20 min
1216.1	11	20 min
1216.2	12	20 min
1218.1	14	20 min
1220.1	15	
1220.2	16	180 min
1220.3	17	
1220.4	17	
1220.5	17	
1220.6	17	
1221.1	18	120 min
1221.2	19	120 min
1221.3	20	120 min
1221.4	21	
1221.5	22	120 min
1221.6	22	120 min
1221.7	19	120 min
1221.8	29	120 min
1227	24	20 min
1228	25	20 min
1229	26	20 min
1231.1	27	20 min
1231.2	24	20 min
1233.1	28	180 min
1234.1	29	
1234.2	30	20 min
1234.3	31	
1235.1	30	20 min
1236	32	
1237	32	
1238.1	25	20 min
1238.2	33	20 min
1238.4	33	

1238.5	34	
1238A	35	
1238B	36	
1238C	35	
1239.1	37	45 min
1239.2	38	45 min
1240	39	20 min
1241	39	20 min
1242.1	40	45 min
1243.1	41	
1244.1	42	20 min
1245.1	37	45 min
1245.2	43	
1246	44	20 min
1247	44	20 min
1248	45	
1249.1	46	45 min
1249.2	45	
1250	39	20 min
1251	24	20 min
1253.1	47	
1253.2	56	20 min
1253.3	48	
1254	47	
1256	49	20 min
1257	49	20 min
1258	49	20 min
1260	49	20 min
1261	49	20 min
1263	50	
1264.1	24	20 min
1264.2	45	
1272.1	49	
1272.2	49	20 min
1273	51	20 min
1274.1	52	20 min
1274.2	53	20 min
1281.1	26	20 min
1282.2	26	20 min
1286	49	20 min
1287	26	20 min
1288	54	120 min
1290	55	45 min
1291	35	20 min
1292	35	20 min
1293	35	20 min
1294.1	52	45 min
1294.2	37	45 min
1295	51	20 min
1296.1	47	
1296.2	47	
ELECTRONICS	57	

**Solano Community College – BLDG 1200 Theater Renovation-Inc
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SECTION 08 8000

GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glass.
- B. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 9005 - Joint Sealers: Sealant and back-up material.
- B. Section 08 1113 - Hollow Metal Doors and Frames: Glazed doors and borrowed lites.
- C. Section 08 1213 - Hollow Metal Frames: Glazed borrowed lites.
- D. Section 08 4113 - Aluminum Framed Entrances and Storefront
- E. Section 08 4229 - Automatic Entrances: Glazing furnished as part of door assembly.
- F. Section 08 5113 - Aluminum Windows: Glazing furnished by window manufacturer.
- G. Section 10 2800 - Toilet, Bath, and Laundry Accessories: Mirrors.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- C. ASTM C1036 - Standard Specification for Flat Glass; 2011e1.
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- E. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.
- F. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2012a.
- G. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
- H. GANA (GM) - GANA Glazing Manual; Glass Association of North America; 2009.
- I. GANA (SM) - GANA Sealant Manual; Glass Association of North America; 2008.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- D. Samples: Submit two samples 4x4 inch (100 x100 mm) in size of glass and plastic units, showing coloration and design.
- E. Samples: Submit 2 inch (50 mm) long bead of glazing sealant, color as selected.
- F. Certificates: Certify that products meet or exceed specified requirements.
- G. Manufacturer's Certificate: Certify that sealed insulated glass meets or exceeds specified requirements.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual and GANA Sealant Manual for glazing installation methods.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.07 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 50 degrees F (10 degrees C).
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Sealed Insulating Glass Units: Provide a five (5) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.
- C. Laminated Glass: Provide a five (5) year warranty to include coverage for delamination, including replacement of failed units.

PART 2 PRODUCTS

2.01 INSULATING GLASS UNITS

2.02 GLASS MATERIALS

- A. Float Glass Manufacturers:
 - 1. AGC Glass Company North America, Inc: www.us.agc.com.
 - 2. Cardinal Glass Industries: www.cardinalcorp.com.
 - 3. PPG Industries, Inc: www.ppgideasclapes.com.
 - 4. Substitutions: Refer to Section 01 6000 - Product Requirements.
- B. Float Glass: Provide float glass glazing unless otherwise indicated.
 - 1. Annealed Type: ASTM C1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
 - 2. Heat-Strengthened and Fully Tempered Types: ASTM C1048.
 - a. Each pane of glass shall be identified by manufacturer with permanent marking identifying type of glazing per CBC 2406.3.
 - 3. Tinted Types: Color and performance characteristics as indicated.
 - 4. Thicknesses: As indicated; for exterior glazing comply with specified requirements for wind load design regardless of specified thickness.
- C. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
 - 1. Laminated Safety Glass: Comply with 16 CFR 1201 test requirements for Category II.
 - 2. Plastic Interlayer: 0.060 inch (1.52 mm) thick, minimum.
 - 3. Where fully tempered is specified or required, provide glass that has been tempered by the tong-less horizontal method.

2.03 SEALED INSULATING GLASS UNITS

- A. Manufacturers:
 - 1. Any of the manufacturers specified for float glass.
 - 2. Substitutions: Refer to Section 01 6000 - Product Requirements.
- B. Laminated Dual Glazed Glass Units: Types as indicated.
 - 1. Locations: Exterior, rainscreen wall
 - 2. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 - 3. Edge Spacers: Aluminum, bent and soldered corners.
 - 4. Edge Seal: Glass to elastomer with supplementary silicone sealant.
 - 5. Purge interpane space with dry hermetic air.
 - 6. Glazed gaskets are to be continuous around perimeter forming an airtight seal.

7. Sound rated assemblies to be installed in accordance with the manufacture's instructions.

2.04 GLAZING COMPOUNDS

- A. Manufacturers:
 1. Pecora Corporation: www.pecora.com.
 2. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 3. Tremco.
 4. Substitutions: Refer to Section 01 6000 - Product Requirements.
- B. Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.
- C. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

2.05 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) x width of glazing rabbet space minus 1/16 inch (1.5 mm) x height to suit glazing method and pane weight and area.
- B. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; hardness range of 5 to 30 cured Shore A durometer; coiled on release paper; black color.
- C. Provide glass fiber sound absorbing material in head, jambs and sill of window cavity.
- D. Install a one -inch thick rigid duct liner wrapped in black (8 oz./yd) duvetyn at the interior perimeter cavity between glazings.
- E. Glazing Tape: Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent, designed for compression of 25 percent to effect an air barrier and vapor retarder seal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings for glazing are correctly sized and within tolerance.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 INSTALLATION - EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

- A. Cut glazing tape to length and set against permanent stops, 3/16 inch (5 mm) below sight line. Seal corners by butting tape and dabbing with butyl sealant.
- B. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.
- D. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.
- E. Install removable stops, with spacer strips inserted between glazing and applied stops 1/4 inch (6.4 mm) below sight lines.
 1. Place glazing tape on glazing pane of unit with tape flush with sight line.
- F. Install removable stops, with spacer strips inserted between glazing and applied stops, 1/4 inch (6 mm) below sight line. Place glazing tape on glazing pane or unit with tape flush with sight line.
- G. Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch (9 mm) below sight line.

- H. Apply cap bead of sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.03 INSTALLATION - EXTERIOR WET METHOD (SEALANT AND SEALANT)

- A. Place setting blocks at 1/4 points and install glazing pane or unit.
- B. Install removable stops with glazing centered in space by inserting spacer shims both sides at 24 inch (610 mm) intervals, 1/4 inch (6.4 mm) below sight line.
- C. Fill gaps between glazing and stops with sealant to depth of bite on glazing, but not more than 3/8 inch (9 mm) below sight line to ensure full contact with glazing and continue the air and vapor seal.
- D. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.04 FIELD QUALITY CONTROL

- A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
- B. Monitor and report installation procedures and unacceptable conditions.

3.05 CLEANING

- A. Remove glazing materials from finish surfaces.
- B. Remove labels after Work is complete.
- C. Clean glass and adjacent surfaces.

3.06 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

END OF SECTION

SECTION 09 0561

COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section applies to all floors identified in the contract documents as to receive the following types of floor coverings:
 - 1. Resilient tile and sheet.
 - 2. Broadloom carpet.
 - 3. Carpet tile.
 - 4. Thin-set ceramic tile and stone tile.
- B. Preparation of new and existing concrete floor slabs for installation of floor coverings.
- C. Testing of concrete floor slabs for moisture and alkalinity (pH).
- D. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
 - 1. Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Unit Price for Alternate Flooring Adhesive: Do not include the cost of the alternate adhesive in the base bid; state on the bid form the unit price per square foot (square meter) for using the alternate adhesive, in the event such remediation is required.
- B. Unit Price for Remedial Floor Coating: Do not include the cost of the floor coating in the base bid; state on the bid form the unit price per square foot (square meter) for the floor coating, installed, in the event such remediation is required.

1.03 REFERENCES

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2013.
- B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete; 1999 (Reapproved 2014).
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2011.
- E. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2011.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

1.05 SUBMITTALS

- A. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
 - 1. Moisture and alkalinity (pH) limits and test methods.
 - 2. Manufacturer's required bond/compatibility test procedure.
- B. Testing Agency's Report:
 - 1. Description of areas tested; include floor plans and photographs if helpful.
 - 2. Summary of conditions encountered.
 - 3. Moisture and alkalinity (pH) test reports.

4. Recommendations for remediation of unsatisfactory surfaces.
5. Submit report to Architect.
6. Submit report not more than two business days after conclusion of testing.

C. Adhesive Bond and Compatibility Test Report.

1.06 QUALITY ASSURANCE

- A. Moisture and alkalinity (pH) testing shall be performed by an independent testing agency employed and paid by Contractor.
- B. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
 1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.
- C. Contractor's Responsibility Relating to Independent Agency Testing:
 1. Provide access for and cooperate with testing agency.
 2. Confirm date of start of testing at least 10 days prior to actual start.
 3. Allow at least 4 business days on site for testing agency activities.
 4. Achieve and maintain specified ambient conditions.
 5. Notify Architect when specified ambient conditions have been achieved and when testing will start.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging; include installation instructions.
- C. Keep materials from freezing.

1.08 FIELD CONDITIONS

- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F (18 degrees C) or more than 85 degrees F (30 degrees C).
- B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
 1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
 2. Latex or polyvinyl acetate additions are permitted; gypsum content is prohibited.
 3. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
- B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.
- C. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
 1. If testing agency recommends any particular products, use one of those.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

- A. Follow recommendations of testing agency.
- B. Perform following operations in the order indicated:
 - 1. Preliminary cleaning.
 - 2. Moisture vapor emission tests; 3 tests in the first 1000 square feet (100 square meters) and one test in each additional 1000 square feet (100 square meters), unless otherwise indicated or required by flooring manufacturer.
 - 3. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 4. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 5. Specified remediation, if required.
 - 6. Patching, smoothing, and leveling, as required.
 - 7. Other preparation specified.
 - 8. Adhesive bond and compatibility test.
 - 9. Protection.
- C. Remediations:
 - 1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
 - 2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating over entire suspect floor area.
 - 3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.02 PRELIMINARY CLEANING

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.

3.03 MOISTURE VAPOR EMISSION TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F1869 and as follows.
- D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet (1.4 kg per 93 square meters) per 24 hours.
- F. Report: Report the information required by the test method.

3.04 INTERNAL RELATIVE HUMIDITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F2170 Procedure A and as follows.
- D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.
- F. Report: Report the information required by the test method.

3.05 ALKALINITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.
- C. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.
- D. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch (25 mm) in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.06 PREPARATION

- A. See individual floor covering section(s) for additional requirements.
- B. Comply with requirements and recommendations of floor covering manufacturer.
- C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
- D. Do not fill expansion joints, isolation joints, or other moving joints.

3.07 ADHESIVE BOND AND COMPATIBILITY TESTING

- A. Comply with requirements and recommendations of floor covering manufacturer.

3.08 APPLICATION OF REMEDIAL FLOOR COATING

- A. Comply with requirements and recommendations of coating manufacturer.

3.09 PROTECTION

- A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Acoustic insulation.
- C. Cementitious backing board.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.
- F. Textured finish system.
- G. Water-resistive barrier over exterior wall sheathing.
- H. Acoustic (sound-dampening) wall and ceiling board.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 05 5400 - Cold-Formed Metal Framing
- C. Section 06 1000 - Rough Carpentry: Building framing and sheathing.
- D. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.
- E. Section 07 2100 - Thermal Insulation:
- F. Section 07 2500 - Weather Barriers: Water-resistive barrier over sheathing.
- G. Section 07 8400 - Firestopping: Top-of-wall assemblies at fire rated walls.
- H. Section 07 9005 - Joint Sealers: Acoustic sealant.
- I. Section 09 3000 - Tiling: Tile backing board.

1.03 REFERENCE STANDARDS

- A. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units; 2013.1.
- B. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2012.
- C. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
- D. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- E. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2011.
- F. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- G. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2011.
- H. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
- I. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.
- J. ASTM C1278/C1278M - Standard Specification for Fiber-Reinforced Gypsum Panel; 2007a (Reapproved 2011).
- K. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing; 2013.

- L. ASTM C1288 - Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets; 1999 (Reapproved 2010).
- M. ASTM C1325 - Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cement Substrate Sheets; 2008b.
- N. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
- O. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2014a.
- P. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
- Q. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- R. ASTM E413 - Classification for Rating Sound Insulation; 2010.
- S. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2013.
- T. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.
- C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board application and finishing, with minimum 2 years of documented experience.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216. Refer to wall types as noted on the drawings.
 - 1. See PART 3 for finishing requirements.
- B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
 - 1. Acoustic Attenuation: STC of 45-49, or as noted on the drawings, calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
 - 2. Gypsum board at sound-rated construction: 5/8-inch thick Type 'X' having a minimum mass of 2.2 PSF
 - 3. Stagger joints 24" between layers.
 - 4. Tape face layer of double layer applications.
 - 5. Edge condition: stagger gypsum board layers at vertical intersections. Provide a 1/4" nominal gap with acoustical sealant to form an airtight seal.
 - 6. Junction boxes to be sealed airtight at back and sides in acoustical walls with acoustical sealant.
 - 7. Recessed Panel boards, equipment, boxes, etc. with a penetration area greater than 25 sq. inches at acoustical walls are to be fully enclosed and sealed with 5/8 inch gypsum board.
- C. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:
 - 1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft (0.24 kPa) with maximum mid-span deflection of L/240.
 - 2. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
 - 3. where ducts and piping greater than 3 inches pass through acoustical wall or ceiling, provide a clearance of 1 inch (+/- 1/4 inch) at the perimeter of the penetration.

4. Where penetrations are 3 inches or less, pass through acoustical wall or ceiling, provide a clearance of 1/4 inch between conduit or piping and the structure, inless otherwise shown.
 5. Where penetration clearances are 3/8 inch or less, caulk with acoustical sealant.
- D. Shaft Walls at Elevator Shafts: Provide completed assemblies with the following characteristics:
1. Air Pressure Within Shaft: Intermittent loads of 5 lbf/sq ft (0.24 kPa) with maximum mid-span deflection of L/240.
 2. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
 3. Provide 1-inch clearance minimum between shaft wall liner board and steel supports for elevator.
- E. Fire Rated Assemblies: Provide completed assemblies with the following characteristics:
1. Fire Rated Partitions: UL listed assembly No. as indicated on drawings..
 2. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.02 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
1. American Gypsum Company: www.americangypsum.com.
 2. CertainTeed Corporation: www.certainteed.com.
 3. Georgia-Pacific Gypsum: www.gpgypsum.com.
 4. National Gypsum Company: www.nationalgypsum.com.
 5. PABCO Gypsum: www.pabcogypsum.com.
 6. USG Corporation: www.usg.com.
 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - a. Mold-resistant board is required whenever board is being installed before the building is enclosed and conditioned.
 - b. Mold-resistant board is required at restrooms and showers.
 3. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 4. Thickness:
 - a. Vertical Surfaces: 5/8 inch (16 mm).
 - b. Ceilings: 5/8 inch (16 mm).
 - c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
 5. Paper-Faced Products:
 - a. American Gypsum; EagleRoc Regular Gypsum Wallboard and FireBloc Type X Gypsum Wallboard.
 - b. American Gypsum Company; LightRoc Gypsum Wallboard.
 - c. Georgia-Pacific Gypsum; ToughRock.
 - d. National Gypsum Company; Gold Bond Brand Gypsum Wallboard.
 - e. Pacific Coast Building Products, Inc; PABCO Regular Gypsum Wallboard and PABCO Flame Curb.
 - f. USG Corporation; Sheetrock Brand Gypsum Panels.
 6. Mold-Resistant Paper-Faced Products:
 - a. American Gypsum Company; M-Bloc Type X.
 - b. American Gypsum; M-Bloc AR Type X.
 - c. American Gypsum; M-Bloc IR Type X.
 - d. CertainTeed Corporation; ProRoc Brand Moisture & Mold Resistant Gypsum Board.
 - e. Georgia-Pacific Gypsum; ToughRock Mold-Guard.
 - f. National Gypsum Company; Gold Bond Brand XP Gypsum Board.

- g. Pacific Coast Building Products, Inc; PABCO Mold Curb Gypsum Wallboard.
 - h. USG Corporation; Sheetrock Brand Mold Tough Gypsum Panels.
 - i. Substitutions: See Section 01 6000 - Product Requirements.
7. Glass Mat Faced Products:
- a. Georgia-Pacific Gypsum; DensArmor Plus.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- C. Impact-Resistant Wallboard:
- 1. Application: High-traffic areas indicated.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. Paper-Faced Type: Gypsum wallboard as defined in ASTM C1396/C1396M.
 - 4. Unfaced Type: Interior fiber-reinforced gypsum panels as defined in ASTM C1278/C1278M.
 - 5. Type: Fire-resistance rated Type X, UL or WH listed.
 - 6. Thickness: 5/8 inch (16 mm).
 - 7. Edges: Tapered.
 - 8. Products:
 - a. National Gypsum Company; Gold Bond Hi-Impact Brand XP Wallboard.
 - b. USG Corporation; Fiberock Brand Panels--VHI Abuse-Resistant.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- D. Backing Board For Wet Areas: One of the following products:
- 1. Application: Surfaces behind tile in wet areas including tub and shower surrounds and shower ceilings.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
 - a. Thickness: 1/2 inch (12.7 mm).
 - 4. ASTM Cement-Based Board: Non-gypsum-based, cementitious board complying with ASTM C1288.
 - a. Products:
 - 1) James Hardie Building Products, Inc: www.jameshardie.com.
 - 2) Substitutions: See Section 01 6000 - Product Requirements.
 - 5. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
 - a. Standard Type: Thickness 1/2 inch (12.7 mm).
 - b. Fire-Resistant Type: Type X core, thickness 5/8 inch (16 mm).
 - c. Products:
 - 1) Georgia-Pacific Gypsum; DensShield Tile Backer.
 - 2) National Gypsum Company; Gold Bond eXP Tile Backer.
 - 3) Substitutions: See Section 01 6000 - Product Requirements.
- E. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
- 1. Application: Vertical surfaces behind thinset tile, except in wet areas.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. Type: Regular and Type X, in locations indicated.
 - 4. Type X Thickness: 5/8 inch (16 mm).
 - 5. Regular Board Thickness: 1/2 inch (13 mm).
 - 6. Edges: Tapered.
 - 7. Products:
 - a. American Gypsum; AquaBloc ("Greenboard").
 - b. CertainTeed Corporation; ProRoc Brand Moisture Resistant Gypsum Board ("Greenboard").
 - c. Georgia-Pacific Gypsum; ToughRock Mold-Guard Gypsum Board.

- d. Substitutions: See Section 01 6000 - Product Requirements.
- F. Ceiling Board: Special sag-resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Ceilings, unless otherwise indicated.
 - 2. Thickness: 1/2 inch (13 mm).
 - 3. Edges: Tapered.
 - 4. Products:
 - a. American Gypsum; Interior Ceiling Board.
 - b. CertainTeed Corporation; ProRoc Interior Ceiling.
 - c. Georgia-Pacific Gypsum; ToughRock Span 24 Ceiling Board.
 - d. USG Corporation; Sheetrock Brand Sag-Resistant Interior Gypsum Ceiling Board.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- G. Acoustical Sound Dampening Wall and Ceiling Board: Two layers of heavy paper faced, high density gypsum board separated by a viscoelastic polymer layer and capable of achieving STC rating of 50 or more in typical stud wall assemblies as calculated in accordance with ASTM E413 and when tested in accordance with ASTM E90.
 - 1. Thickness: 5/8 inch (16 mm).
 - 2. Long Edges: Tapered.
 - 3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 4. Products:
 - a. National Gypsum Company; Gold Bond SoundBreak XP Gypsum Board: www.nationalgypsum.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- H. Acoustical Fiberboard: ASTM C208 cellulosic fiberboard without facing or coating; square edged.
 - 1. Thickness: 1/2 inch (13 mm).
 - 2. In 1-Hour Fire-Rated Partitions: UL listed for assembly used.
 - 3. Products:
 - a. Blue Ridge Fiberboard, A W.R. Meadows Company; Soundstop: www.wrmeadows.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- I. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
 - 1. Application: Exterior sheathing, unless otherwise indicated.
 - 2. Edges: Square, for vertical application.
- J. Shaftwall and Coreboard: Type X; 1 inch (25 mm) thick by 24 inches (610 mm) wide, beveled long edges, ends square cut.
 - 1. Paper Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. Products:
 - a. American Gypsum; Shaft Liner.
 - b. CertainTeed Corporation; ProRoc Brand Shaftliner Type X.
 - c. National Gypsum Company; Gold Bond Brand 1" Fire-Shield Shaftliner XP (mold-resistant).
 - d. USG Corporation; Sheetrock Gypsum Liner Panels--Enhanced (mold-resistant).
 - e. Substitutions: See Section 01 6000 - Product Requirements.

2.03 ACCESSORIES

- A. Acoustic Batt Insulation: ASTM C665; preformed glass fiber batt insulation, friction fit type, unfaced, 3 1/2", 5 1/2", and 9" thick R-11 and R-19 and R-30 per plans. Manufactures: Johns Manville, Owens -Corning, or equivalent.

- B. Acoustic Insulation: Cotton Fiber Insulation: Un-faced 3 1/2" and 5 1/2" (R-11 and R-19) thermally bonded bat insulation made from post-industrial cotton fiber. Manufactures: Bonded Logic Ultratouch.
- C. Safing: USG SAFB mineral wool.
- D. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
- E. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.
 - 1. Product: [Pecora BA-98 and Pecora AC-20 FTR for exposed joints, USG Acoustical Sealant, or equivalent.
- F. Acoustic Sealant: As specified in Section 07 9005.
- G. Access Door: As specified in Section 08 3100.
- H. Access doors at sound-rated construction equivalent to fire-rated access door.
 - 1. Seal door flanges with Pemko S-88 smoke seal at perimeter. Seal entire assembly to gypsum board with acoustical sealant.
- I. Water-Resistive Barrier: .
- J. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.
 - 1. Tape: 2 inch (50 mm) wide, creased paper tape for joints and corners, except as otherwise indicated.
- K. High Build Drywall Surfer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.
- L. Textured Finish Materials: Latex-based compound; plain.
- M. Resilient Channels: at all acoustical sound rated walls or ceilings use Clark Detriech RC Deluxe model RCSD or approved equivalent. Substitutions will require acoustical load test reports for similar conditions.
- N. Screws for Attachment to Steel Members Less Than 0.033 inch (0.84 mm) In Thickness, to Wood Members, and to Gypsum Board: ASTM C1002; self-piercing tapping type; cadmium plated for exterior locations.
- O. Nails for Attachment to Wood Members: ASTM C514.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 SHAFT WALL INSTALLATION

- A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
 - 1. Fasten runners to structure with short leg to finished side, using appropriate power-driven fasteners at not more than 24 inches (600 mm) on center.
 - 2. Install studs at spacing required to meet performance requirements.
- B. Shaft Wall Liner: Cut panels to accurate dimension and install sequentially between special friction studs.
 - 1. On walls over sixteen feet high, screw-attach studs to runners top and bottom.
 - 2. Seal perimeter of shaft wall and penetrations with acoustical sealant.
- C. At all elevators provide a minimum 1-inch clearance between shaft wall liner board and steel supports for elevators.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

- B. Install batt insulation to fill cavities at and fasten to framing where not a tight fit, to prevent slipping.
- C. Safing insulation: Install safing material at duct and pipe penetrations at sound-rated walls and ceilings.
- D. Install mineral wool insulation filling all framing cavities in shaft walls and walls surrounding elevators.
- E. Acoustic Sealant: Install in accordance with manufacturer's instructions.
 - 1. Place one bead continuously on substrate before installation of perimeter framing members.
 - 2. Place continuous bead at perimeter of each layer of gypsum board.
 - 3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.04 RESILIENT CHANNEL INSTALLATION

- A. Attach resilient channels perpendicular to framing. Where load exceeds 10 psf attach resilient channel on 12-inch centers.
- B. Drive screws only through pre-punched holes in channels.
- C. Attach resilient channels with mounting flanges facing in only one direction. Orient the gap between the channel and stud faces upward on walls.
- D. Hold back ends of channels 1/2 to 3 inches from intersecting surfaces.
- E. Splice channels only at joists and overlap ends by not more than 1-1/2 inches.
- F. Locate channels so that gypsum board will not be cantilevered more than 6 inches from vertical surfaces.
- G. Application on Resilient Channels:
 - 1. Use the appropriate length gypsum attaching screws as recommended by manufacturer. Screws shall not contact studs or framing.
 - 2. Resilient channel only to bear load of gypsum board, unless indicated otherwise.
 - 3. Surface mount all fixtures and attach using molly-type fasteners. The fasteners shall not contact resilient channels or structure.
 - 4. Adhere trim and baseboards to avoid "short-circuiting".

3.05 BOARD INSTALLATION

- A. Comply with ASTM C 840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
 - 1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- C. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- D. Sound Rated Construction: Seal door flanges with Pemko S-88 smoke seal at perimeter. Seal entire assembly to gypsum board.
- E. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.
- F. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
 - 1. Seal joints, cut edges, and holes with water-resistant sealant.
 - 2. Paper-Faced Sheathing: Immediately after installation, protect from weather by application of water-resistant barrier.
- G. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

- H. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.
- I. Installation on Wood Framing: For rated assemblies, comply with requirements of listing authority. For non-rated assemblies, install as follows:
 - 1. Single-Layer Applications: Screw attachment.
 - 2. Double-Layer Application: Install base layer using screws or nails. Install face layer using adhesive.

3.06 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
 - 1. Not more than 30 feet (10 meters) apart on walls and ceilings over 50 feet (16 meters) long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.07 JOINT TREATMENT

- A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 2. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
 - 3. Level 3: Walls to receive textured wall finish.
 - 4. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
 - 5. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
 - 6. Level 0: Temporary partitions.
- B. A. Double layer application:
 - 1. Stagger joints 24-inches between layers.
 - 2. Tape face layer.
- C. Sound-rated edge condition: Stagger (i.e., ship-lap) gypsum board layers at vertical intersections. Provide a 1/4-inch nominal gap around the gypsum board face layer at floor and ceiling intersections. Fill the 1/4-inch gap with acoustical sealant to form an airtight seal.
- D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch (0.8 mm).
- E. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.08 PENETRATIONS (THROUGH SOUND-RATED CONSTRUCTION)

- A. Cut-outs are to be regular and not fracture core or tear covering of gypsum board and meet the following requirements.
- B. Minimize penetrations of insulated wall and ceiling constructions. Penetrate only where necessary and fully seal airtight at the perimeter using acoustical sealant.
- C. Where ducts and piping greater than 3-inches diameter penetrate insulated wall or ceiling construction, provide a clearance of 1-inch + 1/4-inch at the perimeter of the penetration.
- D. Where conduit piping 3-inches diameter and less (including mechanical, hydraulic, plumbing, etc.) pass through insulated wall or ceiling construction, provide a clearance of 1/4-inch + 1/8-inch between the conduit or piping and the structure, unless otherwise shown.
- E. After the ductwork, conduit or piping has been installed, repair the gypsum board perimeter clearance to the specified tolerance as required. Where the clearance exceeds 3/4-inch, provide a sheet metal sleeve within the partition packed with safing insulation batts and caulk

both sides airtight with an acoustical sealant. Where the perimeter clearance exceeds 3/8-inch, use a flexible backing rod to caulk against.

- F. Where penetration clearances are 3/8-inch or less, caulk airtight with acoustical sealant at gypsum board.
- G. All gypsum board penetrations (including those resulting from wiring, cables, and electrical junction boxes) are to be sealed airtight with acoustical sealant.
- H. The back and sides of junction boxes in sound-rated construction must be sealed airtight with sheet caulking. Caulk perimeter face at gypsum board with acoustical sealant.
- I. Recessed panel boards, equipment, boxes, etc. with penetration area greater than 25 sq. in. at sound-rated partitions are to be fully enclosed and sealed with 5/8-inch thick gypsum board or 2 psf sheet lead.
- J. Seal multiple conduit penetrations airtight with expanding fire foam sealant.
- K. Seal other sound-rated conditions with spray-applied (40 pcf) cementitious sealant equal to Monokote Z-146

3.09 TEXTURE FINISH

- A. Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions and to match approved sample.
- B. Texture Required: refer to drawings.

3.10 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.

END OF SECTION

SECTION 09 2216
NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal partition, ceiling, and soffit framing.
- B. Framing accessories.

1.02 RELATED REQUIREMENTS

- A. Section 05 5400 - Cold-Formed Metal Framing: Execution requirements for anchors for attaching work of this section.
- B. Section 05 5000 - Metal Fabrications: Metal fabrications attached to stud framing.
- C. Section 06 1000 - Rough Carpentry: Wood blocking within stud framing.
- D. Section 07 2100 - Thermal Insulation: Insulation.
- E. Section 08 3100 - Access Doors and Panels.
- F. Section 08 5113 - Aluminum Windows: Product requirements for window anchors.
- G. Section 09 2116 - Gypsum Board Assemblies: Execution requirements for anchors for attaching work of this section.

1.03 REFERENCE STANDARDS

- A. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2013.
- B. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2011.
- C. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- D. ASTM E413 - Classification for Rating Sound Insulation; 2010.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate prefabricated work, component details, stud layout, framed openings, anchorage to structure, acoustic details, type and location of fasteners, accessories, and items of other related work.
 - 2. Describe method for securing studs to tracks, splicing, and for blocking and reinforcement of framing connections.
- C. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations.
- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience and approved by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Framing, Connectors, and Accessories:
 - 1. Clarkwestern Dietrich Building Systems LLC: www.clarkdeitrich.com.
 - 2. Simpson Strong Tie: www.strongtie.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FRAMING MATERIALS

- A. Fire Rated Assemblies: Comply with applicable code and as indicated on drawings.
- B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf (240 Pa).
 - 1. Studs: C shaped with flat or formed webs with knurled faces.
 - 2. Runners: U shaped, sized to match studs.
 - 3. Ceiling Channels: C shaped.
 - 4. Furring: Hat-shaped sections, minimum depth of 7/8 inch (22 mm).
 - 5. Steel Stud Framing Connectors:
 - a. Products:
 - 1) Simpson Strong Tie, Bridging Connectors; DBC Bridging Connector: www.strongtie.com.
 - 2) Substitutions: See Section 01 6000 - Product Requirements.
- C. Loadbearing Studs: As specified in Section 05 5400.
- D. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
- E. Partition Head to Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and fastened as indicated on drawings.
- F. Acoustic Insulation: As specified in Section 07 2100.
- G. Acoustic Sealant: As specified in Section 09 2116.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.

3.02 INSTALLATION OF STUD FRAMING

- A. Comply with requirements of ASTM C754.
- B. Extend partition framing to structure where indicated and to ceiling in other locations.
- C. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
- D. Align and secure top and bottom runners at 24 inches (600 mm) on center.
- E. At partitions indicated with an acoustic rating:
 - 1. Provide components and install as required to produce STC ratings as indicated, based on published tests by manufacturer conducted in accordance with ASTM E90 with STC rating calculated in accordance with ASTM E413.
 - 2. Place one bead of acoustic sealant between runners and substrate, studs and adjacent construction.
 - 3. Place one bead of acoustic sealant between studs and adjacent vertical surfaces.
- F. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.
- G. Install studs vertically at spacing indicated on drawings.
- H. Align stud web openings horizontally.
- I. Secure studs to tracks using crimping method. Do not weld.
- J. Fabricate corners using a minimum of three studs.
- K. Double stud at wall openings, door and window jambs, not more than 2 inches (50 mm) from each side of openings.
- L. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.

3.03 CEILING AND SOFFIT FRAMING

- A. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.
- B. Install furring independent of walls, columns, and above-ceiling work.
- C. Securely anchor hangers to structural members or embed in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.
- D. Space main carrying channels at maximum 72 inch (1 800 mm) on center, and not more than 6 inches (150 mm) from wall surfaces. Lap splice securely.
- E. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.
- F. Place furring channels perpendicular to carrying channels, not more than 2 inches (50 mm) from perimeter walls, and rigidly secure. Lap splices securely.

END OF SECTION

SECTION 09 2400
PORTLAND CEMENT PLASTERING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Portland cement plaster for installation over metal lath and concrete.

1.02 RELATED REQUIREMENTS

- A. Section 05 5400 - Cold-Formed Metal Framing: Structural metal framing for plaster.
- B. Section 06 1000 - Rough Carpentry: Wood stud framing for plaster.
- C. Section 08 3100 - Access Doors and Panels: Access panels.
- D. Section 09 2216 - Non-Structural Metal Framing: Metal stud framing and furring for plaster.

1.03 REFERENCE STANDARDS

- A. ASTM C926 - Standard Specification for Application of Portland Cement-Based Plaster; 2014a.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittals procedures.
- B. Product Data: Provide data on plaster materials, characteristics and limitations of products specified.
- C. Samples: Submit two samples, 4x4 inch (____x____ mm) in size illustrating finish color and texture.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.06 FIELD CONDITIONS

- A. Do not apply plaster when substrate or ambient air temperature is under 50 degrees F (10 degrees C) or over 80 degrees F (27 degrees C).

PART 2 PRODUCTS

2.01 PORTLAND CEMENT PLASTER ASSEMBLIES

- A. Exterior Stucco: Portland cement plaster system, made of finish, brown, and scratch coat and reinforcing mesh.

2.02 PLASTER MATERIALS

- A. Portland Cement, Aggregates, and Other Materials: In accordance with ASTM C926.

2.03 METAL LATH

- A. Metal Lath and Accessories: As specified in Section 09 2236.23.
- B. Beads, Screeds, and Joint Accessories: As specified in Section 09 2236.23.

2.04 PLASTER MIXES

- A. Over Metal Lath: Three-coat application, mixed and proportioned in accordance with ASTM C926.
- B. Mix only as much plaster as can be used prior to initial set.
- C. Mix materials dry, to uniform color and consistency, before adding water.
- D. Protect mixtures from freezing, frost, contamination, and excessive evaporation.
- E. Do not retemper mixes after initial set has occurred.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify the suitability of existing conditions before starting work.
- B. Concrete: Verify surfaces are flat, honeycomb are filled flush, and surfaces are ready to receive work of this section. Verify no bituminous, water repellent, or form release agents exist on concrete surface that are detrimental to plaster bond.
- C. Metal Lath and Accessories: Verify lath is flat, secured to substrate, and joint and surface perimeter accessories are in place.

3.02 PREPARATION

- A. Clean concrete surfaces of foreign matter. Clean surfaces using acid solutions, solvents, or detergents. Wash surfaces with clean water.
- B. Roughen smooth concrete surfaces and apply bonding agent in accordance with manufacturer's instructions.

3.03 PLASTERING

- A. Apply plaster in accordance with ASTM C926.
- B. Three-Coat Application Over Metal Lath:
 - 1. Apply first coat to a nominal thickness of 3/8 inch (9 mm).
 - 2. Apply second coat to a nominal thickness of 3/8 inch (9 mm).
 - 3. Apply finish coat to a nominal thickness of 1/8 inch (3 mm).
- C. Moist cure base coats.
- D. Apply second coat immediately following initial set of first coat.
- E. After curing, dampen previous coat prior to applying finish coat.
- F. Finish Texture: Float to a consistent and smooth finish.
- G. Avoid excessive working of surface. Delay troweling as long as possible to avoid drawing excess fines to surface.
- H. Moist cure finish coat for minimum period of 48 hours.

END OF SECTION

SECTION 09 3000

TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tile for floor applications.
- B. Tile for wall applications.
- C. Tile for shower receptors.
- D. Ceramic trim.

1.02 RELATED REQUIREMENTS

- A. Section 07 9005 - Joint Sealers.
- B. Section 09 0561 - Common Work Results for Flooring Preparation
- C. Section 09 2116 - Gypsum Board Assemblies: Tile backer board.
- D. Section 22 0500 - Plumbing Utilities

1.03 REFERENCE STANDARDS

- A. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile - Version; 2013.1.
- B. ANSI A108.1A - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2013.1.
- C. ANSI A108.1B - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 2013.1.
- D. ANSI A108.1C - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement Mortar; 2013.1.
- E. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2013.1.
- F. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 2013.1.
- G. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 2013.1.
- H. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 2013.1.
- I. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 2013.1.
- J. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2013.1.
- K. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2013.1.
- L. ANSI A108.12 - American National Standard Specifications for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 2013.1.
- M. ANSI A108.13 - American National Standard Specifications for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2013.1.
- N. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2013.1.

- O. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 2013.1.
- P. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2013.1.
- Q. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2013.1.
- R. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2013.1.
- S. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation - Version; 2013.1.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
- D. Samples: Provide two full size samples of each tile selection for approval of color.
- E. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Tile: 1 percent of each size, color, and surface finish combination, but not less than ten of each type.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of and ANSI A108/A118/A136.1 and TCNA (HB) on site.

PART 2 PRODUCTS

2.01 TILE

- A. Manufacturers: Refer to drawings for schedule of tiles.
 - 1. American Olean Corporation: www.americanolean.com.
 - 2. Dal-Tile Corporation: www.daltile.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 TRIM AND ACCESSORIES

- A. Ceramic Trim: Matching bullnose ceramic shapes in sizes coordinated with field tile.
 - 1. Manufacturers: Same as for tile.

2.03 SETTING MATERIALS

- A. Provide setting materials made by the same manufacturer as grout.
- B. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4, ANSI A118.15, or _____.

2.04 GROUTS

- A. Manufacturers:
 - 1. Type G1 and G2: Custom Building Products: Polyblend sanded grout.
 - 2. Type G3 : Custom Building Products: Prism Surecolor non-sanded grout.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.05 THICK-BED MATERIALS

- A. Mortar Bed Materials: Portland cement, sand, latex additive, and water.
 - 1. Products:

- a. LATICRETE International, Inc; LATICRETE 3701 Fortified Mortar Bed:
www.laticrete.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- B. Cleavage Membrane: 4 mil (0.1 mm) thick polyethylene film.
- C. Waterproofing Membrane Under Mortar Bed: As specified in Section 07 1400.

2.06 ACCESSORY MATERIALS

- A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
- 1. Thickness: 20 mils (0.5 mm), maximum.
 - 2. Crack Resistance: No failure at 1/16 inch (1.6 mm) gap, minimum.
 - 3. Products:
 - a. LATICRETE International, Inc; LATICRETE Blue 92 Anti-Fracture Membrane:
www.laticrete.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- B. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
- 1. Type: Bonded Sheet Membrane.
 - 2. Material: PVC sheet membrane, 40 mils (1 mm), thick, minimum.
 - 3. Products:
 - a. COMPOTITE Corporation; Composeal Gold: www.compotite.com.
 - b. LATICRETE International, Inc; LATICRETE HYDRO BAN: www.laticrete.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- C. Waterproofing Membrane at Showers and Tiled Tubs: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
- 1. Type: Trowel-applied.
 - 2. Products:
 - a. ARDEX Engineered Cements; ARDEX 8+9: www.ardexamericas.com.
 - b. LATICRETE International, Inc; LATICRETE HYDRO BAN: www.laticrete.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- D. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 1/2 inch (13 mm) thick; 2 inch (50 mm) wide coated glass fiber tape for joints and corners.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.

3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

3.03 INSTALLATION - GENERAL

- A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1A thru A108.13, manufacturer's instructions, and TCNA (HB) recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
- E. Form internal angles square and external angles bullnosed.
- F. Sound tile after setting. Replace hollow sounding units.
- G. Keep control and expansion joints free of mortar, grout, and adhesive.
- H. Keep expansion joints free of adhesive or grout. Apply sealant to joints.
- I. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- J. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
- K. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.
- L. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.04 INSTALLATION - FLOORS - MORTAR BED METHODS

- A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F111, with cleavage membrane, unless otherwise indicated.
- B. Cleavage Membrane: Lap edges and ends.
- C. Waterproofing Membrane: Install as recommended by manufacturer and as specified in the section in which the product is specified.
- D. Mortar Bed Thickness: 5/8 inch (15 mm), unless otherwise indicated.

3.05 INSTALLATION - SHOWERS AND BATHTUB WALLS

- A. Grout with standard grout as specified above.
- B. Seal joints between tile work and other work with sealant specified in Section 07 9005.

3.06 INSTALLATION - WALL TILE

- A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244, using membrane at toilet rooms.

3.07 CLEANING

- A. Clean tile and grout surfaces.

3.08 PROTECTION

- A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

SECTION 09 5100
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 07 2100 - Thermal Insulation: Acoustical insulation.
- C. Section 07 9005 - Joint Sealers: Acoustical sealant.
- D. Section 23 1313 - Automatic Fire Protection System: Sprinkler heads in ceiling system.
- E. Section 26 5100 - Interior Lighting: Light fixtures in ceiling system.

1.03 REFERENCE STANDARDS

- A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.
- B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 2013.
- C. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2014.
- D. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.
- E. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate grid layout and related dimensioning.
- C. Product Data: Provide data on suspension system components and acoustical isolators.
- D. Samples: Submit two samples 12x12 inch (300 by 300 mm) in size illustrating material and finish of acoustical units.
- E. Samples: Submit two samples each, 12" inches (300 mm) long, of suspension system main runner.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.06 QUALITY ASSURANCE

- A. Fire-Resistive Assemblies: Complete assembly listed and classified by UL (FRD) for the fire resistance indicated.
- B. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

- C. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 ACOUSTICAL UNITS

- A. Manufacturers:
1. Armstrong World Industries, Inc; Product Ultima, Calla Square Lay-in, fine fissured, and Optima as scheduled below.: www.armstrong.com.
 2. CertainTeed Corporation: www.certainteed.com.
 3. USG: www.usg.com.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Acoustical Tile Type AC1
1. Product: Ultima by Armstrong Commercial
 2. VOC Content: As specified in Section 01 61 16
 3. Size: 24 x 24 inches
 4. Thickness: 3/4 inches
 5. NRC: .70
 6. Edge: Square Lay-in
 7. Surface Color: White
 8. Suspension System: Exposed grid; Product: Armstrong 15/16" Prelude; Color: White
- C. Acoustical Tile Type AC2
1. Product: Calla Colorations Integrated by Armstrong Commercial
 2. VOC Content: As specified in Section 01 61 16
 3. Size: 24 x 48 inches
 4. Thickness: 7/8 inches
 5. NRC: .85
 6. Edge: Beveled Tegular
 7. Surface Color: Black
 8. Suspension System: Exposed grid; Product: Armstrong 9/16" Suprafine XL; Color: Black
- D. Acoustical Tile Type AC3
1. Product: Optima by Armstrong Commercial
 2. VOC Content: As specified in Section 01 61 16
 3. Size: 24 x 24 inches
 4. Thickness: 1 inch
 5. NRC: .90 - 1.00
 6. Edge: Square Lay-in
 7. Surface Color: White
 8. Suspension System: Exposed grid; Product: Armstrong 15/16" Prelude; Color: White
- E. Acoustical Tile Type AC4. Product: Fine Fissured by Armstrong.
1. VOC Content: As specified in Section 01 61 16.
 2. Size: 12 by 12 inches (300 by 300 mm).
 3. Thickness: 5/8 inches (15.9 mm).
 4. Composition: Water felted.
 5. NRC Range: Determined in accordance with ASTM E1264.
 6. Joint: Tongue and groove.
 7. Applied by Adhesive System.

2.02 SUSPENSION SYSTEM(S)

- A. Manufacturers:

1. Same as for acoustical units.
 2. Armstrong World Industries, Inc: www.armstrong.com.
 3. CertainTeed Corporation: www.certainteed.com.
 4. Chicago Metallic Corporation: www.chicagometallic.com.
 5. USG: www.usg.com.
 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.

2.03 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Perimeter Moldings: Same material and finish as grid.
1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
 2. At Concealed Grid: Provide exposed L-shaped molding.
- C. Acoustical Insulation: Specified in Section 07 2100.
- D. Gypsum Board: Fire rated type; 5/8 inch (15 mm) thick, ends and edges square, paper faced.
- E. Acoustical Sealant For Perimeter Moldings: Non-hardening, non-skinning, for use in conjunction with suspended ceiling system.
- F. Isolators: Provide ceiling isolators where indicated for acoustical performance.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.
- D. Locate system on room axis according to reflected plan.
- E. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- F. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.
- G. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- H. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- I. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- J. Support fixture loads using supplementary hangers located within 6 inches (150 mm) of each corner, or support components independently.
- K. Do not eccentrically load system or induce rotation of runners.

- L. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Install in bed of acoustical sealant.
 - 2. Use longest practical lengths.
 - 3. Overlap and rivet corners.
- M. Install light fixture boxes constructed of gypsum board above light fixtures in accordance with fire rated assembly requirements and light fixture ventilation requirements.

3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install units after above-ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
 - 1. Make field cut edges of same profile as factory edges.
- G. Where round obstructions occur, provide preformed closures to match perimeter molding.
- H. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.
- I. Install hold-down clips on panels within 20 ft (6 m) of an exterior door.

END OF SECTION

SECTION 09 6500
RESILIENT FLOOR TILE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient sheet flooring.
- B. Resilient tile flooring.
- C. Resilient base.
- D. Resilient tile flooring.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 03 3000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.
- C. Section 09 0561 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.

1.03 REFERENCE STANDARDS

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- B. ASTM F1303 - Standard Specification for Sheet Vinyl Floor Covering with Backing; 2004 (Reapproved 2014).
- C. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile; 2013a.
- D. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012)e1.
- E. ASTM F1913 - Standard Specification for Vinyl Sheet Floor Covering Without Backing; 2004 (Reapproved 2010).
- F. CAL (CHPS LEM) - Low-Emitting Materials Product List; California Collaborative for High Performance Schools (CHPS); current edition at www.chps.net/.
- G. GEI (SCH) - GREENGUARD "Children and Schools" Certified Products; GREENGUARD Environmental Institute; current listings at www.greenguard.org.
- H. SCS (CPD) - SCS Certified Products; Scientific Certification Systems; current listings at www.scs-certified.com.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Shop Drawings: Indicate seaming plan.
- D. Selection Samples: Submit manufacturer's complete set of color samples to Architect.
- E. Verification Samples: Submit two samples, 12x12 inch (300 by 300 mm) in size illustrating color and pattern for each resilient flooring product specified.
- F. Concrete Testing Standard: Submit a copy of ASTM F710.
- G. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of sub-floor is acceptable.
- H. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- I. LEED Report: Report recycled content and VOC emission of flooring; VOC content of adhesives.

- J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Flooring Material: [25] square feet ([] square meters) of each type and color.
 - 3. Extra Wall Base: [50] linear feet of each type and color.
- K. LEED Submittal: Documentation of recycled content and location of manufacture.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F (13 degrees C) and 90 degrees F (72 degrees C).
- D. Protect roll materials from damage by storing on end.
- E. Do not double stack pallets.

1.06 FIELD CONDITIONS

- A. Maintain temperature in storage area between 55 degrees F (13 degrees C) and 90 degrees F (72 degrees C).
- B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F (21 degrees C) to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F (13 degrees C).

PART 2 PRODUCTS

2.01 SHEET FLOORING

- A. Vinyl Sheet Flooring Type RF3: Color and pattern throughout wear layer thickness, with backing and:
 - 1. Minimum Requirements: Comply with ASTM F1303, Type II, with Class A fibrous backing.
 - 2. VOC Content: Certified as Low Emission by one of the following :
 - a. GreenGuard Children and Schools; www.greenguard.org.
 - b. SCS (CPD) - SCS Certified Products; Scientific Certification Systems.
 - 3. Wear Layer Thickness: .050 inch (1.25 mm) minimum.
 - 4. Total Thickness: 0.080 inch (2 mm) minimum.
 - 5. Heat welded seams.
 - 6. Slip resistance: minimum COF 0.05 per ASTM D2047.
 - 7. Integral coved base with cap strip.
 - 8. Pattern: Solid color.
 - 9. Manufacturers:
 - a. Johnsonite.
- B. Vinyl Welding Rod: Solid vinyl bead produced by manufacturer of vinyl flooring for heat welding seams, in color matching field color.

2.02 TILE FLOORING

- A. Vinyl Tile (RF1): Solid vinyl with color and pattern throughout thickness, and:
 - 1. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
 - 2. VOC Content: Certified as Low Emission by one of the following :
 - a. GreenGuard Children and Schools; www.greenguard.org.
 - b. SCS Floorscore; www.scscertified.com.
 - c. Product listing in the CHPS Low-Emitting Materials Product List at; www.chps.net/manual/lem_table.htm.
 - 3. Tile Size: 12 by 12 inch (305 by 305 mm).
 - 4. Wear Layer Thickness: 0.020 inch (0.50 mm).
 - 5. Total Thickness: 0.100 inch (2.5 mm).

6. Pattern: Refer to Drawings..
7. Manufacturers:
 - a. Armstrong.
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
- B. Resilient Base Type B1
 1. Product: Rubber Wall Base by Johnsonite
 2. Height: 4 inches
 3. Color: 63 Burnt Umber
- C. Resilient Base Type B2
 1. Product: Millwork Wallbase Oblique by Johnsonite
 2. Height: 3 inches
 3. Color: 63 Burnt Umber

2.04 PLANK FLOORING

- A. SOLID VINYL TILE/PLANK (RF2)
 1. High Performance vinyl plank 3mm:
 2. ASTM F 1700 : Class III Type B
 3. Wear Layer : 20 mil
 4. Dimensions: 3.94"w x 36.22" long, square edge
 5. Installation: Glue down
 6. Pattern: Per Drawings
 7. Manufacturers:
 - a. Tandis/ Centiva - Basis of Design
 - b. Shaw Hard Surfaces
 - c. Armstrong Flooring
 - d. Mannington

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
 1. Test in accordance with Section 09 0561.
 2. Test in accordance with ASTM F710.
 3. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

- A. Prepare floor substrates for installation of flooring in accordance with Section 09 0561.
- B. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in accordance with manufacturer's instructions.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Fit joints tightly.
- E. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

- F. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
- G. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- H. At movable partitions, install flooring under partitions without interrupting floor pattern.

3.04 SHEET FLOORING

- A. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns carefully at seams.
- B. Seams are prohibited in bathrooms, kitchens, toilet rooms, and custodial closets.
- C. Double cut sheet at seams.
- D. Lay flooring with tightly butted seams, without any seam sealer unless otherwise indicated.
- E. Finish seams in sheet vinyl by heat welding.
- F. Coved Base: Install as detailed on drawings, using coved base filler as backing at floor to wall junction. Extend sheet flooring vertically to height indicated, and cover top edge with metal cap strip.

3.05 RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 36 inches (900 mm) between joints.
- B. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.06 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's instructions.

3.07 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

SECTION 09 6800

CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet, stretched-in with cushion underlay and direct-glued.
- B. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 03 3000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied carpet.
- C. Section 09 0561 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.
- D. Section 09 6813 - Tile Carpeting.

1.03 REFERENCE STANDARDS

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2006 (Reapproved 2011).
- B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- D. CRI (CIS) - Carpet Installation Standard; Carpet and Rug Institute; 2009.
- E. CRI (GLA) - Green Label Testing Program - Approved Adhesive Products; Carpet and Rug Institute; Current Edition.
- F. CRI (GLC) - Green Label Testing Program - Approved Product Categories for Carpet; Carpet and Rug Institute; Current Edition.
- G. CRI (GLCC) - Green Label Testing Program - Approved Product Categories for Carpet Cushion; Carpet and Rug Institute; Current Edition.
- H. CRI (GLP) - Green Label Plus Testing Program - Certified Products; Carpet and Rug Institute; Current Edition.
- I. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; National Fire Protection Association; 2011.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate seaming plan, method of joining seams, direction of carpet pile and pattern, location of edge moldings and edge bindings.
- C. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- D. Samples: Submit two samples 12x12 inch (300 by 300 mm) in size illustrating color and pattern for each carpet and cushion material specified.
- E. Submit two, 12 inch (300 mm) long samples of edge strip for each color specified.
- F. Manufacturer's Installation Instructions: Indicate special procedures.
- G. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 6000 - Product Requirements, for additional requirements.
2. Extra Carpet: 25 sq ft (2.32 sq m) of each type, color, and pattern installed.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet with minimum three years documented experience.

1.06 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.
- B. Maintain minimum 70 degrees F (21 degrees C) ambient temperature 24 hours prior to, during and 24 hours after installation.
- C. Ventilate installation area during installation and for 72 hours after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 CARPET

- A. Carpet:
 1. Tandus; Product: Graphic Loop 30 oz. SDN; Performance backing.
 2. Color: Per drawings.
 3. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
 4. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
 5. VOC Content: Comply with Section 01 6116.
 6. Substitutions: See Section 01 6000 - Product Requirements.

2.03 ACCESSORIES

- A. Sub-Floor Filler: Type recommended by carpet manufacturer.
- B. Moldings and Edge Strips: Rubber, match base B1 color.
- C. Adhesives - General: Compatible with materials being adhered; maximum VOC content as specified in Section 01 6116.
- D. Seam Adhesive: Recommended by manufacturer.
- E. Contact Adhesive: Compatible with carpet material; releasable type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesives to sub floor surfaces.
- B. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- C. Clean substrate.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet in accordance with manufacturer's instructions and CRI Carpet Installation Standard.

- C. Lay out carpet and locate seams in accordance with shop drawings.
 - 1. Locate seams in area of least traffic, out of areas of pivoting traffic, and parallel to main traffic.
 - 2. Do not locate seams perpendicular through door openings.
 - 3. Align run of pile in same direction as anticipated traffic and in same direction on adjacent pieces.
- D. Install carpet tight and flat on subfloor, well fastened at edges, with a uniform appearance.

3.04 DIRECT-GLUED CARPET

- A. Double cut carpet seams, with accurate pattern match. Make cuts straight, true, and unfrayed. Apply seam adhesive to cut edges of woven carpet immediately.
- B. Apply contact adhesive to floor uniformly at rate recommended by manufacturer. After sufficient open time, press carpet into adhesive.
- C. Apply seam adhesive to the base of the edge glued down. Lay adjoining piece with seam straight, not overlapped or peaked, and free of gaps.
- D. Roll with appropriate roller for complete contact of adhesive to carpet backing.
- E. Trim carpet neatly at walls and around interruptions.

3.05 INSTALLATION ON STEPS

- A. Use one piece of carpet for each tread and the riser below. Apply seam adhesive to all cut edges.
- B. Install carpet with pile direction in the length of the stair.
- C. Adhere carpet tight to stair treads and risers.

3.06 CLEANING

- A. Remove excess adhesive from floor and wall surfaces without damage.
- B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 6813
TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet tile, loose laid with edges and control grid adhered.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 03 3000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.
- C. Section 09 0561 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.
- D. Section 09 6800 - Carpeting: Broadloom carpet.

1.03 REFERENCE STANDARDS

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2006 (Reapproved 2011).
- B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- D. CRI (CIS) - Carpet Installation Standard; Carpet and Rug Institute; 2011.
- E. CRI (GLP) - Green Label Plus Testing Program - Certified Products; Carpet and Rug Institute; Current Edition.
- F. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; National Fire Protection Association; 2011.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate layout of joints.
- C. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- E. Manufacturer's Installation Instructions: Indicate special procedures.
- F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.06 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Tandus .
- B. Tile Carpeting:
 - 1. Shaw Contract: www.tandus.com.
 - 2. Interface, Inc; ____: www.interfaceinc.com.
 - 3. Lees Carpets; ____: www.leescarpets.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

- A. Tile Carpeting, Type CT1: Tufted, manufactured in one color dye lot.
 - 1. Product: Applause III manufactured by Tandus.
 - 2. Tile Size: 24 x 24 inch (600 x 600 mm), nominal.
 - 3. Color: Mosaic 28502.
 - 4. Pattern: As indicated on drawings.
 - 5. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
 - 6. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
 - 7. VOC Content: Comply with Section 01 6116.
 - 8. VOC Content: Provide CRI Green Label Plus certified product; in lieu of labeling, independent test report showing compliance is acceptable.
 - 9. Pile Weight: 18 oz/sq yd (____ gm/sq m).
 - 10. Primary Backing Material: Power Bond Cushion RS.
- B. Carpet Tile Type CT2: Tufted, manufactured in one color dye lot.
 - 1. Product: Aftermath II manufactured by Tandus.
 - 2. Tile Size: 24 x 24 inch (600 x 600 mm), nominal.
 - 3. Color: Fleece 23508.
 - 4. Pattern: As indicated on drawings.
 - 5. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
 - 6. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
 - 7. VOC Content: Comply with Section 01 6116.
 - 8. VOC Content: Provide CRI Green Label Plus certified product; in lieu of labeling, independent test report showing compliance is acceptable.
 - 9. Pile Weight: 17 oz/sq yd (____ gm/sq m).
 - 10. Primary Backing Material: Power Bond Cushion RS.
- C. Carpet Tile Type WM2: Tufted, manufactured in one color dye lot.
 - 1. Product: Abrasive Action 2 - 02578 manufactured by Tandus.
 - 2. Tile Size: 24 x 24 inch (600 x 600 mm), nominal.
 - 3. Color: Winter Grey 19103.
 - 4. Pattern: As indicated on drawings.
 - 5. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
 - 6. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
 - 7. VOC Content: Comply with Section 01 6116.
 - 8. VOC Content: Provide CRI Green Label Plus certified product; in lieu of labeling, independent test report showing compliance is acceptable.
 - 9. Pile Weight: 24 oz/sq yd (____ gm/sq m).
 - 10. Primary Backing Material: Power Bond Cushion.

2.03 ACCESSORIES

- A. Sub-Floor Filler: White premix latex; type recommended by flooring material manufacturer.
- B. Edge Strips: Embossed aluminum, color as selected by Architect.
- C. Stair Nosing: Rubber type, square nose, ribbed top surface, one piece per stair tread width, color as selected by Architect.
- D. Adhesives: Acceptable to carpet tile manufacturer, compatible with materials being adhered; maximum VOC content as specified in Section 01 6116.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet tile.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
- D. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for flooring installation by testing for moisture and pH.
 - 1. Test in accordance with ASTM F710.
 - 2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

- A. Prepare floor substrates for installation of flooring in accordance with Section 09 0561.
- B. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- C. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- D. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- E. Vacuum clean substrate.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions and CRI (CIS).
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Locate change of color or pattern between rooms under door centerline.
- F. Trim carpet tile neatly at walls and around interruptions.
- G. Complete installation of edge strips, concealing exposed edges.

3.04 INSTALLATION ON STAIRS

- A. Use one piece of carpet for each tread and the riser below. Apply seam adhesive to all cut edges.
- B. Lay carpet with pile direction in the length of the stair.
- C. Adhere carpet tight to stair treads and risers.

3.05 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 7200
WALL COVERINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation and prime painting.
- B. Wall covering .

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 09 9000 - Painting and Coating: Preparation and priming of substrate surfaces.

1.03 REFERENCE STANDARDS

- A. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes; 2002 (Reapproved 2013).
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- C. ASTM F793 - Standard Classification of Wallcovering by Use Characteristics; 2010a.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on wall covering and adhesive.
- C. Samples: Submit two samples of wall covering, 12_x 12 inch (____x____ mm) and one Full widthx30" in size illustrating color, finish, and texture.
- D. Test Reports: Indicate verification of flame and smoke ratings, when tested by UL.
- E. Manufacturer's Installation Instructions: Indicate special procedures.
- F. Maintenance Data: Submit data on cleaning, touch-up, and repair of covered surfaces.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Wall Covering Materials: 25 linear feet (8 linear m) of each color and pattern of wall covering; store where directed.
 - 3. Package and label each roll by manufacturer, color and pattern, and destination room number.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section with minimum three years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Inspect roll materials at arrival on site, to verify acceptability.
- B. Protect packaged adhesive from temperature cycling and cold temperatures.
- C. Do not store roll goods on end.

1.07 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer.
- B. Maintain these conditions 24 hours before, during, and after installation of adhesive and wall covering.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Wallcovering - Type [WC1]: Product: Koroseal: Arbor Series Flexible Wood Veneer Wallcovering Planked Veneer (multi Species), conforming to the following:
 - 1. All wallcoverings to be Class A - Flame spread index of 0-25; smoke developed index 0-450 per ASTM E84.
 - 2. Composition: 5- Ply wood wallcovering consisting of genuine wood veneer, bonded to paper, foil, glue line barrier, and paper, with factory applied protective coating..
 - 3. Pattern: Per drawings.
 - 4. Finish: Custom Stain, Submit colors for selection..
- B. Wall Covering: Type WC2 and WC 3, Product: Koroseal Walltalkers: Tacwall
 - 1. Color: refer to drawings..
- C. Adhesive: Type recommended by wall covering manufacturer to suit application to substrate.
- D. Termination Trim: Aluminum J mold - 1/4", color as selected.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Apply adhesive and wall covering in accordance with manufacturer's instructions.
- B. Razor trim edges on flat work table. Do not razor cut on gypsum board surfaces.
- C. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface. Butt edges tightly.
- D. Horizontal seams are not acceptable.
- E. Do not seam within 2 inches (50 mm) of internal corners or within 6 inches (150 mm) of external corners.
- F. Install termination trim.
- G. Remove excess adhesive while wet from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

3.02 CLEANING

- A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.
- B. Reinstall wall plates and accessories removed prior to work of this section.

3.03 PROTECTION

- A. Do not permit construction activities at or near finished wall covering areas.

END OF SECTION

SECTION 09 74 16
FLEXIBLE WOOD VENEER WALLCOVERING

PART 1 – GENERAL

1.01 SUMMARY

- A. Provide wood wallcovering, complete.
- B. Related Sections
 - 1. Section 09 2116 - Gypsum Board: Wall Substrates.
 - 2. Section 09 9000 – Painting and Coating: Preparation and priming of substrate
 - 3. Section 26 5100 – Interior and Exterior Lighting

1.02 REFERENCES

- A. United States Testing Company, Inc.
 - 1. Testing performed "in accordance with the specification set forth in ASTM E84 "Standard Test Method for Surface Burning Characteristics of Building Materials," both as to equipment and test procedures. Test procedure is similar to UL-723, ANSI No. 2.5, NFPA No. 255 and UBC in UBC1994 & 1997.

1.03 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions for each type of wood veneer wallcovering, adhesive and accessory required.
 - 2. Include data on physical properties, fire hazard classification and fire detection characteristics of wallcoverings.
 - 3. Include manufacturer's recommendations for maximum permissible moisture content of substrates.
- B. Submit 6" X 9" samples of each type of wood wallcovering specified, inclusive of product name, wood species and cut and/or figure labeled on the back of each sample.
Submit a copy of maintenance instructions to Owner in accordance with Division 1, Section "Contract Closeout."

1.04 QUALITY ASSURANCE

- A. Manufacturer: Provide each type of wood wallcovering required produced by one manufacturer whose published literature clearly indicated compliance of wood wallcovering with specified requirements.
- B. Applicator: Installation by skilled commercial wallcovering applicators with no less than three years of documented experience installing wallcovering of the types and extent specified for the project.
- C. Composition:
 - 1. A five-ply wood wallcovering consisting of genuine wood veneer, bonded to paper, foil, glue line barrier, and paper.
 - 2. Factory applied protective urethane coating to ensure quality and help maintain the integrity of the wood veneer wallcovering.
- D. Fire Hazard Classification: Provide materials that comply with Class A Fire Rating when tested in accordance with ASTM E84
 - 1. Flame Spread: 10
 - 2. Smoke Developed: 25
- E. Field Test Panels: Install not less than three (3) full-width sheets of each pattern specified in an area designated by the architect and or designer. Review installation area for conformance to manufacture's standard installation instructions. Maintain approved test area as part of the finished installation work and as a standard of comparison for the installation throughout the project.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver all wood wallcovering to the job site in the distributor's undamaged packaging clearly labeled and properly identified.
- B. Store materials in a clean, dry, protected area where temperature and humidity remain stable and within the ranges specified by the distributor.

1.06 PROJECT CONDITIONS

- A. Maintain a constant temperature range of 65 degrees F to 85 degrees F, with not more than 50% relative humidity and not less than the relative humidity specified for the project area in the AWI Quality Standards Section 1700-T-19, for at least 4 days prior to, throughout the installation period and maintained consistently thereafter.
- B. Surface preparation: Provide hanging surface that is smooth and free of all excess dust, oils or other foreign matter.
- C. Select Surface Finish:
 - 1. Provide Gypsum board finish in compliance AWCI Specification, Level 4
 - 2. Finish plaster walls to the manufacturer's specification and free from undulations and surface defects.
 - 3. Prepare metal surfaces to clean, dry and smooth finish with a rust inhibitor applied as indicated by written wood wallcovering product installations instructions.
 - 4. Prepare wood composite surface Select: [MDF] [Particleboard] [Hardwood] as indicated in manufacturer's written installation instructions. Apply non-woven wall liner to any surface showing cracks or splits.
- E. Lighting: Provide permanent lighting during the installation process. If temporary lighting is required, provide not less than an 80 foot candles per square foot lighting level minimum measured mid-height at substrate surfaces.

1.1. WARRANTY

- A. Submit distributor's 1 year written warranty against defects in material and workmanship. Koroseal Interior Products, LLC guarantees and warrants Arbor Series Flexible Wood Wallcovering to be free from defects in material and workmanship for a period of one year. Koroseal Interior Products, LLC's liability is limited to replacement of goods found by Koroseal Interior Products, LLC to be defective. This warranty is in lieu of all other warranties or guarantees expressed or implied, including warranties or guarantees of merchantability and fitness for a particular use.

1.08 MAINTENANCE

- A. Replacement Materials: Provide not less than *1 sheet/5%* (sheets/percent) of each species, cut and finish of wallcovering installed for maintenance purposes. Furnish replacement materials from same production run as installed materials. Protect material with clearly marked packaging indicating product identification and project location.
- B. To clean, treat Arbor Series Flexible Wood Wallcovering as fine wood furniture using a lint-free cloth and Murphy's Oil Soap. Repeat this procedure once a year using Murphy's recommended instructions.

PART 2 - PRODUCTS

2.01 DISTRIBUTOR

- A. Wood Veneer Wallcovering: Arbor Series Flexible Wood Veneer Wallcovering, distributed by Koroseal Interior Products, LLC, Fairlawn, OH. Contact Sales Representative.

2.02 MATERIALS

- A. Wallcovering: Arbor Series Flexible Wood Veneer Wallcovering
 - 1. Species: Select: Custom Blank Veneer

2. Factory Finish: Select: Ultra 70 Custom Stain

2.03 ACCESSORIES

- A. Adhesive:
 1. Roman Decorating Products: Extra Strength Pro-732, Clay Strippable Pro-774
 2. Gardner-Gibson Products: Dynamite 111 Heavy Duty Clay
 3. Gardner-Gibson Products: Dynamite 433 Heavy-Duty Clay Strippable
- B. Substrate Primer/Sealer: Acrylic/latex base primer specifically formulated for use with flexible wood veneer wallcovering.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine substrates and installation conditions.
- B. Test substrates with suitable moisture meter and verify that moisture content does not exceed 4%.
- C. Verify that substrate surfaces are clean, dry, smooth, structurally sound and free from surface defects and imperfections that would show through the finished surface.
- D. Notify the contractor and architect in writing of any conditions detrimental to the proper and timely completion of the installation.
- E. Do not proceed with work until conditions have been corrected.

3.02 INSTALLATION

- A. Install flexible wood veneer wall coverings in strict accordance with manufacturer's written installation instructions.
- B. Do not use oil based primers when installing Arbor Series Flexible Wood Wallcoverings.
- C. After the application of three sheets of wood wallcovering, request inspection by Architect/Designer for material quality and proper installation.
- D. If problems occur, stop the installation and contact the local Arbor Series Wood Veneer Wallcovering Sale Representative before proceeding.
- E. Install each sheet in sequential, numerical order, as printed on the back of each sheet.
- F. Install as delivered from the factory with the standard urethane finish applied by the manufacturer.
- G. Field applied stains and finishes void all Fire Ratings and the manufacturer's written warranty.

3.03 CLEAN-UP COMPLETION

- A. Upon completion of the work, remove excess materials, debris and rubbish resulting from the installation and leave the area in a clean and orderly condition.
- B. Protect the finished wood wallcovering from damage that may occur from other trades until project has been completed.

End of Section

SECTION 09 7733
GLASS FIBER REINFORCED PLASTIC PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glass fiber reinforced plastic panels.
- B. Trim.

1.02 RELATED SECTIONS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 09 5100 - Acoustical Ceilings: Ceiling suspension system.

1.03 REFERENCE STANDARDS

- A. 9 CFR 416.2 - Regulatory Requirements Under the Federal Meat Inspection Act and the Poultry Products Inspection Act, Part 416-Sanitation; current edition.
- B. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2010.
- C. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
- D. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels; 2012.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Samples: Submit two samples 12x12 inch (____by____ mm) in size illustrating material and surface design of panels.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Panels: Quantity equal to 5 percent of total installed.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Glass Fiber Reinforced Plastic Panels:
 - 1. Marlite; _____: www.marlite.com.

2.02 PANEL SYSTEMS

- A. Wall Panels:
 - 1. Panel Size: 4 by 8 feet (1.2 by 2.4 m).
 - 2. Panel Thickness: 0.10 inch (2.5 mm).
 - 3. Surface Design: Embossed.
 - 4. Color: White.
 - 5. Attachment Method: Adhesive only, sealant joints, no trim.

2.03 MATERIALS

- A. Panels: Glass fiber reinforced plastic (FRP), complying with ASTM D5319.
 - 1. Surface Burning Characteristics: Maximum Flame Spread Index of 25, and maximum Smoke Developed Index of 450; when system tested in accordance with ASTM E84.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. Impact Strength: Greater than 6 ft lb force per inch (320 J per m), when tested in accordance with ASTM D256.
 - 4. Sanitation and Cleanability: Comply with 9 CFR 416.2.
- B. Trim: Vinyl; color coordinating with panel.
- C. Adhesive: Type recommended by panel manufacturer.
- D. Sealant: Type recommended by panel manufacturer; white.

PART 3 EXECUTION

3.01 INSTALLATION - WALLS

- A. Install panels in accordance with manufacturer's instructions.
- B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.
- C. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.
- D. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.
- E. Install panels with manufacturer's recommended gap for panel field and corner joints.
- F. Place trim on panel before fastening edges, as required.
- G. Fill channels in trim with sealant before attaching to panel.
- H. Install trim with adhesive and screws or nails, as required.
- I. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.
- J. Remove excess sealant after paneling is installed and prior to curing.

END OF SECTION

SECTION 09 8115
ACOUSTICAL TREATMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Ceiling Reflectors..
- B. Acoustical Balnkets
- C. Insulation Board for sound absorbsion.
- D.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Contract descriptions, description of alterations work, work by others, future work, occupancy conditions, use of site and premises, work sequence.
- B. Section 01 6000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.
- C. See Section 01 7419 - Construction Waste Management and Disposal.
- D. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance (O&M) data, warranties and bonds.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions..
- C. Samples: Submit two _____, 12x12 inch (____x____ mm) in size, illustrating color, finish, and texture.
- D. Manufacturer's Qualification Statement.
- E. Specimen Warranty.
- F. Installer's Qualification Statement.
- G. Field Quality Control Submittals: _____.
- H. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Stock Materials: 10 square feet (____ square meters) of each kind of Panel.

1.04 QUALITY ASSURANCE

- A. A. To facilitate any acoustical "tuning" notify Architect and Acoustical Consultant prior to installing fabric or other coverings over acoustical treatments

PART 2 PRODUCTS

2.01 MATERIALS

- A. Black-Faced Insulation: Semi-rigid (2 lbs./cu. ft.) fiberglass with black protective matt facing
 - 1. Manufactures:
 - a. Knauf Black Acoustical Board (800-825-4434)
 - b. Owens Corning "SelectSound" Black Acoustic Blanket (800-438-7465)
 - c. Johns Manville Insul-Shield Black, (800-644-4013, 800-622-0149).
 - d. CertainTeed CertaPro AcostaBoard Black (800-233-8990)
 - e. Black Echo Eliminator (800.854.2947)
- B. Spherical and Cylindrical Ceiling reflectors:

1. Manufacturers:
 - a. Northwest Wood reflectors

2.02 APPLICATIONS

- A. Acoustical Treatment Board Types for wall sound absorption
 1. AT-1 1-inch-thick Black Faced Insulation sound absorbing glass fiber with black matt finish and edge trim
 2. AT-2 2-inch-thick Black Faced Insulation and edge trim similar to AT-1
 3. AT-3 4-inch-thick Black Faced Insulation and edge trim similar to AT-1
 4. AT-4 wood furring covered with flame retardant muslin wood rails. Do not paint muslin.
 5. AT-5 1 inch thick Tectum wall panels over 1- 1/2 inch furring strips. Fill furring cavity with 2 inch thick batt insulation compressed between the substrate and the Tectum panel.
 6. Theatrical muslin as manufactured by Rose Brand Theatrical Supply (800-223-1624).
- B. 4' x4' Spherical and 4' x8' Cylindrical reflectors for theater acoustics.
- C. Wire cloth: Square 4-mesh 0.063 galvanized wire by Howard Wire Cloth (510-887-8787) or Ametco (440-951-4300).

2.03 MANUFACTURED UNITS

- A. Basis of Design for acoustical reflectors: Manufacturer: Northwest Wood Reflectors.
- B. Description:
 1. Composition: wood panels.
 2. Size: per drawings
 3. Color: As indicated on drawings.
- C. Assembly:
 1. Factory assemble.
- D. Finish: stain

2.04 MATERIALS

2.05 ACCESSORIES

- A. Fasteners: per manufacturers recommendations..
- B. Adhesive: per manufacturers recommendations.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install Black Faced Insulation on stick-clips with black protective caps and using 3-M 77N contact adhesive. At all exposed conditions in occupiable spaces take note of the following. Provide edge trim at edges of all wall installations. Where the insulation is not black it must not be visible at joints between adjacent panels.
- B. Install 2-inch-thick black faced insulation on the face of the loudspeaker baffle walls and all wall and ceiling surfaces in the loudspeaker access spaces.
- C. Install 2-inch-thick black faced insulation on all mechanical room, electrical room and elevator machine room ceilings and the indicated wall surfaces.
- D. Sound absorbing fill concealed behind wire cloth: 2-inch thick black faced insulation with protective matt black facing.
- E. Do not paint Black Faced Insulation or any other acoustically absorptive or porous surface

3.02 FIELD QUALITY CONTROL

- A. Notify Architect and Acoustical consultant prior to installing fabric or other coverings over acoustical treatments to facilitate any "fine tuning".

3.03 CLOSEOUT ACTIVITIES

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

3.04 PROTECTION

3.05 MAINTENANCE

END OF SECTION

SECTION 09 8311
ACOUSTICAL WALL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Site fabricated, fabric-covered acoustical wall system.
- B. Accessories as required for complete installation.
- C. Maintenance.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 09 9000 - Painting and Coating: Preparation and priming of substrate surfaces.

1.03 REFERENCE STANDARDS

- A. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2009.
- B. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2009a.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- D. ASTM E2573 - Standard Practice for Specimen Preparations and Mounting of Site-Fabricated Stretch Systems to Assess Surface Burning Characteristics; 2012.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Specimen warranty.
- C. Shop Drawings: Elevations indicating proposed locations of fabric seams and details indicating typical transitions to other finish surfaces.
- D. Selection Samples: Fabric swatches representing manufacturer's full range of available colors, textures, and patterns.
- E. Verification Samples:
 - 1. For each fabric specified, minimum size 8 inches (200 mm) square, representing actual product in color, texture, and pattern.
 - 2. Acoustical backing material, minimum 12 inches (300 mm) square.
 - 3. Accessory package.
- F. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide all components of acoustical wall systems by a single manufacturer, including recommended primers, adhesives, and sealants.
- B. Installer Qualifications: Firm specializing in site-fabricated wall systems, with not less than 5 years of documented experience in installing wall systems of the type specified, and approved by the manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect fabric, acoustical backing, and track from excessive moisture in shipment, storage, and handling. Do not deliver materials to project until wet work such as concrete and plaster has been completed.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

- A. Do not begin installation until interior conditions have reached temperature and humidity that will be maintained during occupancy. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 ACOUSTICAL WALL SYSTEM

- A. Acoustical Wall System: Site-installed stretched fabric over acoustical core and continuous perimeter and intermediate mounting frames applied directly to wall surface; designed to permit removal and replacement of fabric in individual panels without affecting adjacent panels.
 - 1. Surface Burning Characteristics: Flame Spread Index of 25, maximum; Smoke Developed Index of 450, maximum; when whole system is tested in accordance with ASTM E84 using mounting specified in ASTM E2573.
 - 2. Noise Reduction Coefficient (NRC): 0.80, minimum, when tested in accordance with ASTM C423 Type A mounting.
 - 3. Prefabricated framed panels are not acceptable.
 - 4. Fabric must be installed over acoustical substrate without adhesives, tapes, or fasteners.

2.02 MATERIALS

- A. Frame: Extruded polymer track system with serrated jaws of sufficient strength to hold fabric in place after repeated applications.
 - 1. Track Size: 3/8 inch (9.5 mm) protrusion from wall with minimum 1 inch (25 mm) base leg.
 - 2. Wall Thickness of Track: Minimum 0.062 inch (1.575 mm).
 - 3. Color: As selected from manufacturer's standards.
- B. Acoustical Core:
 - 1. Thickness: 2 inch (____ mm), minimum.
 - 2. Material: Multi-density fiberglass board, consisting of a facing sheet of 12 pounds per cubic foot (192 kg/cu m) density board laminated over 3 pounds per cubic foot (48 kg/cu m) density board.
- C. Rigid Blocking: Fire-retardant treated medium density fiberboard complying with ANSI A208.2.
- D. Fabric: as scheduled on the drawings..
- E. Fasteners: As recommended by manufacturer of acoustical wall system for project conditions.
- F. Adhesives: Low VOC or water-based, approved by wall system manufacturer, and complying with requirements of Section 01 6116.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify that all casework, markerboards, door and window jambs, finished ceiling, and other finished items abutting acoustical wall systems have been installed.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove wall plates and other obstacles, and prepare substrates to receive core material in accordance with manufacturer's instructions.

3.03 INSTALLATION

- A. Install acoustical wall systems at locations indicated , complying with manufacturer's instructions.
- B. Track: Install perimeter and intermediate track using fasteners appropriate to substrate, securing firmly to prevent track separation from substrate.
 - 1. Install track around openings and penetrations.
 - 2. Allow for spacing to accommodate insertion of installation tool.
- C. Acoustical Core Material: Cut core material to fit snugly within frame perimeter. Apply adhesive and press core material into place, maintaining constant plane. Staple core material to prevent air gaps and to maintain secure contact for full adhesion.
 - 1. At fixtures mounted within area of acoustical wall system, install rigid blocking for backing and to maintain fixture surface flush with acoustical panels.
- D. Fabric: Stretch fabric over acoustical core material, locking fabric edges into track's serrated jaws using manufacturer's recommended tool. Keep fabric weave plumb, level, and true, in proper relation to building lines, without ripples, waviness, hourglass, or other deleterious effects.
 - 1. Seams are not permitted.
 - 2. In installing fabric, do not employ adhesives or mechanical fasteners of any type, assuring that the fabric is free-floating and in firm contact with core material.
 - 3. Tension fabric sufficiently to prevent sagging under anticipated changes in temperature and humidity.
 - 4. At outside corners, wrap fabric in one piece, without joints or seams.
 - 5. For ceiling applications, fabric shall not depart from true ceiling plane more than 1 inch in 20 ft (1:250)).

3.04 CLEANING

- A. Clean exposed surfaces of acoustical wall system, complying with manufacturer's instructions for cleaning and repair of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.05 PROTECTION

- A. Protect installed products until completion of project, using methods that will ensure that the finished work will be without damage or deterioration at Date of Substantial Completion.

3.06 MAINTENANCE

- A. Replace damaged, soiled, or vandalized acoustical wall panels for up to 3 years from Date of Substantial Completion.
- B. Replacement of up to 10 percent of the originally installed panels shall be at no additional cost to Owner.
- C. Replacement of defective panels covered under warranty provisions is not included in this maintenance service.

END OF SECTION

SECTION 09 8400
ACOUSTIC ROOM COMPONENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabric-covered fiberglass core panels and mounting accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 09 90 00 - Painting and Coating

1.03 REFERENCE STANDARDS

- A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2009a.
- B. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests; 2005 (Reapproved 2012).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed data sheets for products specified.
- C. Shop Drawings: Fabrication and installation details, panel layout, and fabric orientation.
- D. Verification Samples: Fabricated samples of each type of panel specified; 12 by 12 inch (305 by 305 mm), showing construction, edge details, and fabric covering.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company with not less than 5 years of experience in manufacturing acoustical products similar to those specified.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect acoustical panels from moisture during shipment, storage, and handling. Deliver in factory-wrapped bundles; do not open bundles until panels are needed for installation.
- B. Store panels flat, in dry, well-ventilated space; do not stand panels on end.
- C. Protect panel edges from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fabric-Covered Acoustical Panels:
 - 1. Owens Corning Conwed Designscape: www.conweddesignscape.com.
 - 2. Armstrong World Industries, Inc; _____: www.armstrong.com.
 - 3. CertainTeed Corporation; _____: www.certainteed.com.
 - 4. Essi Acoustical Products Company; _____: www.essiacoustical.com.
 - 5. USG; _____: www.usg.com.
 - 6. Wall Technology, Inc.; IR108 Series: www.walltechnology.com.
- B. Substitutions: See Section 01 6000 - Product Requirements.
- C. Provide all acoustical panels by one manufacturer.

2.02 FABRIC-COVERED ACOUSTICAL PANELS

- A. All Wallcoverings to be Class A. Flame spread index of 0-25; smoked developed index 0-450 per ASTM E84.
- B. Panels: Prefinished, factory assembled fabric-covered panels.
 - 1. Product: Respond Ultimate 2000
 - 2. Thickness: 1-1/8" or 2"

3. Height: 4"
 4. Width: Varies
 5. Finish: Tedlar
 6. Color: TBD (Black)
- C. Fiberglass Board Core Panels:
1. Density: 7 to 10 lb/cu ft (112 to 160 kg/cu m).
 2. Noise Reduction Coefficient (NRC): 0.70 to 0.80 when tested in accordance with ASTM C423 for Type A mounting, per ASTM E795.
 3. Panel Thickness: As necessary to meet required acoustical performance.
 4. Mounting: Back mounting.
- D. Face Covering: Perforated copolymer facing with heat formed square edges.

2.03 FABRICATION

- A. General: Fabricate panels to sizes and configurations indicated.
- B. Tolerances: Fabricate to finished tolerance of plus or minus 1/16 inch (1.6 mm) for thickness, overall length and width, and squareness from corner to corner.

2.04 ACCESSORIES

- A. Back-Mounting Accessories: Manufacturer's standard accessories for concealed support, designed to allow panel removal, and as follows:
 1. Hook and loop strips adhered to substrate and to back of panels.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates for conditions detrimental to installation of acoustical panels. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install acoustical panels in locations indicated, following installation recommendations of panel manufacturer. Align panels accurately, with edges plumb and top edges level. Scribe to fit accurately at adjoining work and penetrations.

3.03 CLEANING

- A. Clean fabric facing upon completion of installation from dust and other foreign materials, following manufacturer's instructions.
- B. Remove surplus materials, trimmed portions of panels, and debris resulting from installation.

3.04 PROTECTION

- A. Provide protection of installed acoustical panels until completion of the work.
- B. Replace panels that cannot be cleaned and repaired to satisfaction of the Architect.

END OF SECTION

SECTION 09 9000
PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints, stains, varnishes, and other coatings.
- C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 2. Elevator pit ladders.
 - 3. Exposed surfaces of steel lintels and ledge angles.
 - 4. Prime surfaces to receive wall coverings.
 - 5. Mechanical and Electrical:
 - a. In finished areas, paint all insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
 - b. In finished areas, paint shop-primed items.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Stainless steel, anodized aluminum, bronze, terne, and lead items.
 - 6. Marble, granite, slate, and other natural stones.
 - 7. Floors, unless specifically so indicated.
 - 8. Ceramic and other tiles.
 - 9. Glass.
 - 10. Acoustical materials, unless specifically so indicated.
 - 11. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 05 5000 - Metal Fabrications: Shop-primed items.
- C. Section 05 7113 - Fabricated Metal Spiral Stairs: Shop-primed items.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2012.
- C. GreenSeal GS-11 - Paints; 2013.
- D. SSPC (PM1) - Good Painting Practice: SSPC Painting Manual, Vol. 1; Society for Protective Coatings; Fourth Edition.
- E. USGBC LEED-NC - LEED Green Building Rating System for New Construction and Major Renovations; U.S. Green Building Council; 2009.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of all products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "Alkyd Enamel").
 - 2. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 3. Manufacturer's installation instructions.
 - 4. If proposal of substitutions is allowed under submittal procedures, explanation of all substitutions proposed.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.
- D. Certification: By manufacturer that all paints and coatings do not contain any of the prohibited chemicals specified; GreenSeal GS-11 certification is not required but if provided shall constitute acceptable certification.
- E. LEED Report: VOC content of all interior opaque coatings actually used.
- F. Manufacturer's Instructions: Indicate special surface preparation procedures.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Paint and Coatings: 1 gallon (4 L) of each color; store where directed.
 - 3. Label each container with color in addition to the manufacturer's label.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 45 degrees F (7 degrees C) for interiors; 50 degrees F (10 degrees C) for exterior; unless required otherwise by manufacturer's instructions.
- E. Minimum Application Temperature for Varnish Finishes: 65 degrees F (18 degrees C) for interior or exterior, unless required otherwise by manufacturer's instructions.
- F. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.
- B. Paints:
 - 1. Base Manufacturer: _____
 - 2. Sherwin-Williams Company: www.sherwin-williams.com
- C. Transparent Finishes:
 - 1. Sherwin-Williams Company: www.sherwin-williams.com.
- D. Stains:
 - 1. Sherwin-Williams Company: www.sherwin-williams.com
- E. Primer Sealers: Same manufacturer as top coats.
- F. Block Fillers: Same manufacturer as top coats.

2.02 PAINTS AND COATINGS - GENERAL

- A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
 - 1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Supply each coating material in quantity required to complete entire project's work from a single production run.
 - 3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Volatile Organic Compound (VOC) Content:
 - 1. Provide coatings that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. Architectural coatings VOC limits of the State in which the Project is located and Cal Green.
 - c. USGBC LEED Rating System, edition as stated in Section 01 3515; for interior wall and ceiling finish (all coats), anti-corrosive paints on interior ferrous metal, clear wood stains and finishes, sanding sealers, other sealers, shellac, and floor coatings.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- D. Flammability: Comply with applicable code for surface burning characteristics.
- E. Colors: As indicated on drawings.
 - 1. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Paint E-OP - All Exterior Surfaces Indicated to be Painted, Unless Otherwise Indicated: Including concrete, concrete masonry, brick, cement board, primed wood, and primed metal.
 - 1. Preparation as specified by manufacturer. For exterior textured coating: Prime: 1 Coat PPG 4-503 Concrete Primer. Top Coats: 2 Coats 4-50 Permacrete Texture (fine.)
 - 2. Two top coats and one coat primer recommended by manufacturer.
 - 3. MPI gloss level 1 flat; use this sheen at all locations.
 - 4. Satin: MPI gloss level 4; use this sheen at all locations.

5. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
 6. Gloss: MPI gloss level 6; use this sheen at all locations.
 7. High Gloss: MPI gloss level 7; use this sheen at all locations.
 8. Top Coat Product(s):
- B. Paint ME-OP-2L - Ferrous Metals, Primed, Latex, 3 Coat:100% Acrylic.
1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
 2. One additional coat of primer. Prime: 1 Coat 4020 Devflex Rust Inhibitive Primer.
 3. Semi-gloss: Two coats of Latex Enamel; Top: 2 coats Fortis 350 100% Acrylic Semi-gloss 2406V.
- C. Paint MgE-OP-3L - Galvanized Metals, Latex, 3 Coat: 100% Acrylic
1. One coat galvanize primer. Prime: 1 Coat 4020 Devflex.
 2. Semi-gloss: Two coats of Latex Enamel; Top: 2 Coats 4216L Devflex High Performance 100% Acrylic Semi-gloss.
- D. Paint MaE-OP-3A - Aluminum and Copper, Unprimed, Water-Borne 100% Acrylic, 3 Coat:
1. One coat 4020 Devflex.
 2. Semi-gloss: Two coats of 100% Acrylic Enamel; 4216L Devflex High Performance Semi-gloss.

2.04 PAINT SYSTEMS - INTERIOR

- A. Paint I-OP - All Interior Surfaces Indicated to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete, concrete masonry, brick, wood, plaster, uncoated steel, shop primed steel, galvanized steel, and aluminum.
1. Two top coats and one coat primer. Prime, Coat 100% Acrylic 4020 Devflex.
 2. Top: 2 Coats 4216L Devflex High Performance 100% Acrylic.
- B. Paint WI-OP-3L - Wood, Opaque, Water-Borne Alkyd, 3 Coat:
1. One coat of latex primer sealer. Prime: 1 Coat 3210 Gripper
 2. Semi-gloss: Two coats of Water-Borne Alkyd Lifemaster Oil GP1506 or Speedhide Water-Borne Alkyd Semi-gloss; 6-1510 Series.
- C. Paint WI-TR-VS - Wood, Transparent, Varnish, Stain: Alkyd Semi-gloss
1. One coat of Stain; Gemini 275 Lacquer Stain.
 2. One coat sealer; Gemini 275 Clear Sealer.
 3. Satin: One coat of Varnish; Gemini 275 Clear Satin Lacquer.
- D. Paint CI-OP-3L - Concrete/Masonry, Opaque, Latex, 3 Coat:
1. One coat of block filler. PPG 6-15 Speedhide Int/Ext Block Filler.
 2. Satin: Two coats of Latex Enamel; Satin 6-4310 Speedhide Zero Satin.
- E. Paint MI-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat: 100% Acrylic.
1. One coat of Latex Primer. 4020 Devflex Primer.
 2. Semi-gloss: Two coats of Latex Enamel; 4216L Devflex Semi Gloss 100% Acrylic High Performance.
- F. Paint MI-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat: 100% Acrylic.
1. Touch-up with latex primer.4020 Devflex Primer.
 2. Semi-gloss: Two coats of latex enamel; Devflex 4216L Semi-gloss. High Performance.
- G. Paint Mgl-OP-3L - Galvanized Metals, Latex, 3 Coat: 100% Acrylic.
1. One coat galvanize primer. 4020 Devflex Primer.
 2. Semi-gloss: Two coats of Latex Enamel; 4216L Devflex Semi Gloss 100% Acrylic High Performance.
- H. Paint CI-OP-3E - Concrete/Masonry, Epoxy Enamel, 3 Coat:
1. One coat of Catalyzed Epoxy Primer. 17-921 Seal Grip Int/Ext Acrylic primer/sealer
 2. Semi-gloss loss: Two coats of Catalyzed Epoxy Enamel; Pitt-glaze WB1 Pre-Catalyzed Semi-gloss Epoxy.
- I. Paint GI-OP-3LA - Gypsum Board/Plaster, 3 Coat: (low occupancy/usage areas.)

1. One coat of Acrylic primer sealer. Speedhide Zero Primer 6-4900.
 2. Eggshell: Two coats of Acrylic Enamel; Speedhide Zero VOC Eggshell 9-300.
- J. Paint GI-OP-HP - Impact Resistant Gypsum Board, Breakthrough HP 100% Light Ind SATIN (Hallways)
1. One coat of Latex Prime Sealer Pure Performance 9-900 Zero Voc Primer.
 2. Two Coats High Performance 100% Light Ind Acrylic Breakthrough High Performance 100% Acrylic Satin V56-410 Series.
- K. Restroom Showers Wet Areas. Gypsum Board.
1. One Coat Primer 17-921 Seal Grip Int/Ext Acrylic Universal Primer.
 2. 2 Coats: Pittglaze WB1 Epoxy 16-510 Pre-Catalyzed Epoxy Semi-gloss.
- L. Dry Erase Paint
1. One coat of Latex Prime Sealer Pure Performance 9-900 Zero Voc Primer.
 2. One coat Dry Erase Paint, in white, over level 4 finish.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of coatings until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
1. Gypsum Wallboard: 12 percent.
 2. Plaster and Stucco: 12 percent.
 3. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
 4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
 5. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to coating application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- G. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

- H. Plaster Surfaces to be Painted: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- I. Aluminum Surfaces to be Painted: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
- J. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- K. Corroded Steel and Iron Surfaces to be Painted: Prepare using at least SSPC-SP 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning).
- L. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand or power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
- M. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
- N. Interior Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.
- O. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior caulking compound after prime coat has been applied. Back prime concealed surfaces before installation.
- P. A. Non- Ferrous Metal, Galvanized, Aluminum, Copper: Metal Etch and Solvent clean per SSPC-SP1 or clean with TSP or other appropriate cleaner followed by thorough water rinsing. Brush Blast or Sand with 80-100 grit sandpaper to remove pretreatments and produce lightly etched surface. Apply a test patch of the coating system specified. Allow product(s) to cure at least one week before testing adhesion per ASTM D3359 (tape Adhesion).
- Q. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with clear sealer.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.
- C. Apply products in accordance with manufacturer's instructions.
- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- E. Apply each coat to uniform appearance.
- F. Sand wood and metal surfaces lightly between coats to achieve required finish.
- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

END OF SECTION

SECTION 10 1400

SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Room and door signs.
- B. Interior directional and informational signs.
- C. Emergency evacuation maps.
- D. Building identification signs.

1.02 RELATED REQUIREMENTS

- A. Section 26 5100 - Interior Lighting: Exit signs required by code.

1.03 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. CBC 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
 - 1. When room numbers to appear on signs differ from those on the drawings, include the drawing room number on schedule.
 - 2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
 - 3. Submit for approval by Owner through Architect prior to fabrication.
- D. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- F. Verification Samples: Submit samples showing colors specified.
- G. Manufacturer's Installation Instructions: Include installation templates and attachment devices.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.
- C. Store tape adhesive at normal room temperature.

1.07 FIELD CONDITIONS

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 SIGNAGE APPLICATIONS

- A. Accessibility Compliance: Signs are required to comply with ADA Standards, CBC 2013, and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
 - 1. Sign Type: Flat signs with engraved panel media as specified.
 - 2. Provide "tactile" signage, with letters raised minimum 1/32 inch (0.8 mm) and Grade II braille.
 - 3. Character Height: 1 inch (25 mm).
 - 4. Sign Height: per plan
 - 5. Office Doors: Identify with room numbers to be determined later, not the numbers shown on the drawings; in addition, provide "window" section for replaceable occupant name.
 - 6. Classrooms and Meeting Rooms: Identify with room numbers to be determined later, not the numbers shown on the drawings; in addition, provide "window" section with sliding "In Use/Vacant" indicator.
 - 7. Service Rooms: Identify with room names and numbers to be determined later, not those shown on the drawings.
 - 8. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", room numbers to be determined later, and braille.
- C. Interior Directional and Informational Signs:
 - 1. Sign Type: Same as room and door signs.
 - 2. Allow for 20 signs 4 inches high by 16 inches long.
- D. Emergency Evacuation Maps:
 - 1. Allow for one map per elevator or stair lobby.
 - 2. Use clear plastic panel silk-screened on reverse, in brushed aluminum frame, screw-mounted.
- E. Building Identification Signs:
 - 1. Use individual metal letters.
 - 2. Mount on outside wall in location shown on drawings.

2.02 SIGN TYPES

- A. Flat Signs: Signage media without frame.
 - 1. Edges: Square.
 - 2. Corners: Square.
 - 3. Wall Mounting of One-Sided Signs: Tape adhesive.
- B. Color and Font: Unless otherwise indicated:
 - 1. Character Font: Helvetica, Arial, or other sans serif font.
 - 2. Character Case: Upper case only.
 - 3. Background Color: Clear.
 - 4. Character Color: Contrasting color.

2.03 TACTILE SIGNAGE MEDIA

- A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:
 - 1. Total Thickness: 1/16 inch (1.6 mm).

2.04 NON-TACTILE SIGNAGE MEDIA

- A. Silk Screened Plastic Panels: Letters and graphics silk screened onto reverse side of plastic surface:
 - 1. Sign Color: Clear.
 - 2. Total Thickness: 1/8 inch (3 mm).

2.05 DIMENSIONAL LETTERS

- A. Metal Letters:
 - 1. Metal: Aluminum casting.
 - 2. Finish: Polished.
 - 3. Mounting: Tape adhesive.

2.06 ACCESSORIES

- A. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Locate signs where indicated:
 - 1. Room and Door Signs: Locate on wall at latch side of door with centerline of sign at 60 inches (1525 mm) above finished floor.
 - 2. If no location is indicated obtain Owner's instructions.
- D. Protect from damage until Substantial Completion; repair or replace damage items.

END OF SECTION

SECTION 10 2113.19
PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Solid plastic toilet compartments.
- B. Urinal screens.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Blocking and supports.
- B. Section 10 2800 - Toilet, Bath, and Laundry Accessories.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.
- C. Product Data: Provide data on panel construction, hardware, and accessories.
- D. Samples: Submit two samples of partition panels, [8 x 8] inch in size illustrating panel finish, color, and sheen.
- E. Samples: Submit (2) actual sample items of proposed pulls, hinges, and attachment hardware demonstrating hardware design, quality, and finish.
- F. Manufacturer's Installation Instructions: Indicate special procedures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Solid color reinforced composite Toilet Compartments:
 - 1. Bobrick Washroom Equipment, Inc.. Brbrick.com
 - 2. Substitutions: Not permitted

2.02 SOLID COLOR REINFORCED COMPOSITE TOILET COMPARTMENTS

- A. All Wallcoverings to be Class A. Flame spread index of 0-25; smoke developed index 0-450 per ASTM E84.
- B. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid color reinforced composite material, floor-mounted unbraced.
 - 1. Color: SC02 Desert Beige.
- C. Doors:
 - 1. Thickness: [3/4] inch
 - 2. Width for Handicapped Use: 36 inch (915 mm), out-swinging.
 - 3. Height: 55 inch (1397 mm).
- D. Panels:
 - 1. Thickness: 1 inch (25 mm).
 - 2. Height: 55 inch (1397 mm).
 - 3. Depth: As indicated on drawings.
- E. Pilasters:
 - 1. Thickness: 1 inch (25 mm).
 - 2. Width: As required to fit space; minimum 3 inch (76 mm).
- F. Screens: Without doors; to match compartments; mounted to wall with two panel brackets .

2.03 ACCESSORIES

- A. Pilaster Shoes: Formed chromed steel with satin finish, 4 in (101.6 mm) high, concealing floor fastenings.
 - 1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.
- B. Head Rails: Hollow anodized aluminum, satin finish,.065 inch (1.65 mm) size, with anti-grip profile and cast socket wall brackets.
- C. Wall and Pilaster Brackets: Satin stainless steel.
- D. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
- E. Hardware: Satin stainless steel:
 - 1. Pivot hinges, gravity type, adjustable for door close positioning; three per door.
 - 2. Door Latch: Slide type with exterior emergency access feature.
 - 3. Coat hook with rubber bumper; one per compartment, mounted on door.
 - 4. Provide door pull for outswinging doors (HCP).
 - a. Provide loop pull, self closing door at accessible stalls.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify correct spacing of and between plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 to 1/2 inch (9 to 13 mm) space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.
- E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.03 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch (5 mm).
- B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.
- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

SECTION 10 2601
WALL AND CORNER GUARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Corner guards.

1.02 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications: Anchors for attachment of work of this section, concealed in wall.
- B. Section 06 1000 - Rough Carpentry Blocking for wall and corner guard anchors.
- C. Section 09 7200 - Wall Coverings: Terminating wall covering at corner guard.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.
- C. Samples: Submit two sections of corner guard, 12 inch (300 mm) long, illustrating component design, configuration, color and finish.
- D. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Corner Guards:
 - 1. Construction Specialties, Inc.; Product Acrovyn, specific product noted on drawings: www.c-sgroup.com.
 - 2. Basis of Design: Koroguard Inc.,
 - 3. Inpro.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 COMPONENTS

- A. Corner Guard: Koroguard.
 - 1. Product: gs Corner Guards
 - 2. 16 GA.Stainless steel #4 Satin
 - 3. Size: 2" Wing
 - 4. Hieght: Veries
- B. Corner Guard: Koroguard
 - 1. Color R100 Recess Mounted Cover Guards
 - 2. Color: Porcelain
 - 3. Size: 2" Wing
 - 4. Hieght: Veries

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members only.
- B. Position as noted on plans.

END OF SECTION

SECTION 10 2800
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Accessories for toilet rooms, showers, and utility rooms.
- B. Electrically operated paper towel dispensers.
- C. Electric hand/hair dryers.
- D. Grab bars.

1.02 RELATED REQUIREMENTS

- A. Section 09 3000 - Tiling: Ceramic washroom accessories.
- B. Section 10 2113.19 - Plastic Toilet Compartments.

1.03 REFERENCE STANDARDS

- A. ASTM C1036 - Standard Specification for Flat Glass; 2011e1.
- B. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2008 (Reapproved 2013).
- C. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2004 (Reapproved 2010).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- C. Samples: Submit one sample of each accessory, illustrating color and finish.
- D. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Bobrick.
- B. Other Acceptable Manufacturers:
 - 1. A & J Washroom Accessories Inc: www.ajwashroom.com.
 - 2. American Specialties, Inc: www.americanspecialties.com.
 - 3. Bradley Corporation: www.bradleycorp.com.
 - 4. Substitutions: Not permitted.

2.02 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
- B. Keys: Provide 2 keys for each accessory to Owner; master key lockable accessories.
- C. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

2.03 FINISHES

- A. Stainless Steel: No. 4 Brushed finish, unless otherwise noted.

2.04 TOILET ROOM ACCESSORIES

- A. Toilet Paper dispenser, seat cover dispenser, and napkin disposal unit: Double roll, dual side-by-side partition mounting, stainless steel unit with pivot hinge, tumbler lock.
- B. Paper Towel Dispenser: Folded paper type, stainless steel, semi-recessed, with viewing slots on sides as refill indicator and tumbler lock.
- C. Paper Towel Dispenser: Electric, roll paper type.
 - 1. Cover: Stainless steel.
 - 2. Paper Discharge: Auto-cut dispense.
 - 3. Capacity: 6 inch diameter roll.
 - 4. Mounting: Fully recessed.
 - 5. Power: Battery operated.
 - 6. Refill Indicator: Illuminated refill indicator.
- D. Combination Towel Dispenser/Waste Receptacle: Semi- Recessed with projecting waste receptacle, stainless steel; seamless wall flanges, continuous piano hinges, tumbler locks on upper and lower doors.
 - 1. Product: B-3944 manufactured by Bobrick.
- E. Soap Dispenser: Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and horizontal stainless steel tank and working parts; push type soap valve, check valve, and window gage refill indicator, tumbler lock.
- F. Mirrors: Stainless steel framed, 1/4 inch (6 mm) thick annealed float glass; ASTM C1036.
 - 1. Size: Continuous over sink areas..Product: Bobrick B165
 - 2. Provide one full length mirror at each rest room and dressing rooms as indicated on drawings.
 - 3. Provide graffiti-film on mirrors that do not change mirror color or reflective properties.
 - 4. Shelf: Stainless steel; gage and finish to match mirror frame, turned down edges, welded to frame; 5 inches (125 mm) deep, 24 inches in length, located per drawings.
- G. Grab Bars: Stainless steel, nonslip grasping surface finish.
 - 1. Standard Duty Grab Bars:
 - a. Push/Pull Point Load: 250 pound-force (1112 N), minimum.
 - b. Dimensions: 1-1/4 inch (32 mm) outside diameter, minimum 0.05 inch (1.3 mm) wall thickness, exposed flange mounting, 1-1/2 inch (38 mm) clearance between wall and inside of grab bar.
 - c. Length and Configuration: As indicated on drawings.
- H. Sanitary Napkin/Tampon Dispenser: Stainless steel, recessed.
 - 1. Operation: 25 cent coin required to operate dispenser. Provide locked coin box, separately keyed.
 - 2. Minimum capacity: 15 napkins and 20 tampons.
- I. Diaper Changing Station: Wall-mounted folding diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285.
 - 1. Style: Horizontal.
 - 2. Mounting: Surface.
 - 3. Manufacturers:
 - a. Koala Kare Products: www.koalabear.com.
 - b. Substitutions: 01 6000 - Product Requirements.

2.05 UTILITY ROOM ACCESSORIES

- A. Mop and Broom Holder: 0.05 inch (1.3 mm) thick stainless steel, Type 304, hat-shaped channel.
 - 1. Holders: 3 spring-loaded rubber cam holders.
 - 2. Length: Manufacturer's standard length for number of holders.
- B. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch (1.3 mm) thick stainless steel, Type 304, with 1/2 inch (12 mm) returned edges, 0.06 inch (1.6 mm) steel wall brackets.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. Verify that field measurements are as indicated on drawings.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.
 - 1. Other Accessories: As indicated on the drawings.

END OF SECTION

SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire Hose Cabinets.
- C. Fire extinguisher cabinets.
- D. Accessories.

1.02 REFERENCE STANDARDS

- A. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.
- B. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate cabinet physical dimensions.
- C. Product Data: Provide extinguisher operational features.
- D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.04 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Extinguisher and Hose Cabinets and Accessories:
 - 1. Ansul, a Tyco Business: www.ansul.com.
 - 2. JL Industries, Inc: www.jlindustries.com.
 - 3. Larsen's Manufacturing Co: www.larsensmfg.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
 - 1. Provide extinguishers labeled by UL for the purpose specified and indicated.
- B. Water Type Fire Extinguishers: Stainless steel tank, pressurized, with premixed antifreeze solution, including hose and nozzle.
 - 1. Class: 2A.
 - 2. Size: 2.5 gallon (9.4 L).

2.03 FIRE EXTINGUISHER CABINETS

- A. Metal: Formed stainless steel sheet; 0.036 inch (0.9 mm) thick base metal.
- B. Cabinet Configuration: Recessed and surface mounted type.
 - 1. Sized to accommodate accessories.
- C. Door: 0.036 inch (0.9 mm) thick, reinforced for flatness and rigidity; latch. Hinge doors for 180 degree opening with two butt hinge. Provide nylon catch.
- D. Door Glazing: Glass, clear, 1/8 inch (3 mm) thick float. Set in resilient channel gasket glazing.

- E. Cabinet Mounting Hardware: Appropriate to cabinet. Pre-drill for anchors.
- F. Finish of Cabinet Exterior Trim and Door: Primed for field paint finish.
- G. Finish of Cabinet Interior: White enamel.

2.04 FIRE HOSE CABINETS:

- A. Metal: Formed Stainless Sheet, 0.036 inch thick base metal.
- B. Cabinet Configuration: Surface mounted, size to fit hose.
- C. Door: 0.036 inch (0.9 mm) thick, reinforced for flatness and rigidity; latch. Hinge doors for 180 degree opening with two butt hinge. Provide nylon catch.
- D. Door Glazing: Glass, clear, 1/8 inch (3 mm) thick float. Set in resilient channel gasket glazing.
- E. Cabinet Mounting Hardware: Appropriate to cabinet. Pre-drill for anchors.
- F. Finish of Cabinet Exterior Trim and Door: Red baked enamel.
- G. Finish of Cabinet Interior: Enamel, grey.

2.05 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, chrome-plated.
- B. Cabinet Signage: Fire Extinguisher.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure rigidly in place.
- C. Place extinguishers in cabinets.
- D. Position cabinet signage at cabinet face above cabinet door..

END OF SECTION

SECTION 10 5100

LOCKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal lockers.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's published data on locker construction, sizes and accessories.
- B. Shop Drawings: Indicate locker plan layout, numbering plan and combination lock code.
- C. Samples: Submit two samples [8] x [8] inches in size, of each color scheduled.
- D. Manufacturer's Installation Instructions: Indicate component installation assembly.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Protect locker finish and adjacent surfaces from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Lockers:
 - 1. Art Metal Products: www.artmetalproducts.com.
 - 2. Lyon Workspace Products: www.lyonworkspace.com.
 - 3. Penco Products, Inc: www.pencoproducts.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 LOCKER APPLICATIONS

2.03 METAL LOCKERS

- A. Lockers: Factory assembled, made of formed sheet steel, ASTM A653/A653M SS Grade 33/230, with G60/Z180 coating, stretcher leveled; metal edges finished smooth without burrs; baked enamel finished inside and out.
 - 1. Where ends or sides are exposed, provide flush panel closures.
 - 2. Provide filler strips where indicated, securely attached to lockers.
 - 3. Color: To be selected by Architect; allow for contrasting colors for locker bodies and doors.
- B. Locker Body: Formed and flanged; with steel stiffener ribs; electric spot welded.
 - 1. Body and Shelves: 24 gage, 0.0239 inch (0.61 mm).
- C. Frames: Formed channel shape, welded and ground flush, welded to body, resilient gaskets and latching for quiet operation.
 - 1. Door Frame: 16 gage, 0.0598 inch (1.52 mm), minimum.
- D. Doors: Hollow double pan, sandwich construction, 1-3/16 inch (30 mm) thick; welded construction, channel reinforced top and bottom with intermediate stiffener ribs, grind and finish edges smooth.
 - 1. Door Outer Face: 18 gage, 0.0478 inch (1.21 mm), minimum.
 - 2. Door Inner Face: 20 gage, 0.0359 inch (0.91 mm), minimum.
 - 3. Form recess for operating handle and locking device.
 - 4. Provide louvers in door face, top and bottom, for ventilation.
- E. Hinges: Two for doors under 42 inches (1 050 mm) high; three for doors over 42 inches (1 050 mm) high; weld securely to locker body and door.
 - 1. Hinge Thickness: 14 gage, 0.0747 inch (1.90 mm).
- F. Number Plates: Provide oval shaped brass plates. Form numbers high of block font style with ADA designation, in contrasting color.

2.04 MATERIALS

- A. Sheet Steel: ASTM A653/A653M SS Grade 33/230, with G60/Z180 coating, stretcher leveled; to the following minimum thicknesses:
 - 1. Body and Shelf: 24 gage, 0.024 inch (0.6 mm).
 - 2. Door Outer Face: 18 gage, 0.048 inch (1.2 mm).
 - 3. Door Inner Face: 20 gage, 0.036 inch (0.9 mm).
 - 4. Door Frame: 16 gage, 0.060 inch (1.5 mm).
 - 5. Hinges: 14 gage, 0.075 inch (1.9 mm).
 - 6. Sloping Top: 20 gage, 0.036 inch (0.9 mm).
 - 7. Trim: 20 gage, 0.036 inch (0.9 mm).
- B. Accessories For Each Locker: Two single prong wall hooks, coat hanger bar.

2.05 LOCKER UNITS

- A. Configuration: Refer to Elevation H7/A9.80
- B. Mounting: Surface mounted.
- C. Base: By locker manufacturer.
- D. Top: Sloped metal with closures.
- E. Locking: Equipped for padlock hasps.
- F. Ventilation Method: Door louvers.
- G. Provide ventilation openings at top and bottom of each locker.
- H. Form recess for operating handle and locking device.
- I. Finish edges smooth without burrs.
- J. Fabricate sloped metal tops, ends and closure pieces.
- K. Provide end panels and filler strips.

2.06 FINISHING

- A. Clean, degrease, and neutralize metal; prime and finish with one coat of baked enamel.
- B. Paint locker units 1 color, as selected.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install lockers plumb and square.
- C. Place and secure on base.
- D. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 lb (445 N).
- E. Bolt adjoining locker units together to provide rigid installation.
- F. Install end panels, filler panels, and sloped tops.
- G. Install accessories.
- H. Replace components that do not operate smoothly.

3.02 CLEANING

- A. Clean locker interiors and exterior surfaces.

END OF SECTION

**SECTION 11 5213
PROJECTION SCREENS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Front projection screen assemblies.

1.02 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications: Supports for suspended projection screens.
- B. Section 26 2726 - Wiring Devices

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's catalog cuts and descriptive information on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Samples: For screen fabrics, submit two samples 6 x 6 inch (152 x 152 mm) in size.
- D. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Experienced in manufacturing products specified in this section.
- B. Installer Qualifications: Experienced in installation of the work of this section.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver projection screens to project site in manufacturer's original unopened packaging. Inspect for damage and size before accepting delivery.
- B. Store in a protected, clean, dry area with temperature maintained above 50 degrees F (10 degrees C). Stack according to manufacturer's recommendations.
- C. Acclimate screens to building temperatures for 24 hours prior to installation, or in accordance with manufacturer's recommendations.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide 2 year manufacturer warranty for projection screen assembly.

PART 2 PRODUCTS

2.01 FRONT PROJECTION SCREENS

- A. Front Projection Screens: Factory assembled unless otherwise indicated.
 - 1. Dimensions: As indicated on drawings.
 - 2. In Classrooms: Motorized, matte light diffusing fabric screen, horizontally tensioned, wall mounted.
- B. Matte Light Diffusing Fabric: Light diffusing screen fabric; washable, flame retardant and mildew resistant.
- C. Exposed Screen Cases: Steel; integral roller brackets.
 - 1. Finish: Baked enamel.
 - 2. Color: White.
 - 3. End Caps: Steel; finished to match case.
 - 4. Provide supports for suspension from ceiling where indicated.

- 5. Mounting: Wall.
- D. Electrically-Operated Screens:
 - 1. Roller: 2 inch (51 mm) aluminum, with locking device.
 - 2. Vertical Tensioning: Screen fabric weighted at bottom with steel bar with plastic end caps.
- E. Provide mounting hardware, brackets, supports, fasteners, and other mounting accessories required for a complete installation, in accordance with manufacturer's recommendations for specified substrates and mountings.

2.02 ELECTRICAL COMPONENTS

- A. Electrical Components: Listed and classified by UL as suitable for the purpose specified and indicated.
- B. Motors: Direct drive, 110 V, 60 Hz.
 - 1. Screen Motor: Mounted inside roller; three wire with ground; quick reverse type and lifetime lubricated; equipped with thermal overload cut-off, internal junction box, electric brake, and pre-set accessible limit switches.
 - a. Electrical Characteristics: 1.2 amps.
 - b. Motor mounted on sound absorber.
- C. Controls: Three (3) position control switch with plate.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions, using manufacturer's recommended hardware for relevant substrates.
- B. Do not field cut screens.
- C. Install screens in mountings as specified and as indicated on drawings.
- D. Install plumb and level.
- E. Install electrically operated screens ready for connection to power and control systems by others.
- F. Adjust projection screens and related hardware in accordance with manufacturer's instructions for proper placement and operation.
- G. Test electrical screens for proper working condition. Adjust as needed.

3.02 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch up, repair, or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 11 61 33

PRODUCTION RIGGING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. The Rigging Contractor shall provide all items necessary for a complete, safe, fully functional system as described herein and as shown on drawings, including all tools, scaffolding, labor, and supervision, even though they may not be specifically enumerated.
 - 2. It shall be under the work in this section to mount and rig the multicable and install hang the connector strip receptacle boxes to battens. Production Lighting Control shall supply the multicable and connector strips.
 - 3. Stage platform extension system.

1.02 RELATED SECTIONS

- A. Coordinate with the following sections in carrying out this work:
 - 1. Division 01 – General Conditions
 - 2. Division 05 – Metals
 - 3. Floor and adjacent architectural finishes
 - 4. Section 11 61 83 – Production Lighting Control
 - 5. Section 26 05 35 – Production Systems Electrical Installation
 - 6. Section 27 41 16 – AV Systems
 - 7. Division 23 1313 – Wet Sprinkler Pipe System
 - 8. Division 23 – HVAC and Plumbing
 - 9. Division 26 – Electrical
 - 10. It shall be under the work in this section to coordinate established clearances to the general contractor and all others trades on the project and maintain necessary clearance requirements for all rigging components and clear zones.
 - a. No conduit, raceway, sprinkler pipe, plumbing pipe, duct or any other part of the mechanical systems or any structural component shall be in a rigging clear zone or shall obstruct the operations of the rigging systems or shall be within 6” of a moving rigging component, including lift lines.

1.03 REFERENCES

- A. Comply with all national, state and local regulations. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.
- B. Equipment shall be provided per the related trade and regulatory guidelines including but not limited to UL, CEC, IEEE, and all manufacturer's recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers' warranties.
- C. Labor shall be provided per applicable labor regulations and practices.

1.04 DEFINITIONS

- A. Refer to Div. 01 for definitions.
- B. District Representative: For the scope in this Section, authorized personnel representing Solano Community College District and The Shalleck Collaborative, Inc., Theatre Consultants.

1.05 SYSTEM DESCRIPTION

- A. The remodel of performing arts center for Solano Community College, facility includes a proscenium theatre, black box theatre, and support spaces.
- B. The stage will include single purchase, guided counterweighted rigging pipe battens in quantities and configurations as shown on Drawings.

- C. Selected battens shall be equipped with manually operating, bi-parting drapery traveler tracks.

1.06 SUBSTITUTIONS

- A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by the District's Representative prior to bid. Substitution requests made after bid shall be neither reviewed nor accepted. Requests shall be made in accordance with Division 1 of the specifications, and in a timely fashion so as to not affect the project schedule in either case of the substitution being accepted or rejected.
- B. Documentation for the substitution shall be submitted with supporting material and shall include the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The District's Representative shall be the sole evaluator of the fitness of the substitution.
- C. All expenses related to the substitution including, but not be limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.07 SUBMITTALS

- A. Submittals shall be made in a timely fashion so as to not affect the project schedule, and shall allow for adequate time for review and resubmittal. Partial submittals shall not be acceptable and shall be returned without review.
- B. All submittals shall be made in electronic format.
 - 1. Provide Hard copies if requested by Architect.
 - 2. Files shall be in .pdf format, and submitted via email, direct FTP download, USB memory stick, CD or DVD.
 - a. Third party website transfer services which require membership shall not be an acceptable means of transmittal.
- C. All submittals shall be complete and submitted as a comprehensive package, including finish selection materials (if required) and samples (if requested), all materials listed in this section, including, but not limited to, all shop drawings, product data, relevant calculations (as required) and any other information required to review the systems. Incomplete submittals will be rejected without review.
- D. All submittals shall be prepared for review by the CA Division of the State Architect as "deferred approval" items. As such complete shop drawings and relevant calculations shall be fully engineered and bear the stamp of a Structural Engineer licensed in the State of CA.
- E. Submittals shall be reviewed and field dimensions verified prior to commencing acquisition for, and fabrication of the work in this section. All services and parts of the work in this section shall be verified through the submittal process. Approval does not relieve the Contractor of the responsibility of providing equipment in accordance with the specifications.
- F. Shop Drawings:
 - 1. Submit component and installation drawings and schedules showing all information necessary to fully explain the design features, appearance, function, fabrication, installation, and use of system components in all phases of operation.
 - 2. Upon approval by the District's Representative, submit a dedicated set of drawings, product data and test and compliance certifications regarding all aspects of the proscenium fire safety curtain for review by building officials.
 - 3. Shop drawing plans and section shall be at 1/4" scale minimum. Details shall be larger scales to fully explain the component.
 - 4. Provide clear space on all shop drawings for comments and approval stamps.
 - 5. Provide full scale, digital color proofs of each screen of rigging control equipment displays.
- G. Product Data:
 - 1. Submit data sheets for all standard component parts, which shall include all information necessary to verify compliance with this Section.

2. Product data shall be properly identify each components intended use. Any options or variations must be clearly noted.
- H. Samples:
1. Upon 14 days of request by the District's Representative, submit samples for review. Samples may include, but are not limited to:
 - a. Black finished T-bar
 - b. Tracks and hardware
 - c. Lift line cable termination
 - d. Selected drapery materials, 2 bolt yards minimum
 - e. Sewing detail sampler demonstrating drapery top, side and bottom.
- I. Record Documents:
1. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
 2. Within 30 days, submit three (2) paper copies and six (6) electronic copies , in PDF format, of "as built" submittals including shop drawings, product data, flame certifications and listings, operations and instructions manuals for all products provided, care and maintenance instructions, service line and online contacts and warranty documents. Electronic copies shall be submitted in CD or DVD rom or on a USB storage drive.

1.08 WARRANTY

- A. Warranty shall provide coverage of material and product defects and assembly workmanship for a period of three years following the date of acceptance by the District.
- B. Items under warranty shall be serviced to the satisfaction of the District with 14 days of notification to the Contractor, except for safety related items, which shall be corrected within 48 hours of notification.

1.09 MAINTENANCE SERVICE:

- A. Provide maintenance service for a period of one (1) year after final acceptance of the installation. This service consists of at least one visit to the site for checking and adjusting of equipment. Perform the visit 11 months after the system has been accepted. Time of visit shall be coordinated with District and District Representative's schedule.

1.10 QUALITY ASSURANCE

- A. Equipment in this Section shall be provided by specialty suppliers and manufacturers meeting the qualifications listed herein.
- B. Specialty suppliers and the individuals responsible for installation in the field shall have been continuously engaged in the sales and integration of rigging equipment similar to that specified herein for a minimum of fifteen years, and shall have completed at least ten installations of this type and scope. The District's Representative shall be the final judge of the suitability of experience.
- C. Specialty suppliers shall have at time of bid and continuously maintain throughout the project and warranty period a CA Specialty Contractor's license appropriate for the work in this Section: CA C-61 or D-48 or D34-A license as applicable.
- D. Specialty suppliers shall maintain bonds in the amount required for the project.
- E. Specialty manufacturers responsible for engineering and manufacturing shall have been continuously engaged in the engineering and manufacturing of rigging equipment similar to that specified herein for a minimum of fifteen years, and shall have provided equipment for at least fifty installations of this type and scope. The District's Representative shall be the final judge of the suitability of experience.
- F. All equipment shall be UL listed and bear the appropriate labels.

1.11 DELIVERY, STORAGE AND HANDLING

- A. Packing shall prevent damage to the equipment during transit. Costs to repair or replace all equipment damaged during the course of the contract services shall be borne by the Contractor.
- B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible to properly sequence the work and to protect from damage during delivery, handling, storage and installation.
- C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.
- D. Draperies shall be packed and shipped in methods and containers that shall prevent crushing of finished goods.

1.12 PROJECT CONDITIONS

- A. Defects in the field which may impact the work in this Section shall be reported to the District's Representative and corrected in accordance with the requirements of the applicable Section of work prior to commencement of the work in this Section.
- B. Field Conditions: All bidders shall fully inform themselves of the conditions under which the work is to be performed. No additional compensation shall be allowed for any labor or item the bidder could have been fully informed of prior to the bid date.

1.13 MAINTENANCE

- A. Provide maintenance stock of User-serviceable components within the system. Maintenance stock shall be packaged in labeled long term storage packaging and turned over to the District at time of system commissioning.
- B. Maintenance stock shall include:
 - 1. For each type in the system provide:
 - a. One master traveler track carrier
 - b. Four intermediate traveler track carriers.
 - c. Four shackles of each type in the system.
 - d. Eight thimbles.
 - e. Eight wire rope compression sleeves
 - f. 1 qt. lubricant of all types included in the system.
 - g. Four spare control fuses of each type

PART 2 - PRODUCTS

2.01 SPECIALTY MANUFACTURERS AND SUPPLIERS

- A. Requirements: reference section 11061.1.10.
- B. The following production systems specialty manufacturers may furnish equipment for the work in this section:

Pook Diemont & Ohl, Inc.
701 E. 132nd Street
Bronx, NY 10454
(718) 402-2677
Contact: Ted Ohl or Barbara Pook

J.R.Clancy
7041 Interstate Island Road
Syracuse, NY 13209
(800) 836-1885
Contact: Marilyn Larsen

H&H Hardware
2203 Edwards Avenue
South El Monte, CA 91733
(800) 221-9995
Contact: Chuck Hart or Allen McKune

Joël Theatrical
375 Watline Ave.
Mississauga, Ontario, L4Z 1P3 Canada
(905) 890-8802
Contact: Van Marineau

Thern Stage Equipment
5712 Industrial Park Road
Winona, MN 55987
(800) 553-2204
Contact: Dave Maxwell

C. The following production systems specialty suppliers may bid the work in this section:

Pook Diemont & Ohl, Inc.
701 E. 132nd Street
Bronx, NY 10454
(718) 402-2677
Contact: Ted Ohl or Barbara Pook

J.R.Clancy
7041 Interstate Island Road
Syracuse, NY 13209
(800) 836-1885
Contact: Marilyn Larsen

LVH Entertainment Systems
300 Irving Drive
Oxnard, CA 93030
(888) 313-2033
Contact: Mike Kunz

Stagecraft Industries, Inc.
5051 North Lagoon Ave
Portland, OR 97217
Tel. (503) 286-1600
Contact: Kevin Shetterly

D. All other manufacturers and installers must be approved prior to bid. Other contractors seeking acceptance must submit the following information at least 2 weeks prior to the bid opening date. Approval of contractors will be by addenda. Failure to submit any of the required information will automatically disqualify the contractor from consideration of approval.

1. A listing of five equivalent installations including:
 - a. Name, address and telephone number of College;
 - b. Name, address and telephone number of Theatre Consultant;
 - c. Scope of work.

2. A brief written description of the contractor's operation including facilities, financial capabilities, and experience of key personnel.
3. A statement from a bonding company agreeing to provide the required bonds in the amount required for the project.
4. Documentation necessary to show compliance with Quality Assurance, above

2.02 MATERIALS

- A. All components supplied under this Section shall be new. Used or factory reconditioned components shall not be acceptable.
- B. Materials shall conform to the following ASTM, ANSI and ESTA standard specifications:
 1. A-36 – Specification for structural steel
 2. A-47 – Specification for malleable iron casting
 3. A-48 – Specification for gray iron casting
 4. A-120 – Specification for black and hot-dipped zinc-coated (galvanized) steel pipe for ordinary use
 5. B18.2.1&2 – Specification for square and hex bolts and nuts
 6. B221-02 – Specification for aluminum alloy
- C. Materials, devices, assemblies and installation shall meet or exceed applicable ESTA standards.
- D. In order to establish minimum standards of safety, the following factors shall be used:
 1. Cables and fittings – 8:1 Safety Factor
 2. Cable bending ratio – Sheave tread diameter is 30 times cable diameter
 3. Tread Pressures – 500 lbs. for cast iron; 900 lbs. for Nylatron; 1000 lbs. for steel
 4. Maximum fleet angle – 1-1/2 degrees
 5. Steel – Per AISC specifications
 6. Bearings – Two times required load at full speed for 2000 hours
 7. Bolts – Minimum SAE J429 Grade 5 (ISO R898 Class 8.8), zinc plated
- E. All turnbuckles, clips, tracks, chains and other items of incidental hardware shall be furnished plated or painted black.
- F. All nuts shall be new lock nuts or shall be provided with lockwashers. No exceptions.
- G. Lift Lines:
 1. Diameters as noted on drawings or as required, 7 x 19 construction, galvanized wire rope aircraft cable, with the following breaking strengths:
 - a. 3/16" diameter: 4,200 lbs.
 - b. 1/4" diameter: 7,000 lbs.
 - c. 3/8" diameter: 14,400 lbs.
 2. Damaged or deformed cable shall not be used. All wire rope rigging shall be installed so as to prevent abrasion of the wire rope against any part of the building construction or other equipment.
- H. Sheaves:
 1. Sheaves shall be of the following materials:
 - a. ASTM A-48 Class 30 grey iron castings or steel, as required to for dead plus live load tread pressures.
 2. Diameters shall be as shown on Drawings or as required to meet or exceed the wire rope manufacturer's minimum recommended D/d ratio, assumed herein to be 32x the lift line diameter.
 3. Groove depths shall be sufficient to encompass fully the cables and ropes. Grooves shall have sloped sides (8 degree minimum) and conform to rope and cable manufacturers' standards for groove shape and tolerance.

4. Sheaves shall be supported by bearings and a machined steel shaft, which shall be keyed to one side plate to prevent rotation. Proper adjustment of the bearing shall be accomplished by means of a fine thread, self-locking nut on the opposite end of the shaft. Each sheave shall run plumb and true without chafing when rotated.
- I. Block mounting clips:
 1. Blocks shall not be welded to structure and shall be clipped to building steel flanges.
 2. Flange mounting clips shall be bent plate min 5/16" thick, hot rolled steel, and min. 50KSI yield strength. The clip shall match the flange thickness of the beam to which the block is mounted. Bolts shall compress clips to base angles so there is full planar contact between the clip face and the beam flange. Bolted clips shall be oriented away from the result force on the blocks.
 - J. Motor Hoists – General
 1. All winches shall be supported by a sturdy steel base, holding the elements of the winch in proper alignment.
 - K. Gearmotors and Primary Brakes:
 1. Motors, primary brakes, and gearboxes shall be an integrated unit, with the first stage pinion gear mounted directly on the motor's armature shaft. No couplings will be permitted between the motor, primary brake and gear reducer. Exceptions will be permitted only when special gearing or torque requirements cannot be met with an integrated unit.
 2. Motors shall be totally enclosed fan cooled (TEFC). The motor shall have a minimum AGMA service factor of 1.0 for constant operation.
 3. The gear reducer shall be a combination Helical/Worm reducer. The gear case shall be cast iron for protection against shock damage. The output shaft(s) shall have double lip oil seals to prevent leaks. The gearing service factor shall be a minimum of 1.0 with a mechanical strength service factor of 1.25.
 4. Primary Brake:
 - a. For motors of 20 HP or less the primary brake shall be an integral part of the motor, mounted directly on the motor's armature shaft. No couplings will be permitted between the motor and primary brake.
 - b. Brakes shall fail to a safe condition ("fail safe") in case of power failure. Brakes shall be spring applied, direct acting, electrically released by energizing the coil simultaneously with the motor winding, and equipped with a manual release. The brake shall an AC / DC electro-magnetic unit with a minimum retarding torque equal to 200% of motor full load torque.
 - L. Shafts, Keys, and Couplings:
 1. Shafts shall be designed to accommodate the applied loads (including shock and bending loads) in accordance with ANSI B 106.1M, "Design of Transmission Shafting,"
 2. All connections shall be keyed, using keys designed to accommodate the applied loads. Keys shall be in accordance with ANSI B 17.1, "Keys and Keyseats".
 3. Couplings shall be chosen to accommodate the applied loads, including shock and bending loads. Couplings shall accommodate the possible parallel and angular misalignments caused during manufacturing, assembly, and installation, as well as by structural tolerances and structural or equipment deflections.
 4. In the case of line shaft hoists, the couplings in the shafts between the drums shall be universal joints in order to compensate for misalignment and deflections.
 5. Only couplings made of steel and with steel to steel contact surfaces shall be used.
 - M. Bearings:
 1. Bearings shall be selected to accommodate the applied loads and speeds.
 2. The use of self-aligning flange bearings is preferred. The use of other bearing types shall be in accordance with good engineering practice. Pillow blocks may be used only where they are subject to compressive forces only.

- N. Helical Drums:
1. Provide cast iron or steel drums designed to properly support the required loads.
 2. Each helical drum shall be supported by a rigid steel base, holding the elements of the drum assembly in proper alignment.
 3. Where directly adjacent to a motor, drum shall be directly connected to the output shaft of the integrated motor - brake - gear reducer unit and the outboard end of the drum shall be supported by a self aligning flange bearing.
 4. Where connected to shafting, both ends of each drum shall be supported by a self-aligning flange bearing mounted in a steel plate that fully captures the drum shaft.
 5. Side plates shall hold a minimum of three keepers designed to prevent cross winding of the lift lines on the drums.
 6. Drums shall be helically grooved to accept a single layer of cable accommodating the entire travel distance PLUS three dead wraps PLUS two contingency wraps.
 7. The drum diameter shall meet or exceed the wire rope manufacturer's minimum recommended D/d ratio, assumed herein to be 32x the lift line diameter.
 8. Cables shall enter the drum at a 45 degree angle and shall be retained by a Nicopress stop sleeve.
- O. Direct Struck Limit Switches
1. Direct struck limit switches shall be heavy duty, lever operated rotary head units, and shall have positive opening contacts.
 2. Direct struck limit switches shall be Telmecanique ZCKJ series or Allen Bradley Bulletin 802T.
 3. Mount limit switch strike plate assembly to a Unistrut assembly to allow for 2' minimum of vertical adjustment.
- P. Fabrication:
1. The mechanical fabrication and workmanship shall incorporate best practices for good fit and finish. There shall be no burrs or sharp edges to cause a hazard nor shall there be any sharp corners accessible to personnel.
 2. All moving parts shall have specified tolerances.
 3. All equipment shall be built and installed to facilitate future maintenance and replacement.
- Q. Finishes:
1. Paint shall be the manufacturer's standard finish and color except as noted.
 2. All turnbuckles, clips, tracks, chains and other items of incidental hardware shall be furnished plated or painted black.
- R. Recommended Working Load: This specification calls for minimum recommended working loads for hardware. The manufacturer's recommended working load is the maximum load which the manufacturer recommends be applied to properly installed, maintained, and operated new equipment. Manufacturer's recommended working loads shall be determined by calculations by a Licensed Professional Engineer and destructive testing by an independent testing laboratory. These calculations and reports shall be available for review.

2.03 COUNTERWEIGHT SETS

- A. System must fit into existing building conditions. The space between loading gallery and wall and stage door and wall are very tight. See drawings.
- B. Counterweight sets must meet DSA requirements.
- C. It shall be under the work in this section to mount and rig the multicable and install and hang the connector strip receptacle boxes to battens. Production Lighting Control shall supply the multicable and connector strips. Production Rigging shall coordinate the length of multicable required for the linesets and inform Production lighting contractor of the required length to make a function lineset. The multicable shall not pull the lineset out of alignment with the other linesets.

D. Guide System:

1. The complete guide system shall consist of vertical flanges, located to receive sets on centers as shown on drawings. The T-bar guides shall be 2" deep x 2" wide x 3/16" black painted steel members.
2. Guides shall be held in place by clips on each leg of the guide. The clips are bolted to horizontal angles. The clips and guide shall be formed so that they lock together in accurate alignment.
3. Horizontal wall battens shall be located per drawings, Wall battens shall be unistrut anchored to the wall.
4. Wall battens shall hold in place wall knees, steel plate formed from 24" x 1/4" steel, with factory punched slots to aid in alignment made necessary by irregularities in the wall. Wall knees shall be bolted to wall batten with 1/2" bolts as shown on the drawings. Wall knees shall be welded to the wall batten after final commissioning and approvals have been given. Wall knees shall be welded to the backing girts provided under structural steel contract.
5. There shall be a top stop batten, a bottom stop batten and a floor batten, all of which shall be made of 2" x 2" x 1/4" steel angle bolted to each A-guide with 3/8" bolts. The top and bottom stop battens shall each have a 2" x 2" hardwood and 3/8" thick rubber bump stop securely bolted to the stop battens by 3/8" bolts every three sets. Rubber shall be continuously attached to the hardwood with mastic and screws. Bump stops shall be placed to maximize travel.
 - a. Single set bump stops shall be installed where required to limit shell batten travel within the limits shell ceiling height.
6. All other members of the guide system shall be assembled using 5/16" hex head bolts, lock nuts and washers.
7. All components of the guide system shall be finished flat black. No exceptions.
8. Guides shall be installed precisely and plumb, and splices shall align. Minor inconsistencies in the guide flanges shall be ground smooth.

E. 10" Tension Floor Block:

1. The cast iron sheave shall have a 10" outside diameter, and shall be an ASTM A48 Class 30 grey iron casting or steel, with a machined groove for a 3/4" rope.
2. The sheave shall be equipped with a 17 mm diameter machined steel shaft and two sealed, precision ball bearings.
3. Side plates shall be a minimum of 3/16" steel plate.
4. The block shall have a minimum weight of 40 lbs. to properly tension the hand line.
5. A toe kick plate shall be provided to permit adjustment of the rope tension.
6. The floor block shall be held in place and guided in the A-bar guides by two guide shoe assemblies, each consisting of two UHMW guides, one UHMW spacer, and 5/16" thick steel plates. Each guide shall be secured to the housing by means of two 3/8" hex head bolts and nuts.
 - a. Floor block shall be mounted at an angle to the A-bar guides. Floor block guides shall have welded assembly spacer so floor block will be parallel with plaster line. Floor blocks are not perpendicular to the A-bar.

F. Counterweight Arbors:

1. Arbor shall be lengths as shown on Drawings.
2. The arbor top shall be a 1/4" steel plate formed into a channel with 3" sides, punched to receive 8 cables. A bolt and spacer shall tie the legs together and provide a tie-off point for the hand line. The front of the arbor top shall carry a 1-1/2" high white set number.
3. The arbor bottom shall be of similar construction, with counterweight rests to keep the weights from resting on the inner arbor rod nuts.

4. The top and bottom of the arbor shall be tied together by means of two 3/4" steel arbor rods and a continuous 3/8" x 3" steel back plate. The arbor rods shall have three nuts at each end, the outermost being a lock nut. One rod lock nut at the bottom shall be a forged eye for use as a tie off for a capstan winch.
 5. Guide assemblies (two minimum) shall be provided, each comprised of UHMW plates between full width steel backup plates, secured to the arbor by means of two 3/8" hex head bolts and lock nuts.
 - a. UHMW spacers shall be sized 1/16" more than A-bar flange thickness. Guides shall be as wide as possible to provide maximum engagement on T-bars.
 6. Provide 12-gauge spreader plates (two minimum) on arbor rods so they can be spaced between counterweights on 2 foot centers. Provide a retaining collar on each rod, each with a 1/4" screw knob. The front retaining collar shall be welded to the top spreader plate.
 7. Provide labels on the steel back plates showing the proper locations for the spreader plates.
 8. Provide lineset number at top front of arbor.
 9. Arbors shall be finished flat black.
 10. Manufacture may elect to supply "brickhouse" arbor, with final approval by college reprehensive.
 11. Arbor shall fit into the existing building space allowed.
- G. Counterweight:
1. Counterweights shall be steel plate 1" thick x 13-3/4" long and width 2" narrower than the set centers, with U shaped cutouts for the arbor rods. Counterweights shall be flame or laser cut steel. Each piece shall be free from slag and sharp edges. The thickness of counterweights shall not vary more than 1/8" from nominal dimension.
 2. Weight shall be primed grey with rust inhibitor.
 - a. Dead load weight shall be painted yellow on the edges once installed.
 3. Opposite corners shall be notched for ease of handling. Pipe weight dead load shall be stacked with weights alternating to provide finger holds when loading arbors.
 4. Provide 35,000 lbs. of live load counterweight PLUS the dead load of pipe weight of all installed sets. Provide an additional 7,000 lbs of live load counterweight for the orchestra shell ceilings.
 5. Load all sets for balance at the midpoint of travel and band pipe weight dead load stack with 2 mechanically locked steel straps to arbor.
 6. Deliver and distribute live load counterweight in safe and neat stacks at follows:
 - a. 10% to the rigging side fly gallery.
 - b. 90% to the loading gallery.
- H. Operating Line:
1. Operating line shall employ a 3-strand composite construction combining filament and staple/spun polyester wrapped around fibrillated polyolefin.
 2. The rope shall hold knots well, be easily spliced and be dense enough to allow it to be clamped in a rope lock without damage. Rope shall not be subject to rotting, mildew, or moisture damage nor shall its length be affected by changes in humidity.
 3. Tape ends before cutting. Attach to arbor around rope thimble with two half hitches or bowline and tape end to standing line with rigging tape.
 4. Adjust length so tension block is at mid travel at time of checkout.
 5. Operating lines shall be Multiline II rope or SureGrip rope as provided by J. R. Clancy, standard white.
- I. Locking Rails:
1. Locking rails shall be engineered and installed to resist 350 lbs./ft. upward or downward loads.
 2. The locking rail shall be 3" x 3" x 1/4" minimum rectangular steel tube drilled to receive rope locks.

3. Drill 1-1/4" diameter holes for belaying pins at approximately 4'-0" o.c. midway between ropelocks.
 4. The onstage face of the rail shall have set numbers painted in 2" high white characters.
 5. The top of the rail shall have a continuous 2" high white write-on Plexiglas strip fastened with rivets or self tapping screws. Interrupt at lock pipe flat bars.
 6. Lock pipe assembly:
 - a. Provide 1/4" x 2" steel flat bars with 1/2" radius rounded top corners and stacked pairs of 1-1/4" inside diameter holes on +/-6' centers with shaft length. Bars shall allow 1" diameter pipes to be inserted to lock all the rope locks open or closed.
 - b. Provide with two complete sets of 1" diameter pipes with a stop welded to one end and holes drilled to accept a pad lock at the other end. Deliver fly gallery lock pipes to fly gallery.
 7. Stanchions made from 3" x 3" steel tube and shall be provided on 4 foot maximum centers.
 8. At floor level locking rail provide continuous 3" x 3" horizontal engaging tube between stanchions with 1-1/2" clear to finished stage floor for capstan winch.
 9. At fly gallery locking rail, provide expanded metal mesh between the stanchions from the top of gallery structure up to 1'-0" below the bottom of the locking rail. The top edge of the expanded metal shall be captured in steel angle for safety and reinforcement.
 10. Rails shall be finished flat black.
 11. Provide padlocks for both ends of the lock bars all keyed the same. Provide 6 sets of keys.
 12. Provide barrier at any gap between rope locks greater than 20". Barrier shall be bolted to locking rail or attached in a way so that it is removable for installation of future line sets as identified on drawings.
 13. Provide two complete locking rail assemblies as shown on Drawings designed to fit into the existing building.
- J. Rope Locks:
1. The rope lock shall consist of an ASTM A536 ductile iron housing, cams and handle. The body of the rope lock shall accommodate a padlock, securing the handle in the closed position.
 2. There shall be a rubber bumper in the housing to silence the handle when it is opened. Replace standard bumper with larger bumper to keep the handle from hitting the steel tube of the lock rail.
 3. Rope lock shall be configured so it will not open if the set is out of balance by 50 lbs. in either direction, and the balance or out of balance condition shall be clearly identifiable.
 4. Adjustment for rope shall be from 5/8" to 1" by means of a 1/2" nylon tipped, socket head adjustment screw with lock nut at the rear of the housing.
 5. The handle shall be 9" long with a vinyl dip coating. The handle shall be installed so that it passes two degrees past vertical to lock the hand line. The cam at the lower end of the handle shall be equipped with a steel roller to eliminate sliding friction and promote ease of use.
 6. A vinyl dip coated, oval, welded steel ring shall be provided as a safety lock.
 7. The rope lock shall mount to the locking rail with four 3/8" hex bolts and lock nuts.
 8. Provide rope locks for the complete quantity of A-bar centers as shown on drawings, whether or not every set is installed.
 9. Rope locks shall be SureLock as provided by J. R. Clancy.
- K. Outrigger Brackets:
1. Angle iron outrigger brackets shall be made of 3/16" x 1- 3/4" x 1-3/4" angle and spaced at the purlin points. The brackets shall be attached to the wall. The brackets shall include clamps for attaching the batten.

2. The outrigger batten shall be made from 1-1/2" I.D. (1.9" Outside diameter), schedule 40 pipe extending the full length of the locking rail. Specifications are the same as other battens.
 3. Rails shall be finished flat black.
 4. Provide complete outrigger bracket assemblies as shown on drawings at floor level.
- L. Index Light:
1. Each index light unit shall consist of a sheet steel housing containing LED lights and wired on two, alternating, separate circuits with leads and junction box at either end. One circuit shall have warm white LEDs (~3000K color temperature matching tungsten light) and one shall have deep blue LEDs..
 2. Units shall be constructed so as to light the locking rail and prevent light from spilling on stage. The exterior of the index strip light shall be painted a matte black, the interior shall be white.
 3. Units shall mount to outrigger brackets or outrigger pipe and shall not sit proud of the outrigger pipe on the stage center side.
 4. Furnish each locking rail length with one control station which can control each circuit individually. Coordinate and deliver to Div. 26 Contractor for connection and installation.
 - a. Blue circuit shall be dimmable.
 - b. White circuit shall be or dimmable.
 5. Provide two continuous lengths and install at the floor level and fly gallery.
 6. Provide Dimmable LED "index strip light".
 - a. Fixtures must be capable of dimming to 5% of lumen output, measurable when standing at the locking rail.
 - b. Lumen output at locking rail must be 75 foot candles minimum on white circuit and 20 foot candles minimum on blue circuit when at full brightness.
- M. Head Blocks:
1. The sheave shall be an ASTM A48 Class 30 grey iron casting or steel with an outer diameter as shown on drawings. The machined rope and cable grooves shall have equal pitch diameters. The sheave shall be equipped with a 1" (for 12" diameter sheaves) or 1-1/2" (for 16" diameter sheaves) diameter machined steel shaft and two tapered roller bearings.
 2. Base angles shall be a minimum 2" x 1-1/2" x 1/4" angle with the short leg turned in. The turned in leg shall be notched to allow clear passage of all cables.
 3. Side plates shall be a minimum of 10-gauge (for 12" diameter sheaves) or 7-gauge (for 16" diameter sheaves) steel, and shall fully enclose the sheave. Side plates shall be bolted and welded to the base angles for extra strength. Side plates shall be shaped to overlap the flanges of the head block beams. There shall be a minimum of six bolts with spacers between the side plates, four of which prevent cables from escaping the sheave grooves.
 4. The block and associated mounting hardware shall have a recommended working load of at least 3,000 lbs. (for 12" diameter sheaves) or 3,600 lbs. (for 16" diameter sheaves).
 5. Block mounting clip per standard specification listed in Section 11061.2.02I. Clips will need to bolt to base angles at an angle to keep head block parallel with plasterline.
- N. Loft Blocks:
1. The sheave shall have an outside diameter as shown on drawings, and shall be an ASTM A48 Class 30 grey iron casting or steel, with machined grooves. The sheave shall be equipped with a 17 mm minimum diameter machined steel shaft and two sealed, precision ball bearings.
 - a. All loft blocks shall be single line sheaves.
 - b. Exception: multicable management lift line locations shall have two grooves.
 - c. Exception: short line loft block shall be multi-grooved to carry all lines.
 2. Base angles shall be a minimum 1-1/2" x 1-1/2" x 3/16" angle.

3. Side plates shall be a minimum of 10-gauge steel, and shall fully enclose the sheave. Side plates shall be bolted to the base angles. There shall be a minimum of seven ¼" bolts with spacers between the side plates, four of which prevent cables from escaping the sheave grooves.
 4. The block and associated mounting hardware shall have a recommended working load of at least 500 lbs. minimum for 8-1/2" dia, 700lbs. minimum for 12" dia, and 1400lbs minimum for 16".
 5. Block mounting clip per standard specification listed above.
- O. Lift Cables:
1. All lift cables shall be diameters as shown on drawings and as specified above.
 2. Batten terminations shall be:
 - a. Pipe clamp
 - b. Turnbuckle
 - c. Wire rope thimble
 - d. One compression sleeves
 - e. Heavy black heat shrink tubing over cable ends
 3. Arbor terminations shall be:
 - a. Wire rope thimble
 - b. One compression sleeves
 - c. Heavy black heat shrink tubing over cable ends
 - d. Forged and galvanized shackle rated for full working load plus factor of safety, with cotter pin on inward side.
 4. Fittings as specified below.
 5. Adjust pipes so the pipe is aligned straight.
- P. Cable Fittings:
1. Swaged sleeve fittings shall be copper Nicopress. Swaged fittings shall be installed per the fitting manufacturer's instructions, using the appropriate tools, and checked with a "go/no-go gauge".
 2. Eyes shall be formed over galvanized wire rope thimbles of correct sizes.
- Q. Turnbuckles:
1. Cotter pin jaw-jaw with 6" throw, drop forged and galvanized. Turnbuckles shall be moused after adjustment to prevent loosening.
- R. Pipe Clamps:
1. Pipe clamps shall be made of two strips of 12 Ga. by 2" hot rolled steel formed to encompass and clamp the pipe batten to prevent its rotation. Corners shall be rounded.
 2. There shall be a 3/8" x 1" hex bolt with lock nut above and below the batten. A 5/8" hole in the top of each clamp half allows the attachment of cable, chain, or other fittings.
- S. Multicable Management:
1. For lighting multicables or cable bundles provide cable cradles, blocks and wire rope terminations as indicated on the Drawings.
 2. It is under the work in this section to mount lighting cable extension drops to multicable management system and to mount electrical devices to battens.
 - a. Cable and batten mounted devices shall be provided under section 116183 Production Lighting.
 - b. Coordinate proper lengths to maximize high trim and install multicable on cable cradles as indicated.
 - c. Mount lighting receptacle devices to battens as shown on PL drawings and shop drawings.
 - d. Electrical terminations to gridiron and batten terminal boxes under Division 26 Electrical work.
 3. Cable cradles to be securely bolted to 1/8" thick steel strap hangers on each side of the assembly.

4. Cable cradle strap to include guides of UHMW split blocks drilled vertically for passage of the adjacent lift line at the split. Halves shall be fastened together with countersunk nuts and bolts for ease of installation and removal.
 5. Lift line attachment at single purchase cable cradle forged eye and gridiron dead off:
 - a. Wire rope thimble
 - b. Two compression sleeves
 - c. Black heat shrink tubing over cable ends
 - d. Forged and galvanized cotter pin shackle rated for full working load plus factor of safety.
 6. Provide 8-1/2" diameter sheave with same specifications as for loft blocks, attached to double purchase cable cradle assembly. Lift line to pass through sheave and attach to gridiron.
 7. Dead-off at the grid iron shall include an assembly of a 5" yellow painted backing channel with forged eye bolt. Assembly to be J-bolted to the gridiron grating.
 8. Provide mounting hardware at rigging beams for multicable strain relief as shown on the Drawings.
- T. Two-Pipe Truss Battens:
1. Battens shall be two pipe truss battens as listed on batten schedule in the drawings.
 2. All battens shall be welded trusses of two 1-1/2" nominal diameter, schedule 40 black pipes in lengths as shown on the drawings. Space pipes apart with 1-3/4" square mech tube steel, coped and welded, located a maximum of 5 feet apart and welded between the pipes.
 - a. There shall be two pieces of square tube, spaced 6" apart, at every lift line termination.
 - b. There shall be intermediate square tubes, spaced as required to maintain minimum distance of 5'-0".
 - c. There shall not be square tube on the center line.
 3. All edges shall be de-burred.
 4. All joints shall be spliced with tight fitting mech tube sleeves held by two 3/8" hex bolts and lock nuts on each side of the joint. Hex bolts shall all be parallel and installed vertically.
 5. Battens shall be finished with a suitable rust resistant finish, black.
 6. The center of each counterweight pipe batten shall be marked with a 1" wide white stripe enamel painted around the full circumference.
 7. Safety yellow end caps at each end, all battens.
 - a. 2-1/2" diameter 16GA metal end cap with 1" high minimum black numbers for lineset identification. Cap shall be tack welded to mounting collar. Collar shall be mounted to batten with 1/4" hex head bolt. Numbers shall be on bottom of end cap, visible from the floor when batten is flown out, and on side of end cap. End cap shall be painted black with side face painted yellow. Numbers shall be white on bottom and black on side.
 8. The upstage side of each lower pipe shall be marked with 1/4" wide white stripe enamel painted on the upstage side of the pipe only at one foot intervals starting from the center mark going both stage right and stage left. Next to every other one foot intervals mark the distance from center line starting at 2 feet.
 9. Pipes shall be enamel painted flat black.
- U. Three-Pipe Truss Battens:
1. For Orchestra Enclosure ceiling support battens, provide trusses as specified above for two-pipe truss battens except with three pipes in configuration as shown on drawings.
- V. Counterweight System Labeling:
1. The linesets shall be labeled with the designations indicated on the Drawings in the following locations:
 - a. The onstage face of each locking rail.
 - b. The upper offstage railing of the loading gallery.

- c. The onstage web of the counterweight headblock beam, 6" tall numbers.
 - d. The grid walking surface channel, next to second, center and far loft blocks.
 - e. Pipe ends, as specified above.
 - f. Arbors tops, as specified above.
2. Labels shall be 2" high contrasting color lettering painted with enamel paint on structure by a professional sign painter.
- W. System Signage:
1. Provide signage indicating system load data and warnings on downstage wall for each of the following locations:
 - a. Rigged side stage level.
 - b. Rigged side fly gallery level.
 - c. Loading gallery level.
 2. System data shall include:
 - a. Overall live load capacity of general purpose battens.
 - b. Concentrated live load capacity mid way between pickups on general purpose battens.
 - c. Weight per each counterweight.
 - d. Weight per foot of counterweight.
 - e. System operation safety advisory.
 - f. Load capacities of tracked multi cable pick-up rigging points
 - g. Rigging Contractor contact information.
 3. Signs shall meet ANSI Z535 standard for warning signs.
 4. Mount on wall in plain view.
- X. Mobile Capstan Winch:
1. Provide 1 capstan motorized traction drum winch.
 2. Hoist components shall be per standard specification list above.
 3. Unit to be self contained including rope line diverter block, motor, drum, starter, up/down foot pedal controls power cord. Sled shall include swivel and fixed casters, front lip angle to engage tube on locking rail stanchions, horn cleat, push handle and power cord coil rack.
 4. Pull capacity shall be 1,500 lbs. Power shall be 120/208VAC.
 5. Provide with 60'-0" extension cord with twistlock male connector. Coordinate and provide female receptacle with faceplate for installation under Division 26 Electrical work.
 6. Provide with 150' of white 1" diameter Multi-Line II or SureGrip rope as provided by J. R. Clancy, standard white, with forged safety hook and whipped and dipped ends.

2.04 SAG BARS

- A. Provide lifeline sag bars as shown on the drawings
1. Top of the sag bars shall be 1/2" thick UHMW flush countersunk head bolted to the horizontal steel tube every 18" and at all ends.
 2. Sag bars shall be constructed from 1-1/2" square tube.
 3. Provide vertical frames to support the horizontal tube every 4 feet and at ends.
 4. Attach sag bar frames to the grid iron with J-bolts.

2.05 SIDE TAB BATTENS

- A. Side tab battens shall be as specified above for Counterweight Sets
- B. Mule Blocks
1. Provide mule blocks as shown on drawings.
 2. Mule blocks shall be as specified above for multi-grove loft blocks.
 3. Mounting structure shall hold blocks at proper angle to accept lift lines from head block without more than 1 degree of fleet angle.
- C. Provide multicable management as specified above.

2.06 STRAIGHT LIFT FIRE CURTAIN

A. General Description:

1. Furnish and install a manually operated straight lift type, automatically closing fire safety curtain for the proscenium opening indicated on the drawings. Curtain shall comply with all requirements of the current edition of NFPA 80 or subsequent applicable code.
 - a. The curtain shall be arranged to intercept fire and smoke and prevent glow from severe fire on the stage from showing on the auditorium side for at least thirty (30) minutes.
 - b. The curtain shall close by gravity due to over-balance of the curtain as specified below. Emergency closing must occur in less than thirty seconds when the fire line is manually released or fusible links separate.
 - c. Time of emergency deployment shall be per code.
 - d. New track shall be installed.
2. Provide building attachment backing.
 - a. As required
3. Fire Safety Curtain material:
 - a. The curtain shall be fabricated from tightly woven non-wire inserted, non-asbestos, non-carcinogenic silica based cloth, 12 x 7 weave of .070" thickness weighing at least 40 ounces per square yard. The curtain shall be listed and approved by the State of California Fire Marshall and shall bear a certification label from a nationally recognized listing agency. All strips of fabric shall be in continuous lengths running the full height of the curtain. There shall be no horizontal seams. Each seam shall be sewn with two lines of stitching using fiberglass thread. Top and bottom pockets shall be 6". The bottom pocket shall be equipped with a 3" yield pad filled with fire curtain material.
 - b. Acceptable products: Zetex 1210-ZP or equal.
4. Sides of curtain shall have roller guides every 18", securely fastened to a side hem with at least three bolts or rivets through a continuous sheet metal vertical reinforcement assembly per code. Each guide shall have four steel wheels, which properly engage the track in the smoke pocket.
5. Top Smoke Seal:
 - a. Provide a smoke seal consisting of a triple layer of folded fabric fastened above the proscenium with a mounting clamp so it rubs the curtain and seals the top of the opening.
 - b. The fabric shall be Zetex 800 or equal cloth with a minimum weight of 27 oz. per square yard.
6. Smoke Pockets and Guide Track:
 - a. Provide smoke pockets to extend from the stage floor to the height specified in the drawings and per code. Pockets shall consist of channel and 1/4" steel plate which shall be bolted to the channels with round head bolts on 2'-0" centers. A 14 ga. steel channel track, entirely enclosed except for a slot in the side, shall be bolted to the side of the smoke pocket to carry the guide rollers. Channels shall be anchored to the walls on 4'-0" centers.
7. Battens
 - a. Battens shall be made of 2" I.D., schedule 40 black iron pipe. Fabrication shall be as for standard sets.
8. Lift Cables:
 - a. The curtain lift cables shall be 1/4" diameter as specified in section above. The curtain end of each cable shall be attached to the batten using a 3/8" x 6" turnbuckle and pipe clamp.
 - b. Cables shall be terminated with corresponding cable thimbles and Nicopress fitting at each end.
9. Safety Chains:

- a. Supply one more safety chain than the number of lift cables. 1/4" proof coil chains shall be located between lift cables except at the ends where chains shall be 12" or less from the end of the batten. Chains shall be attached to the top of the curtain with pipe clamps around the top of the batten and screw pin shackles moused with wire to prevent pin unscrewing. (cotter pin shackles are not acceptable) The other end shall be appropriately attached to the strong back channels via a angle iron with forged eye bolt and steel clips.
10. Line Shaft Fire Curtain Winch:
 - a. The winch shall consist of a gearmotor assembly, a drum for each lift line, and interconnecting shafts. The gearmotor assembly shall include a brake release and an adjustable hydraulic speed regulator, allowing the curtain to close at a controlled rate of speed when the brake is released by the activation of the fire line. The winch shall have a lifting capacity as required for the curtain assembly and when engaged shall operate at a rate of 25 feet per minute.
11. Gearmotor:
 - a. Per standard specification see above.
12. Drums:
 - a. Per standard specification.
 - b. Alternate drums shall be threaded in opposite directions, to keep the batten from "walking" as its elevation changes.
 - c. Drums shall be interconnected by shafts with universal joints at each end.
13. Shafts:
 - a. Per standard specification.
14. Rotary Limit Switches:
 - a. Rotary limit switch assemblies shall have two or four independently adjustable switch/cam sets as required. Cams shall be driven by a geared assembly.
 - b. Switches shall have snap acting contacts.
 - c. Rotary limit switches shall be driven directly or by roller chains. If roller chains are used, sprockets shall be pinned to prevent slipping and sized for maximum usable rotation of switch cams. The input shaft and drive chain shall be fully guarded.
 - d. Switches shall be mounted to the winch base to allow for easy adjustment of the switch settings.
15. Direct Struck Limit Switch:
 - a. A hard limit switch shall be the ultimate indicator of curtain upward overtravel to prevent any carriers from exiting the guide tracks. A hard limit switch shall be mounted on 2 foot length of unistrut for adjustment, and shall be engaged by the top of the fire curtain or an armature mounted at the top of the fire curtain.
 - b. Limit switch shall be per standard specification.
 - c. In the event an overtravel limit is engaged, the appropriate "primary limit failure" fault indicator shall illuminate.
16. Fixed Speed Starter:
 - a. The traction drive winch shall be controlled by a UL 580E compliant, full voltage, self protected, reversing starter. Enclosure shall be NEMA 12 with hinged, latching cover. The interior of the starter cabinet shall be "touch safe" per IEC 204-1 "Protection against direct contact" rules.
 - b. The NEMA/IEC, magnetically operated, mechanically and electrically interlocked, reversing starter shall be sized to match the winch motor horsepower and shall be rated for plugging and jogging. Units shall incorporate UL580E Type 2, non-welding, positive break contactors.
 - c. Overcurrent protection shall be provided by an IEC Class 10 overload. Short circuit protection shall be provided by a circuit breaker.

- d. Starters shall be wired so that operation of the normal end of travel limit switches shall only allow movement away from the limit switch. Operation of an overtravel limit switch shall open the line contactor, and will not allow further movement in either direction. A spring return toggle switch shall be housed inside the starter cabinet to allow override of the overtravel limits for resetting purposes.
17. Control Stations:
- a. Two control stations shall be provided one in wall mounted NEMA 12 enclosures. Each shall contain hold to operate (dead man) Up and Down pushbuttons, a mushroom head emergency stop pushbutton.
 - b. One control station shall be wall mounted stage right at stage level. This panel shall also include LED's indicating full travel positions (green) and "primary limit failure" (red). The "primary limit failure" indicators shall illuminate when the ultimate limits are reached on the rotary or hard limit switches. Grid Irion station shall be a stand-alone, surface mounted enclosure mounted near the motor.
18. Fire Line System:
- a. The manual fire line release system shall consist of a 1/8" diameter wire rope, with fusible links rated at 165°F spaced a maximum 15 feet apart. One or more fusible links shall be spaced no more than 7.5 feet vertical above the finished stage floor.
 - b. The fire line shall cross the top of the stage side of the proscenium within 12 inches of the roof support structure.
 - c. Provide single side mounting and swivel pulleys to provide a fair lead to all connections. Provide captured fire line tension weight with sheave.
 - d. Provide two fire line release devices with red protective enclosures and signage. Signs shall read in English, and Spanish:

IN CASE OF FIRE
PULL RING
TO LOWER FIRE CURTAIN
AFTER FIRE CURTAIN IS DOWN
RELEASE SMOKE VENTS
 - e. or equivalent to describe the action required on the specific release device.
 - f. Arrows shall point to release devices.
 - g. Signs shall have 1" high minimum red characters on a white background and shall be professional made signs on wood or plastic. Painted signs shall be protected with a clear Plexiglas cover.
 - h. Signs shall be mounted above fire line releases and not behind stage draperies.
 - i. Size shall be coordinated with surrounding equipment.
19. Electrical Fire Line Release rate of rise:
- a. The fire curtain shall be equipped with an electro-mechanical fire line release mechanism which is activated by a rate of rise heat detector. A switch shall be mounted in the release mechanism enclosure for testing system operation. Activation of release mechanism shall release tension in the fire line, which, in turn, releases the winch break and the fire curtain to close in the normal manner. The release unit shall incorporate three pulleys to permit its attachment to the fireline at any point and to help prevent accidental release.
 - b. The release shall contain an integral battery and charger to provide emergency power during power interruptions. The release shall operate from a 120 VAC power source.
 - c. The electrical fire line release shall be UL Listed.

2.07 SCENE SHOP BATTEN

- A. Provide rigging system for the hoisting of battens. Unit shall have a hoisting capacity of 2000#, plus factors of safety as specified herein.
 - 1. Battens will be motorized winch operated with wire guide tracked clue.

2. Coordinate with building steel for proper installation.
- B. Batten
 1. battens shall be as specified above for Counterweight Sets
 - a. except shall only be a single pipe batten.
- C. Guided Clew:
 1. The guided clew shall be a 1/4" thick steel plate with holes for the number of cables in the system and one drive line. Two guide spools shall be provided for 1/4" diameter guide cables.
 2. The guided clew shall have a recommended working load of at least 1,500 lbs.
- D. Loft blocks and head blocks shall be as specified above.
 1. Batten terminations shall be as specified above.
 2. Except provide batten trim clamp:
 - a. JR Clancy 026-23x1.5 or equal.
- E. Motorized winch
 1. Per hoist standard specifications above.
 2. Up / Down pushbutton station.
 3. 2000 lb. lifting capacity; 20 fpm lifting speed.
 4. Gearbox with 2 hp electric motor.
 5. Integrated brake motor for reliability.
 6. Direct acting brake is spring applied and electrically released.
 7. Provide hard physically actuated wall mounted limit switches for end of travel and overtravel.
 8. Two 5/16" diameter drive lines
 9. "Push to run" control stations require that a user be at the control station for the hoist to operate.
 10. Key operated switch
 11. D:d ratio of 18:1.
 12. Pushbutton control station with key switch.
 13. Operates on 208 VAC 3 phase.
 14. Provide
 - a. JR Clancy Stagehand plus utility hoist
 - b. Provide Columbus Mckinnon Corporation Entertainment Technology SW-E Meteor winch
 - c. or equal.

2.08 FRONT OF HOUSE LIGHTING BATTEN

- A. Line Shaft batten Winch:
 1. The winch shall consist of a gearmotor assembly, a drum for each lift line, and interconnecting shafts. The gearmotor assembly shall include an electric released brake.
 2. The winch shall have a lifting capacity of 2500 lbs.
 3. Shall operate at a rate of 25 feet per minute.
 4. Layout of drums shall avoid existing catwalk wall braces.
- B. Double pipe batten
 1. Shall be same as specified above for Counterweight Sets
- C. Gearmotor:
 1. Per standard specification see above.
- D. Drums:
 1. Per standard specification.
 2. Alternate drums shall be threaded in opposite directions, to keep the batten from "walking" as its elevation changes.
 3. Drums shall be interconnected by shafts with universal joints at each end.

- E. Shafts:
 - 1. Per standard specification.
- F. Rotary Limit Switches:
 - 1. Rotary limit switch assemblies shall have two or four independently adjustable switch/cam sets as required. Cams shall be driven by a geared assembly.
 - 2. Switches shall have snap acting contacts.
 - 3. Rotary limit switches shall be driven directly or by roller chains. If roller chains are used, sprockets shall be pinned to prevent slipping and sized for maximum usable rotation of switch cams. The input shaft and drive chain shall be fully guarded.
 - 4. Switches shall be mounted to the winch base to allow for easy adjustment of the switch settings.
- G. Direct Struck Limit Switch:
 - 1. A hard limit switch shall be the ultimate indicator of curtain upward overtravel to prevent damage. A hard limit switch shall be mounted above the batten to one of the catwalk braces so that the limit switch can engage the top of the batten before hitting the catwalk braces.
 - 2. Limit switch shall be per standard specification.
 - 3. In the event an overtravel limit is engaged, the appropriate "primary limit failure" fault indicator shall illuminate.
- H. Motor Controllers:
 - 1. For fire and electrical safety, motor controllers shall conform to the CEC (NFPA 70), be built in accordance with UL Standard 508, and be "touch safe" per IEC 204-1 "Protection against direct contact" rules.
 - 2. Controllers shall be wired so that operation of the normal end of travel limit switches shall only allow movement away from the limit switch.
 - 3. The controller shall be sized to match the winch motor horsepower. Overload and overcurrent protection shall conform to UL and CEC requirements.
 - 4. Controllers shall be wired so that operation of the normal end of travel limit switches shall only allow movement away from the limit switch.
 - 5. Controllers shall provide under voltage, over voltage, instantaneous over current, overload, and phase loss protection.
- I. Control Station:
 - 1. Control station shall be mounted in the stage left production control rack, and contain hold to operate (dead man) Up and Down pushbuttons for each hoist. A key operated On / Off switch shall be provided.
 - 2. A red, mushroom head emergency stop pushbutton shall be provided, which will disconnect power to the hoist through a circuit meeting NFPA-79 requirements.
 - 3. A "Service" indicator shall be provided to alert the user when regular system service is required.
 - 4. LED lights to indicate limit switch activation.
 - 5. LED lights to indicate at set limit location.
 - 6. Panel components (pushbuttons, key switches, switches, indicators, E-stop switches, and the like) shall be industrial grade units.
- J. Position Control:
 - 1. The user shall be able to set four preset stop positions. The hoist shall stop at each preset position, and an "At Target" indicator will illuminate. Releasing and pressing the Up or Down button again will move the load to the next preset position.
 - 2. Presets positions are set by the user, by moving the load to the desired position, and performing a simple control sequence.
 - 3. The system shall provide reliable, accurate positioning within 1/16" of the target position.
 - 4. A solid state position encoder shall be provided.

- K. Emergency Stop System:
1. Provide local Emergency Stops at each hoist location on the stage level locking rail.
 2. The emergency stop system shall meet NFPA-79 (Electrical Standards for Industrial Machinery) and directly remove power by means of electromechanical components, using a UL580E Type 2, non-welding, positive break contactors
 3. The emergency stop circuit shall be a normally closed circuit or a supervised circuit that provides the same or greater level of reliability and security. Its operations shall not depend on software or semiconductors.
 4. Resetting the emergency stop circuit shall not initiate motion.
- L. Multicable management
1. The assembly shall consist of an extruded aluminum wireway: in a "pantograph" configuration that shall manage cables plumb at any batten trim. Systems and installations that allow cables to sway out of alignment with the battens shall be unacceptable.
 2. 3" wide by 1.5" high in cross section containing two cable compartments.
 3. The length of each section to be specified based on the distance between rigging pickup cables and maximum actual travel.
 4. Multi-cable management shall raise and lower the enclosed electrical cable as it travels with the batten, and shall provide a permanent electrical connection for the lighting system circuits.
 5. Install between rigging lift lines and in such a way as to prevent electrical cables from fouling with other hoisting components of mechanism.
 6. Unit housing shall have an electrostatic paint finish in black that is inherently rustproof.
 7. Aluminum wireway shall have a uniform minimum wall thickness of .094.
 8. Festoon cable shall be sized per the applicable sections of CEC with neoprene covered, black, heavy duty SO, SOW or better, provided in the specified number of conductors.
 9. Units shall contain electrically insulated, adjustable pressure pad strain relief devices to hold all cable securely in place.
 10. Unit shall be provide with two pipe clamp mounting devise for attachment to 1-1/2" pipe (1.9" O.D.) batten.
 11. Each hinge section to be provided with a pair of 7 gauge hinge arms and grade 8 attachment hardware.
 12. Unistrut P1001 horizontal stabilization track to be supplied in the specified length.
 13. Trolleys and mounting brackets shall be provided with unit to manage excess cable and shall to attach extruded aluminum wireway to unistrut as required.
 14. End stop plates to be provided to prevent the trolley from exiting the track.
 15. Unit shall provide required circuits and production lighting data cables shown on PL Drawings run from ceiling to batten

2.09 MOTORIZED COUNTERWEIGHT ASSIST HOISTS

- A. For sets designated on drawings, provide each with a counterweight arbor with motor assist.
1. The system shall be able to provide reliable, accurate positioning. The winch shall be of a compact design with all required components integrated into its structure, mounted as shown on drawings.
 2. Each winch assembly shall be less than 12" wide.
 3. The winch and arbor engagement will handle an out of balance load equal to 1,000 lbs.
- B. Winches shall operate with the following characteristics:
1. Fixed batten speed of 25 feet per minute
- C. Motor, Gearbox and Brake
1. Per standard specification listed in above.
- D. Drive Medium
1. The drive medium shall allow the use of a standard head block without modification and shall be positively driven in a manner that will allow repeatable positioning.

2. The drive medium shall have a minimum design factor of 10:1.
- E. Limit Switches
 1. All winches shall have positively driven mechanical limit switches for normal end of travel indication. These switches shall signal the reversing contactors.
- F. Positively driven mechanical limit switches shall be provided for overtravel indication. Actuation of an overtravel limit switch shall use a separate, redundant circuit than the normal end of travel switches, and positively disconnect power from the winch, per NFPA 79, using a UL580E Type 2, non-welding, positive break contactor.
- G. Motor Controllers:
 1. For fire and electrical safety, motor controllers shall conform to the CEC (NFPA 70), be built in accordance with UL Standard 508, and be "touch safe" per IEC 204-1 "Protection against direct contact" rules.
 2. Controllers shall be wired so that operation of the normal end of travel limit switches shall only allow movement away from the limit switch.
 3. The controller shall be sized to match the winch motor horsepower. Overload and overcurrent protection shall conform to UL and CEC requirements.
 4. Controllers shall be wired so that operation of the normal end of travel limit switches shall only allow movement away from the limit switch.
 5. Controllers shall provide under voltage, over voltage, instantaneous over current, overload, and phase loss protection.
- H. Control Station:
 1. Control stations shall be contained in the hoist assembly, and contain hold to operate (dead man) Up and Down pushbuttons for each hoist. A key operated On / Off switch shall be provided.
 2. A red, mushroom head emergency stop pushbutton shall be provided, which will disconnect power to the hoist through a circuit meeting NFPA-79 requirements.
 3. A "Service" indicator shall be provided to alert the user when regular system service is required.
 4. Panel components (pushbuttons, key switches, switches, indicators, E-stop switches, and the like) shall be industrial grade units.
- I. Position Control:
 1. The user shall be able to set four preset stop positions. The hoist shall stop at each preset position, and an "At Target" indicator will illuminate. Releasing and pressing the Up or Down button again will move the load to the next preset position.
 2. Presets positions are set by the user, by moving the load to the desired position, and performing a simple control sequence.
 3. The system shall provide reliable, accurate positioning within 1/16" of the target position.
 4. A solid state position encoder shall be provided.
- J. Emergency Stop System:
 1. Provide local Emergency Stops at each hoist location on the stage level locking rail.
 2. The emergency stop system shall meet NFPA-79 (Electrical Standards for Industrial Machinery) and directly remove power by means of electromechanical components, using a UL580E Type 2, non-welding, positive break contactors
 3. The emergency stop circuit shall be a normally closed circuit or a supervised circuit that provides the same or greater level of reliability and security. Its operations shall not depend on software or semiconductors.
 4. Resetting the emergency stop circuit shall not initiate motion.

2.10 MISCELLANEOUS RIGGING EQUIPMENT

- A. Proscenium Safety Rope tie-off
 1. Provide proscenium safety rope tie off points as either side of the proscenium.
 2. Assembly shall be designed to withstand a horizontal load of 1000# applied to safety rope.

3. Rope shall thread through eyes at smoke pocket as shown on drawings.
4. Provide safety rope
 - a. Safety rope shall be 1/2" synthetic rope capable of withstanding the forces listed above.
 - b. Rope shall be free of splintering fibers
 - c. Rope shall be white with 18" orange cloth ribbons tied and woven at 10'-0" centers.
5. Signage
 - a. Provide advisory signs Tie-off points, located as shown on drawing.
 - b. Sign shall include text as shown on drawings.
 - c. Signs shall meet ANSI Z535 standard for warning signs
- B. Belaying Pins
 1. Belaying pins shall be machine turned hardwood, hickory or similar, 21" long by 1-5/32" in diameter with a shoulder and handgrip at the top.
 2. Quantity: (60)
- C. Signage:
 1. Provide four (4) manufactured "SAFETY FIRST" signs with 3" high characters minimum to be posted where instructed by the District's Representative.
 2. Provide 1 sign at rigging gallery level locking rail, as shown on drawings. This sign shall obstruct operation from this location and shall act as a guardrail compliant with applicable codes.
 - a. The sign shall mount by use of two vertical stanchions sized to fit within the belaying pin holes in the locking rail. Top height shall be set by stop collars on the vertical stanchions. stanchions shall be threaded on the bottom and sign shall be secured by nuts on the bottom threads.

2.11 DRAPERY TRACK

- A. Drapery Track
 1. Provide heavy duty stage traveler curtain tracks in locations as shown on drawings, complete with all necessary accessories.
 2. Maximize height of acoustic tracks so top of tracks clear under obstructions by maximum 1/2".
 3. Horizontally brace the acoustic tracks in the catwalks to catwalk structure.
 4. Provide strong back for acoustic drapery track to span building support locations.
 5. Track shall be of 14 gauge galvanized steel construction. Each section of track less than 20 feet shall be in one continuous piece. Splice clamps shall be permitted for section lengths over 20 feet.
 6. Track shall have sufficient capacity to carry maximum loaded carrier at minimum spacing.
 7. All non-moving/movement bearing parts shall be finished flat black.
 8. Carriers:
 - a. Carriers shall be constructed of nylon, supported from two heavy-duty neoprene or urethane tired wheels riveted to steel body with shielded ball bearings. Each carrier shall be equipped with a free-moving swivel and sufficient trim chain to accommodate a curtain.
 - b. Each carrier shall have rear fold back-pack tabs and rubber washers shall be provided between each back-pack tab and carrier.
 - c. Provide one carrier for each 12" of track, plus spares.
 - d. Provide master carriers at the leading and training edge of each stage drapes.
 - e. The master carrier block shall be constructed of plated steel having two cable clips to clamp the cord to the carrier. Four wheels in pairs identical to the single carrier above shall support the block.
 - f. Carriers shall have 25# capacity.
 9. Live and dead end pulleys shall 6" diameter, equipped with sealed precision ball bearings on adequately guarded plated steel housings. Provide end stops at each track end.

10. Provide with 6" diameter adjustable, demountable floor pulley.
 - a. Fastening to stage floor with threaded inserts and wing bolts for quick removal.
 - b. Main drape shall be supplied with sand bag type.
 - c. In the catwalks fasten to lower railing horizontal with angle plate, bolts, and U-bolts.
11. Stretch-resistant, cable center operating cord shall be 1/2" in diameter.
12. Track shall be rigged for bi-parting operation with a 48" center overlap. Hanging clamps will be provided for suspension at five foot maximum intervals.
13. Provide track stops as indicated on the drawings
14. Traveler Tracks shall be:
 - a. H&H 400 Series for straight tracks
 - b. H&H 500 Series for curved tracks
 - c. H&H 300 Series for black box drapery track
 - d. Or equal

2.12 ACOUSTIC DRAPERIES

- A. Fabric:
 1. Fabric shall be as specified below. Weight and color per drape schedule.
 - a. "Black" shall be black.
 2. Flame Retardancy: Fabrics must comply with flame retardancy according to the requirements of the National Fire Protection Association's NFPA #701.
- B. Fullness shall be as shown on drapery schedule.
 1. Pleats: Pleats for draperies specified with fullness shall be box sewn on 12" centers.
- C. Seams: Seams between strips shall be single stitched without puckers using thread of matching color. Drapes shall be sewn so pile runs in the same direction. Seams shall be arranged to be concealed by Pleats.
- D. Top Finish: 3-1/2" black nylon webbing shall be double stitched to the top of the curtain with 1" of face fabric turned under the webbing.
 1. Brass rustproof grommets shall be inserted in pleat centers or on 12" centers on flat curtains. Grommets shall be used as follows: #4 grommets - lined velour, heavy weight fabrics. Grommets shall be black.
 - a. All drapes shall have two grommets in top corners and spacing shall coordinate with master carrier chains.
 2. Track Mounted curtains shall be supplied with black powder coated carabineers at all grommets to attachment to carrier chain.
 3. Provide a 12" square of face and lining fabric to the rear of a top offstage corner of each panel. This panel shall be available as a cutaway sample for testing of flame retardant characteristics over time.
- E. Manufacturer's contact information, flame certifications, material and drape dimensions shall appear on a label sewn to the rear of a bottom offstage corner of each panel. Label shall be black with white lettering.
- F. Drapes shall be provided in sizes and quantities as noted on the drape schedule. Verify in field, maximize height.
- G. Fabric
 1. Inherently flame retardant polyester.
 2. Colors, fabric type and weight shall be as noted on the drape schedule.
 3. Acceptable fabrics:
 4. KM Fabrics "Prestige" 26oz. per bolt yard IFR Velour as noted on drapery schedule
- H. Sewing
 1. Nap shall be sewn up, unless otherwise noted on schedule.
 - 2.

3. Bottom Hems:
 - a. All full height curtains shall have 6" bottom hems complete with separate interior chain pockets filled with #8 plated jack chain. Chain pockets shall be stitched so that the chain will ride 2" above the finished bottom edge of the curtain.
 4. Side Hems:
 - a. Side hems shall be 2". Raw edge of fabric shall be turned under the 2" side hem.
- I. Acoustic Drapery Schedule:

DESCRIPTION	PANELS	FINISHED DRAPE WIDTH	FINISHED DRAPE HEIGHT	SEWN IN FULLNESS	DRAPE WEIGHT BOLT YARD	COLOR	BI-PART	NOTES
VA - 1A&1B	2	28'-0"	6'-0"	100%	26oz	Black	yes	Velour side toward audience
VA - 2A & 2B	2	30'-0"	5'-0"	100%	26oz	Black	yes	Velour side toward audience
VA - 3	1	20'-0"	13'-0"	100%	26oz	Black	no	
VA - 4	1	36'-0"	7'-0"	100%	26oz	Black	no	

2.13 STAGE EXTENSION AND SEATING PLATFORMS

- A. Platform decking
 1. Deck shall be portable and provide a stable surface when used under the audience seating and as a stage extension in both configurations as shown on the drawings. The platforms shall be equal length
 2. Deck shall be a laminate of high-strength outer layers bonded to a honeycomb core for rigidity and light weight. Deck shall be a 3.2"-thick laminated composite constructed of phenolic-treated cellulose honeycomb between solid-core fir plywood. Deck edges shall be closed with a 6005-T5 aluminum extrusion that is anodized black. Corner reinforcement shall be made of high-impact, injection-molded polycarbonate.
 3. Performance: Certified, uniformly distributed live-load capacity of 4800 pounds per 4' x 8' section (150 pounds per sq. foot) to meet 2013 CBC code.
 4. Deck shall attach by molded corner receptacles to scaffold supports without tools, clamps or clips.
 5. Decks shall be double sided honeycomb decks with 1/4" replaceable double tempered hardboard.
 6. Maximum weight of one platform shall be less than 63 lbs
 7. Provide FSR-500 solid BLK floor hatch covers as shown on the drawings.
- B. Hard closure Fascia construction
 1. Provide 1/8" thick aluminum, closure panels at the stage side of the audience mid riser platform
 2. Fascia panels shall have z-clips to adjacent panels to maintain alignment.
 3. Fascia panels shall be designed to remove in sections. Each section shall match the length of its associated platform.
 4. Finish fascia panels on all sides with black powder coat.
- C. Drapery
 1. Provide drapery at stage extension front full height to mask front of platform and all understructure from the audience. Drapery shall clip to platform face.
 2. Provide drapery at the front of the understage lip railing. Velcro drapery to the top of the railing.
 3. Fabric shall be black 26oz velour IFR.
 4. Fabric shall be sew with 100% fullness.
- D. Platform support Framing
 1. Audience support system shall be easy to set up and store and shall provide a stable, robust understructure.
 2. Supports shall store compactly and shall be unitized. Individual legs or braces shall not be acceptable.
 3. Support system shall be assembled without tools by as few as two people.

4. Conical nodes shall guide the corner of one, two, three or four deck(s) into location and proper alignment on a single support column. Without tools, clamps or separate processes, decks shall fasten in place and stage support frames shall interlock with clamps that link the adjacent support frames.
 5. Fixed stage deck height shall match height as shown on drawings. Legs shall be capable of 2-1/2" of leveling adjustment. Each screw foot shaft shall have a diameter of no less than 3/4" and have zinc-plated Acme threads. The bottom of the foot shall be molded urethane.
 6. Certified, uniformly distributed live-load capacity of 4800 pounds per 4' x 8' section.
 7. Provide in quantity and configuration as shown on drawings.
 8. Platform frame shall match deck manufacturer listed above.
 9. Support legs shall extend or telescope to change between two riser heights without the use of tools.
- E. Stage facing Railings
1. Provide railings under the stage lip when in audience seating mode.
 2. Railings shall be black finished 1-1/4" dia aluminum tube
 3. Railing shall have a quick clamp cam lock system that clamps onto the top and bottom of the platform.
 4. Railing shall have 4" kick plate and mid and top railing.
 5. Railings shall be code compliant 2013 CBC.
- F. Audience aisle railing
1. Provide audience aisle railing on top of platforms
 2. Railings shall be black finished 1-1/4" dia aluminum tube
 3. Railing shall socket into the tops of the platforms
 4. Provide flush cover for when platforms are in stage mode
 5. Railings shall be code compliant 2013 CBC
- G. Step Lighting
1. Provide LED step lights at audience seating level changes
 2. Step lights shall full louvers to keep all light off the stage during backouts.
 3. Provide two transformers one for each row.
 4. Provide all wire and extension cords to plug into outlets in the pit.
- H. System shall be manufactured by StageRight
- a. No known equal

PART 3 - EXECUTION

3.01 PERFORMANCE OF THE WORK

- A. The Rigging Contractor shall be responsible for storage of stage equipment, tools, and equipment during the period of the installation.
- B. Extent: All specified equipment shall be installed by fully trained superintendents and workmen. Equipment shall be installed in a workman like manner, per plans and specifications. Equipment shall be aligned, adjusted, and trimmed for the most efficient operation, the greatest safety and for the best visual appearance.
- C. Standards: Installation practices shall be in accordance with OSHA Safety and Health Standards and all local codes. All welding must be performed in full compliance with the latest edition of the Structural Welding Code (ANSI/AWS D1.1).
- D. Alignment: Mule blocks, cable rollers and guides shall be installed using a precision laser, as required, to provide proper alignment, to maintain minimum fleet angles, and to prevent contact with other surfaces. There shall be no fleet angle where possible, but if required fleet angle shall be no greater than 1½°.

- E. Fabricate metal work in accordance with standards of first class workmanship with ornamental work free of blemishes like tool marks, burrs, scars and abrasions. All edges shall be smooth. All points, welds and intersections shall be properly made and fitted to provide a uniform finish.
- F. All connection points shall be welded and ground smooth.
- G. Provide slotted holes, as needed, in steel members which require accurate alignment.
- H. Fit abutting surfaces closely.
- I. Accurately align and adjust various frame members before final anchoring.
- J. Erect metal work level, plumb, square and in proper alignment with adjacent work. Deformed components shall be remedied.
- K. Attachments: All equipment shall be securely attached to the building structure.
- L. Finishes:
 - 1. All welds must be touched up to match disturbed finishes.
 - 2. All finishes which are disturbed during shipping and installation shall be touched up to match the original.

3.02 CLEAN UP

- A. The Contractor shall be responsible for clean up, including removal of packing materials etc. and the protection of surfaces or equipment provided by other contractors.

3.03 INSPECTION AND TESTING

- A. Upon completion of the installation, and after allowing the draperies to hang out for 2 weeks minimum, the Contractor shall notify the District's Representative that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the District's Representative's schedule.
 - 1. The Contractor shall be liable for any return visits by the specialty sub-contractor, factory engineer or District's Representative as a result of incomplete or incorrect installation, or erroneous representation that the Systems are complete and ready for the related Contractor or District's Representative to carry out their work.
- B. During the periods where movable systems are operated, the Theatre shall be quiet.
- C. Inspection shall include, but shall not be limited to:
- D. In preparation for inspection by the District's Representative:
 - 1. All linesets shall be balanced to pipe weight at mid travel, and drapery or Orchestra Enclosure loads if present at the time of inspection.
 - 2. All sets flown out to high trim.
 - 3. Rigging system components cleared of dust and debris.
- E. Make available for review by the District's Representative:
 - 1. Access to all components for physical inspection.
 - 2. All systems shall be complete, and will be operated by the District's Representative for approval.
 - 3. Spare parts inventory.

3.04 TRAINING

- A. Upon final approval of the system by the District's Representative, representatives from the Rigging Specialty Sub-Contractor shall provide instruct designated District staff or representatives in the safe use and maintenance of all systems specified herein.
- B. Schedule training sessions shall be scheduled in advance to the District staff or representatives' schedules.
- C. Provide 6 hours of training. Training shall be in two sessions a minimum of 1 week apart.

- D. Training shall include, but not be limited to:
1. An overview of the systems and all of its components.
 2. Proper and safe operations of all rigging systems including use of counterweight, operation of rigging battens, loading and un-loading of counterweight, safe and proper use of capstan winch, adjustment of lower tension block,
 3. Care and maintenance of rigging systems.
 4. Care and maintenance of drapes including proper folding and storage
 5. Basic system visual inspections

END OF SECTION

SECTION 12 3600
COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Countertops for architectural cabinet work.
- B. Wall-hung counters and vanity tops.

1.02 RELATED REQUIREMENTS

- A. Section 06 4100 - Architectural Wood Casework.
- B. Section 22 0500 - Plumbing and Utilities: Sinks.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- C. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; International Surface Fabricators Association; 2013.
- D. ISFA 3-01 - Classification and Standards for Solid Surfacing Material; International Surface Fabricators Association; 2013.
- E. MIA (DSDM) - Dimensional Stone Design Manual; VII, 2007.
- F. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- G. PS 1 - Structural Plywood; 2009.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.
- D. Verification Samples: For each finish product specified, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
- E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Same fabricator as for cabinets on which tops are to be installed.
- B. Installer Qualifications: Fabricator.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOP ASSEMBLIES

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS).
- B. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
 - 1. Flat Sheet Thickness: [5/8] inch, minimum.
 - 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISSFA-2 and NEMA LD 3; acrylic resin, mineral filler, soft alloy aluminum scrap fillers and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
 - a. Surface Burning Characteristics: Flame spread 25, maximum; smoke developed 450, maximum; when tested in accordance with ASTM E84.
 - b. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
 - c. Color and Pattern: As indicated on drawings.
 - d. Manufacturers:
 - 1) Dupont: www.corian.com.
 - 2) Formica Corporation: www.formica.com.
 - 3) Avonite Surfaces : www.avonitesurfaces.com.
 - 4) Substitutions: See Section 01 6000 - Product Requirements.
 - 3. Other Components Thickness: 1/2 inch (12 mm), minimum.
 - 4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch (32 mm) thick; square edge .
 - 5. Back and End Splashes: Same sheet material, square top; minimum 4 inches (102 mm) high.
- C. Natural Quartz and Resin Composite Countertops: Sheet or slab of natural quartz and plastic resin over continuous substrate.
 - 1. Flat Sheet Thickness: 1-1/4 inch (32 mm), minimum.
 - 2. Natural Quartz and Resin Composite Sheets, Slabs and Castings: Complying with ISFA 3-01 and NEMA LD 3; orthophthalic polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
 - a. Factory fabricate components to the greatest extent practical in sizes and shapes indicated; comply with the MIA Dimension Stone Design Manual.
 - b. Finish on Exposed Surfaces: Polished.
 - c. Color and Pattern: As indicated on drawings.
 - 3. Other Components Thickness: 3/4 inch (19 mm), minimum.
 - 4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch (32 mm) thick; square edge; use marine edge at sinks.
 - 5. Back and End Splashes: Same sheet material, square top; minimum 4 inches (102 mm) high.

2.02 ACCESSORY MATERIALS

- A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch (19 mm) thick; join lengths using metal splines.
- B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- C. Joint Sealant: Mildew-resistant silicone sealant, white.

2.03 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
 - 1. Join lengths of tops using best method recommended by manufacturer.
 - 2. Fabricate to overhang fronts and ends of cabinets 1 inch (25 mm) except where top butts against cabinet or wall.

3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
 2. Height: 4 inches (102 mm), unless otherwise indicated.
- C. Solid Surfacing: Fabricate tops up to 144 inches (3657 mm) long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
- D. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet (3 mm in 3 m), maximum.
- B. Offset From Wall, Countertops: 1/8 inch (3 mm) maximum; 1/16 inch (1.5 mm) minimum.
- C. Field Joints: 1/8 inch (3 mm) wide, maximum.

3.05 CLEANING

- A. Clean countertops surfaces thoroughly.

3.06 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 12 9300
SITE FURNISHINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Benches.
- B. Waste receptacles.
- C. Ash receptacles.
- D. Bicycle racks
- E. Bicycle lockers

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Bollard infill and underground encasement.

1.03 REFERENCE STANDARDS

- A. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984 (Reapproved 2009).

1.04 SUBMITTALS

- A. See Section 01 33 00 - Submittals, for submittal procedures.
- B. Product Data: Provide manufacturer's specifications and descriptive literature, installation instructions, and maintenance information.
- C. Samples: Submit two sets of manufacturer's available colors for metal furnishings.

1.05 WARRANTY

- A. See Section 01 60 00 - Product Requirements, for additional warranty requirements.
- B. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- C. Provide manufacturer's warranty against defects in materials or workmanship for ductile iron castings for a period of 10 years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Furnishings:
 - 1. Forms + Surfaces; www.forms-surfaces.com.
 - 2. Landscape Forms; www.landscapeforms.com
 - 3. Keystone Ridge Designs; www.keystoneridgedesigns.com
 - 4. Maglin; www.maglin.com
 - 5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 METAL FURNISHINGS

- A. Metal Furnishings, General:
 - 1. Cast iron components: Ductile iron castings complying with ASTM A536; cleaned, treated, and powder-coated.
 - a. Color: As selected by Architect from manufacturer's standard range.
 - 2. Hardware: Stainless steel.
- B. Benches: Metal frame and seat section with back.
 - 1. Frame: Steel.
 - 2. Seat: Wood slat.
 - 3. Mounting: Surface.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that mounting surfaces, preinstalled anchor bolts, or other mounting devices are properly installed; and ready to receive site furnishing items.

3.02 INSTALLATION

- A. Install site furnishings in accordance with approved shop drawings, and manufacturer's installation instructions.
- B. Provide level mounting surfaces for site furnishing items.

END OF SECTION

SECTION 14 2010
PASSENGER ELEVATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Complete elevator systems.
- B. Elevator maintenance.

1.02 RELATED REQUIREMENTS

- A. Section 01 5000 - Temporary Facilities and Controls: Temporary power supply.
- B. Section 03 3000 - Cast-in-Place Concrete: Includes elevator machine foundation.
- C. Section 05 1200 - Structural Steel Framing: Includes hoistway framing.
- D. Section 05 5000 - Metal Fabrications: Includes pit ladder, sill supports, divider beams, and overhead hoist beams.
- E. Section 07 1400 - Fluid Applied Waterproofing: Waterproofing of elevator pit walls and floor.
- F. Section 09 2116 - Gypsum Board Assemblies: Gypsum shaft walls.
- G. Section 22 0500 - Plumbing and Utilities
- H. Section 22 1313 - Automatic Fire Protection System
- I. Section 26 6113 - Fire Alarm System
- J. Section 31 0000 - Earthwork and Grading

1.03 REFERENCE STANDARDS

- A. AISC 360 - Specification for Structural Steel Buildings; American Institute of Steel Construction, Inc.; 2010.
- B. ASME A17.1 - Safety Code for Elevators and Escalators; The American Society of Mechanical Engineers; 2007.
- C. ASME A17.2 - Guide for Inspection of Elevators, Escalators, and Moving Walks; The American Society of Mechanical Engineers; 2012.
- D. ASME/ANSI A17.7, Safety Code for Elevators and Escalators.
- E. CEC - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.
- G. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.
- H. ASNI/UL 10B, Fire Tests of Door Assemblies.
- I. CBC 2013, and local building codes.
- J. All other local applicable codes.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a meeting one week prior to starting work.
 - 1. Review schedule of installation, installation procedures and conditions, and coordination with related work.
- B. Construction Use of Elevator: Not permitted.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate the following information:

1. Locations of Machine Room Equipment: Driving machines, controllers, governors and other components.
 2. Hoistway Components: Car, counterweight, sheaves, machine and sheave beams, guide rails, buffers, ropes, and other components.
 3. Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.
 4. Individual weight of principal components; load reaction at points of support.
 5. Loads on hoisting beams and location of trolley beams.
 6. Clearances and over-travel of car and counterweight.
 7. Locations in hoistway and machine room of traveling cables and connections for car light.
 8. Location and sizes of access doors, doors, and frames.
 9. Expected heat dissipation of elevator equipment in machine room.
 10. Applicable seismic design data; certified by a licensed Professional Structural Engineer.
 11. Electrical characteristics and connection requirements.
 12. Show arrangement of equipment in machine room so rotating elements, sheaves, and other equipment can be removed for repairs or replaced without disturbing other components. Arrange equipment for clear passage through access door.
- C. Product Data: Provide data on the following items:
1. Signal and operating fixtures, operating panels, indicators.
 2. Cab design, dimensions, layout, and components.
 3. Cab and hoistway door and frame details.
 4. Electrical characteristics and connection requirements.
 5. Expected heat dissipation of elevator equipment in hoistway (BTU).
 6. Color selection chart for Cab and Entrances.
- D. Samples: Submit three samples, 12 x 12 inch (305 x 305 mm) in size illustrating cab floor material.
- E. Operations and Maintenance Manuals: Provide manufacturer's standard operations and maintenance manual.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with applicable code and as supplemented in this section.
- B. Designer Qualifications: Design guide rails, brackets, anchors, and machine anchors under direct supervision of a Professional Structural Engineer experienced in design of work of this type and licensed in the State in which the Project is located.
- C. Perform structural steel design, fabrication, and installation in accordance with AISC 360, Specification for Structural Steel Buildings. Perform seismic design in accordance with applicable code.
- D. Fabricate and install door and frame assemblies in accordance with NFPA 80.
- E. Perform electrical work in accordance with CEC.
- F. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum ten years documented experience.
- G. Installer Qualifications: Company specializing in performing the work of this section and approved by elevator equipment manufacturer.
- H. Products Requiring Fire Resistance Rating: Listed and classified by UL.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide one year minimum manufacturer warranty for elevator operating equipment and devices.
- C. This Section specifies hydraulic elevators.
- D. Work Required:

1. The work required under this section consists of all labor, materials and services required for the complete installation (including operational verification) of all the equipment required for the elevator as herein specified.
2. All work shall be performed in a first class, safe and workmanlike manner.
3. In all cases where a device or part of the equipment is herein referred to in the singular, it is intended that such reference shall apply to as many of such devices or parts as are required to make complete installation.

1.08 MAINTENANCE AND SERVICE

- A. Maintenance service consisting of regular examinations and adjustments of the elevator equipment shall be provided by the elevator contractor for a period of twelve (12) months after the elevator has been turned over for the customer's use. This service shall not be subcontracted but shall be performed by the elevator contractor. All work shall be performed by competent employees during regular working hours of regular working days. This service shall not cover adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents caused by persons other than the elevator contractor. Only genuine parts and supplies as used in the manufacture and installation of the original equipment shall be provided.
- B. The elevator control system must:
 1. Provide in the controller the necessary devices to run the elevator on inspection operation.
 2. Provide on top of the car the necessary devices to run the elevator in inspection operation.
 3. Provide in the controller an emergency stop switch. This emergency stop switch when opened disconnects power from the brake and prevents the motor from running.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Other Acceptable Manufacturers:
 1. ThyssenKrupp Elevator: www.thyssenkruppelevator.com.
 2. Otis Elevator Co; Product Hydro Fit 3500: www.otis.com. (Basis of design)
 3. Schindler Elevator Corp; Schindler 3300 Low-Rise MRL: www.us.schindler.com.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. All components to be manufactured by same entity, unless otherwise indicated.

2.02 DESIGN AND SPECIFICATIONS

- A. Provide holeless hydraulic elevators. The control system and car design based on materials and systems manufactured by Otis Elevator Company. Specifically, the system shall consist of the following components:
 1. The entire hydraulic system and the controller shall be located inside the hoistway. No extra machine room or control closet space is required.
 2. Sleep mode operation for LED ceiling lights and car fan.
 3. LED lighting standard in ceiling lights and elevator fixtures.

2.03 SYSTEM DESCRIPTION

- A. Equipment Description: Holeless Hydraulic elevator with Machine-Room Less application.
- B. Equipment Control: Elevonic Control System.
- C. Quantity of Elevators: 1
- D. Stops: 2
- E. Openings: Front
- F. Travel (maximum): 26'-6"
- G. Rated Capacity: 3500 lb.
- H. Rated Speed: 100 fpm
- I. Platform Size: 6'-6 3/4" W x 6'-1 1/8" D
- J. Clear Inside Dimensions: 6'-5 9/16" W x 5'-5 9/16" D

- K. Cab Height: 7'-9"
- L. Entrance Type and Width: Single-Slide Door 3'-0" (914mm)
- M. Entrance Height: 7'-0"
- N. Main Power Supply: 480 Volts, 3-Phase, 60Hz + or - 5% of normal, 3-Phase, with a separate equipment grounding conductor.
- O. Car Lighting Power Supply: 120 Volts, Single-Phase, 15 Amp, 60 Hz.
- P. Controller Location: Inside hoistway, accessible by a door in a side hoistway wall on the 1st or 2nd landing. (1st landing only if rear entrance.)
- Q. Stopping Accuracy: +/- 1/4" (6.4 mm) under any loading condition or direction of travel.
- R. Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the call shall park at the last landing served.
- S. Operating Features - Standard
 - 1. Full Collective Operation.
 - 2. Fan and Light Protection.
 - 3. Full Collective Operation.
 - 4. Firefighters' Service Phase I and Phase II.
 - 5. Top of Car Inspection.
 - 6. Relative System Response Dispatching.
- T. Door Control Features:
 - 1. Door control to open doors automatically when car arrives at a landing in response to a normal hall or car call.
 - 2. Elevator doors shall be provided with a reopening device that will stop and reopen the car door(s) and hoistway door(s) automatically should the door(s) become obstructed by an object or person. Door protection shall consist of a two dimensional, multi-beam array projecting across the car door opening.
 - 3. Door nudging operation to occur if doors are prevented from closing for an adjustable period of time.

2.04 EQUIPMENT: MACHINE COMPONENTS

- A. The hydraulic system shall be of compact design suitable for operation under the required pressure. The control valve shall control flow for up and down directions hydraulically and shall include an integral check valve. A control section including control solenoids shall direct the main valve and control: up and down starting, acceleration, transition from full speed to leveling speed, up and down stops, pressure relief and manual lowering. All of these functions shall be fully adjustable for maximum smoothness and to meet contract conditions. System to be provided with a low-pressure switch and a shut-off valve.
- B. A microprocessor-based controller shall be provided, including necessary starting switches together with all relays, switches, solid-state components and hardware required for operation, including door operation, as described herein. A three (3) phase overload device shall be provided to protect the motor against overloading. The controller shall be located together with the hydraulic system in the hoistway pit and be easily accessible for maintenance through the same access door that is also used for the hydraulic system.
- C. A manual lowering feature shall permit lowering the elevator at slow speed in the event of power failure or for adjusting purposes.
- D. Pressure Switch

2.05 EQUIPMENT: HOISTWAY COMPONENTS

- A. Plunger(s) and Cylinder(s): Each cylinder shall be constructed of steel pipe of sufficient thickness and suitable for the operation pressure. The top of each cylinder shall be equipped with a cylinder head with a drip ring to collect any oil seepage as well as an internal guide ring and self-adjusting packing. Each plunger shall be constructed of selected steel tubing or pipe of

proper diameter machined true and smooth with a fine polished finish. Each plunger shall be provided with a stop ring electrically welded to it to prevent the plunger from leaving the cylinder. Each plunger and cylinder shall be installed plumb and shall operate freely with minimum friction.

- B. Car Guide Rails: Tee-section steel rails with brackets and fasteners.
- C. Polyurethane type buffers shall be used.
- D. Wiring: Wiring for hoistway electrical devices included in scope of the elevator system, hall panels, pit emergency stop switch, and the traveling cable for the elevator car.
- E. Hoistway Entrances:
 - Frames: Entrance frames shall be of bolted construction for complete one-piece unit assembly. All frames shall be securely fastened to fixing angles mounted in the hoistway and shall be of UL fire rated steel.
 - 1. Sills shall be extruded aluminum.
 - 2. Doors: Entrance doors shall be of metal construction with vertical channel reinforcements.
 - 3. Fire Rating: Entrance and doors shall be UL fire rated for 1 hour.
 - 4. Entrance marking plates: Entrance jambs shall be marked with 4" x 4" (102 mm x 102 mm) plated having raised floor markings with Braille located adjacent to the floor marking. Marking plates shall be provided on both sides of the entrance.
 - 5. Sight Guards: Sight guards will be furnished with all doors painted to match with painted doors, painted black for stainless steel and gold satin doors.

2.06 EQUIPMENT: CAR COMPONENTS

- A. Cab: Steel Shell Cab with laminated vertical removable panels (DL14SMA).
- B. Car Front Finish: Satin Stainless Steel.
- C. Car Door Finish: Satin Stainless Steel.
- D. Ceiling Type: Flat steel ceiling , Brushed Steel Finish with 6 LED lights.
- E. Emergency Car Lighting: An emergency power unit employing a 6-volt sealed rechargeable battery and totally static circuits shall be provided to illuminate the elevator car in the event of building power failure.
- F. Fan: A one-speed 120 VAC fan will be mounted to the structural ceiling to facilitate in-car air circulation, meeting A17.1 code requirements. The fan shall be rubber mounted to prevent the transmission of structural vibration and will include a baffle to diffuse audible noise. A switch shall be provided in the car-operating panel to control the fan.
- G. Handrail: Handrails shall be provided on the side and rear walls of the car enclosure. Handrails shall be 1 1/2" diameter (38.1 mm) round bar handrail with a Brushed Steel Finish.
- H. Threshold: Extruded Aluminum Finish.
- I. Emergency Exit Contact: An electrical contact shall be provided on the car-top exit.
- J. Guides: Car roller type guides at the top and the bottom.
- K. Platform: Car platform shall be constructed of metal.
- L. Certificate frame: Provide a Certificate frame with a satin stainless steel finish.
- M. The LED ceiling lights and the fan should automatically shut off when the system is not in use and be powered back up after a passenger calls the elevator and pushes a hall button.

2.07 EQUIPMENT: SIGNAL DEVICES AND FIXTURES

- A. Car Operating Panel: A car operating panel shall be provided which contains all push buttons, key switches, and message indicators for elevator operation. The car operating panel shall have a satin stainless steel finish.
- B. A car operating panel shall be furnished. It shall contain a bank of round stainless steel, mechanical LED illuminated buttons. Flush mounted to the panel and marked to correspond to the landings served. All buttons to have raised numerals and Braille markings with Flat Raised Satin Stainless Steel button with blue LED illuminating halo.

- C. The car operating panel shall be equipped with the following features:
 - 1. Raised markings and Braille to the left hand side of each push-button.
 - 2. Car Position Indicator at the top of and integral to the car operating panel.
 - 3. Door open and door close buttons.
 - 4. Inspection key-switch.
 - 5. Elevator Data Plate marked with elevator capacity and car number.
 - 6. Help Button: The help button shall initiate two-way communication between the car and a location inside the building, switching over to another location if the call is unanswered, where personnel are available who can take the appropriate action. Visual indicators are provided for call initiation and call acknowledgement.
 - 7. Landing Passing Signal: A chime bell shall sound in the car to signal that the car is either stopping at or passing a floor served by the elevator.
 - 8. In car stop switch.
 - 9. Firefighter's Phase II Key-switch.
 - 10. Call Cancel Button.
- D. Car Position Indicator: A digital, LED car position indicator shall be integral to the car operating panel.
- E. Hall Fixtures: Hall fixtures shall be provided with necessary push buttons and key switches for elevator operation.
 - 1. Integral Hall fixtures shall feature round stainless steel, mechanical buttons marked to correspond to the landings. Hall fixtures to be located in the entrance frame face. Buttons shall be in vertically mounted fixture. Fixture shall be Satin Stainless Steel Finish.
- F. Car Lantern and Chime: A directional lantern visible from the corridor shall be provided in the car entrance. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel and a chime will sound.

2.08 EMERGENCY POWER

- A. Arrange elevator operation to operate under emergency power when normal power supply fails.
- B. Emergency Power Supply: Self-contained battery power.
- C. Provide operational control circuitry for adapting the change from normal to emergency power.
- D. Upon transfer to emergency power, advance to first level landing, stop car, open doors, disable operating circuits, and hold in standby condition.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that hoistway, pit, and machine room are ready for work of this section.
- C. Verify hoistway shaft and openings are of correct size and within tolerance.
- D. Verify location and size of machine foundation and position of machine foundation bolts.
- E. Verify that electrical power is available and of the correct characteristics.

3.02 PREPARATION

- A. Arrange for temporary electrical power for installation work and testing of elevator components.

3.03 INSTALLATION

- A. Install system components. Connect equipment to building utilities.
- B. Provide conduit, boxes, wiring, and accessories.
- C. Install hydraulic piping between cylinder and pump unit.
- D. Mount machines on vibration and acoustic isolators, on bed plate and concrete pad. Place on structural supports and bearing plates. Securely fasten to building supports. Prevent lateral displacement.

- E. Accommodate equipment in space indicated.
- F. Install guide rails using threaded bolts with metal shims and lock washers under nuts. Compensate for expansion and contraction movement of guide rails.
- G. Accurately machine and align guide rails. Form smooth joints with machined splice plates.
- H. Coordinate installation of hoistway wall construction.
- I. Install hoistway door sills, frames, and headers in hoistway walls. Grout sills in place. Set entrances in vertical alignment with car openings and aligned with plumb hoistway lines.
- J. Structural Metal Surfaces: Clean surfaces of rust, oil or grease; wipe clean with solvent; prime two coats.
- K. Machine Room Components: Clean and degrease; prime one coat, finish with one coat of enamel.
- L. Adjust equipment for smooth and quiet operation.

3.04 ERECTION TOLERANCES

- A. Guide Rail Alignment: Plumb and parallel to each other in accordance with ASME A17.1 .
- B. Cab Movement on Aligned Guide Rails: Smooth movement, with no objectionable lateral or oscillating movement or vibration.

3.05 FIELD QUALITY CONTROL

- A. Testing and inspection by regulatory agencies will be performed at their discretion.
 - 1. Schedule tests with agencies and notify Owner and Architect.
 - 2. Obtain permits required to perform tests.
 - 3. Document regulatory agency tests and inspections in accordance with the requirements of Section 01 4000.
 - 4. Perform tests required by regulatory agencies.
 - 5. Furnish test and approval certificates issued by authorities having jurisdiction.

3.06 ADJUSTING

- A. Adjust for smooth acceleration and deceleration of car so not to cause passenger discomfort.
- B. Adjust automatic floor leveling feature at each floor to achieve 1/4 inch (6 mm) from flush.

3.07 CLEANING

- A. Remove protective coverings from finished surfaces.
- B. Clean surfaces and components ready for inspection.

3.08 PROTECTION

- A. Do not permit construction traffic within cab after cleaning.
- B. Protect installed products until project completion.
- C. Touch-up, repair, or replace damaged products before Date of Substantial Completion.

3.09 MAINTENANCE

- A. See Section 01 7000 - Execution Requirements, for additional requirements relating to maintenance service.
- B. Perform maintenance work using competent and qualified personnel under the supervision and in the direct employ of the elevator manufacturer or original installer.
- C. Provide service and maintenance of elevator system and components for one year from Date of Substantial Completion.
- D. Examine system components monthly. Clean, adjust, and lubricate equipment.
- E. Include systematic examination, adjustment, and lubrication of elevator equipment. Maintain hydraulic fluid levels. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original equipment. Replace wire ropes when necessary to maintain the required factor of safety.

- F. Perform work without removing cars during peak traffic periods.

END OF SECTION

SECTION 23 0900

CONTROLS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish a totally native BACnet Delta Controls System, including software for an operator's terminal, based on a distributed logic control system in accordance with this Specification. The operator's terminal, all global controllers, logic controllers, and all input/output devices shall communicate using the protocols and local area network (LAN) standards as defined by ANSI/ASHRAE™ Standard 135–2001, BACnet. In other words, all workstations and controllers, including unitary controllers, shall be native BACnet devices. No gateways shall be used. Items of work included are as follows:
1. Provide all necessary BACnet-compliant hardware and software to meet the system's functional specifications. Provide Protocol Implementation Conformance Statement (PICS) for every controller in system, including unitary controllers. All direct digital logic hardware is to comply with BACnet.
 2. Prepare individual hardware layouts, interconnection drawings, and software configuration from project design data.
 3. Implement the detailed design for all system-standard analog and binary objects, distributed control and system databases, graphic displays, logs, and management reports based on control descriptions, logic drawings, configuration data, and bid documents.
 4. Design, provide, and install all equipment cabinets, panels, data communication network cables needed, and all associated hardware.
 5. Provide and install all interconnecting cables between supplied cabinets, logic controllers, and input/output devices.
 6. Provide and install all interconnecting cables between all operator's terminals and peripheral devices (such as printers, etc.) supplied under this section.
 7. Provide supervisory specialists and technicians at the job site to assist in all phases of system installation, startup, and commissioning.
 8. Provide a comprehensive operator and technician training program with a minimum of 24 hours at control company training center.
 9. Provide new sensors, valves, and damper actuators. No used components shall be used as any part or piece of installed system.

1.2 SUBMITTALS

- A. All submittals shall be submitted under the provisions of Section 01 3300.

B. Product Data:

1. Submit Detailed Bill of Material list for each panel, identifying quantity, part number, description, and associated options.
2. Cataloged cut sheets of all equipment used. This includes, but is not limited to, the following: DDC panels, peripherals, sensors, actuators, dampers, control air system components, and so forth.
3. Control Valve Schedules. This spreadsheet type schedule shall include a separate line for each valve and a column for each of the valve attributes, including: code number, configuration, fail position, pipe size, valve size, body configuration, close off pressure, capacity, valve CV, calculated CV, design pressure, actual pressure, and actuator type.
4. Range and scale information for all transmitters and sensors. This sheet shall clearly indicate one device and any applicable options. Where more than one device to be used is on a single sheet, submit two sheets, individually marked.
5. Hardware data sheets for all operator workstations, local access panels, and portable operator terminals.
6. Software manuals for all applications programs to be provided as a part of the operator workstations, portable operator terminals, programming devices, and so forth for evaluation for compliance with the performance requirements of this Specification.

C. Shop Drawings:

1. Prepare shop drawings of temperature controls and air conditioning unit controls and include the following information. Any work installed without prior shop drawing approval shall be removed at the Contractors expense.
2. Each submittal shall include the following information:
 - a. FMS riser diagram showing all DDC controllers, operator workstations, network repeaters, and network wiring.
 - b. One-line schematics and system flow diagrams showing the location of all control devices.
 - c. Points list for each DDC controller, including: tag, point type, system name, object name, expanded ID, display units, controller type, address, cable destination, module type, terminal ID, panel, slot number, reference drawing, and cable number.
 - d. Vendor's own written description for each sequence of operations, to include the following:
 - i Sequences shall reference input/output and software parameters by name and description.

- ii The sequences of operations provided in the submittal by the FMS Contractor shall represent the detailed analysis needed to create actual programming code from the design documents.
 - iii Points shall be referenced by name, including all software points such as programmable setpoints, range limits, time delays, and so forth.
 - iv The sequence of operations shall cover normal operation and operation under the various alarm conditions applicable to that system.
- e. User interface functional outline. The outline shall include each display screen to be provided, data to be displayed, and links to other screens. The outline level hierarchy shall be:
- i Site
 - ii Building
 - iii Floor
 - iv System
- f. Schematics showing integration with existing Delta Controls system provided by Trinity EMCS Inc. Contact Philip Hervé (707) 495-1811 for further information.
- D. Training Course Outlines:
- 1. Submit training course outlines for each four-hour session.
- E. O&M Manuals. Submit three sets of each manual. Refer to Section 01 77 00 – Contract Closeout for other Operation and Maintenance Data requirements
- 1. Include the following documentation in the DDC Software Manual:
 - a. Sequence of Operations
 - b. Program listing of software source code or flow chart diagrams of programming objects.
 - c. Printed listing of controller and operator workstation database files.
 - d. Software point name abbreviation list. Include name, description, controller where located, point type and point ID.
 - e. I/O point list. Include point name, controller location, point number, control device, range and span.
 - f. Printouts of all reports, group listings and alarm messages.
 - g. Index of all DDC point names with documentation manual page number references.

2. Include the following documentation in the Hardware Manual:
 - a. General description and cut sheets for all components.
 - b. Detailed wiring and installation illustrations and complete calibration procedures for each field and panel device.
 - c. Complete trouble-shooting procedures and guidelines.
 - d. Complete operating instructions for all systems.
 - e. Maintenance instructions: Document all maintenance and repair/replacement procedures.
3. Provide three copies of all manufacturers manuals covering the installed system. This shall include, as a minimum:
 - a. System Engineering Manual
 - b. System Installation Manual
 - c. Programming Manual
 - d. Engineering and Troubleshooting Bulletins
 - e. Operator Workstation Software Manual
 - f. All other pertinent manuals published by the control system manufacturer.
- F. Record Drawings: Refer to Section 01 77 00 for project record document requirements.
- G. Warranty: Refer to Section 01 78 36 - Warranties for additional warranty requirements.
 1. Material: The Control System shall be free from defects in material and workmanship under normal use and service. If within thirty six (36) months from the date of manufacture any of the equipment herein described is defective in operation, workmanship or materials, it will be replaced, repaired or adjusted at the option of the FMS Contractor free of charge.
 2. Installation: The Control System shall be free from defects in installation workmanship for a period of one year from acceptance. The FMS Contractor shall, free of charge, correct any defects in workmanship within one week of notification in writing by the Owner.
- H. Drawings shall be submitted in the following standard sizes: 11" x 17" (ANSI B).

1.3 **SYSTEM DESCRIPTION**

A. General Requirements

1. A distributed logic control system complete with Direct Digital Control (DDC) and Direct Analog Control (DAC) software shall be provided. System shall be totally based on ANSI/ASHRAE Standard 135-2001, BACnet.
2. The entire processing system shall be in complete compliance with the BACnet standard: ANSI/ASHRAE 135-2001. The system shall use BACnet protocols and LAN types throughout and exclusively. Non-BACnet-compliant or proprietary equipment or systems (including gateways) shall not be acceptable and are specifically prohibited.
3. All logic controllers for controlled equipment and Microsoft Windows-based operator's terminals shall communicate and share data utilizing only BACnet communication protocols.
4. All logic controllers shall be fully programmable. That is, programmable controllers for any piece of controlled equipment shall be provided.
5. The Controls Contractor shall assume complete responsibility for the entire controls system as a single source. The Contractor shall certify that there are factory-trained technical personnel on staff, under direct employ, on a daily basis. These employees shall be qualified to engineer, program, debug, and service all portions of the BACnet based logic control system. This shall include operator's terminal, global controllers, routers, terminal unit controllers, sensors, and all other sections of the system.

B. Basic System Features

1. Zone-by-zone direct digital logic control of space temperature, scheduling, optimum start, equipment alarm reporting, and override timers for after-hours usage. A zone is the area served by one AC logic controller unit.
2. Operator's terminal software shall be Microsoft Windows 7 based. The Energy Management and Control System (EMCS) application program shall be written to communicate specifically utilizing BACnet protocols. Software shall be multi-tasking, capable of executing and displaying multiple instances in individual windows while running concurrently with other Windows programs such as word processors or database programs. Software shall support Windows Dynamic Data Exchange (DDE) interface. Software shall strictly follow Microsoft Windows API guidelines. Systems using proprietary software or operating systems other than that described above are strictly prohibited. Operation of the terminal software shall be simple and intuitive.
3. Operator's terminal software shall contain an easy-to-operate system allowing configuration of system-wide BACnet controllers, including management and display of the controller programming. This system shall provide the capability to configure controller binary and analog inputs/outputs.

4. Operator's terminal operating system shall be capable of utilizing third-party Windows based programs for such things as spreadsheet analysis, graphing, charting, custom report generation, and graphics design packages. Graphics generation shall be done using standard Windows packages. No proprietary graphics generation software shall be needed.
5. Complete energy management firmware, including self-adjusting optimum start, demand limiting, global control strategies, and logging routines for use with total control systems, shall be supplied. All energy management firmware shall be resident in field hardware, shall be easily updateable through software downloads as provided by the manufacturer, and shall not be dependent on the operator's terminal for operation. Operator's terminal software is to be used for access to field-based energy management control firmware only.
6. Priority password security systems shall prevent unauthorized use. Each user shall have an individual password. The user shall only be given access to the system functions required for individual job performance.
7. Equipment monitoring and alarm functions, including information for diagnosing equipment problems, shall be included with the system.
8. The complete system, including but not limited to terminal unit controllers, global controllers and operator's terminals, shall auto-restart, without operator intervention, on resumption of power after a power failure. Database stored in global controller memory shall be battery-backed up for a minimum of 1 year. Logic controllers for all air handlers and all unitary equipment shall utilize EEPROM for all variable data storage. Batteries on unitary controllers shall not be allowed.
9. System design shall be modular and have proven reliability.
10. All software and/or firmware interface equipment for connection to remote monitoring station from field hardware or the operator's terminal shall be provided.

PART 2 - PRODUCTS

2.1 TERMINAL UNIT CONTROLLERS

- A. Terminal unit controllers shall be BACnet class 3 devices.
- B. Provide (1) native BACnet logic controller for each controlled device. All controllers shall interface to global controller via MS/TP LAN using BACnet protocol. No gateways shall be used. Controllers shall include input, output, and self-contained logic program as needed for complete control of unit.
- C. Logic controllers shall include universal inputs with 10-bit resolution and that can accept 3K and 10K thermistors, 0–5 VDC, 0-10VDC, 4–20 mA, and dry contact signals. Any input on controller may be either analog or digital. Controller shall also include support and modifiable programming for interface to intelligent room sensor. Controller shall include binary outputs on board.

- D. Each EMS controller shall have a “hand-off-auto” switch associated with each Digital Output (DO) and shall have a “hand-off-auto” switch and associated potentiometer associated with each Analog Output (AO). This will allow each output (digital or analog) to be manually operated through the entire intended range of operation.
- E. Each EMS controller shall be mounted in an accessible location, below ceiling level, and outside of classroom areas. This will allow service access without ladders and without disturbing occupied classrooms.
- F. All program sequences shall be stored on board logic controller in EEPROM. No batteries shall be needed to retain logic program. All program sequences shall be executed by controller 10 times per second and shall be capable of multiple PID loops for control of multiple devices.
- G. Programming of logic controller shall be completely modifiable in the field over installed BACnet LANs or remotely via modem interface. Operator shall program logic sequences by graphically moving function blocks on screen and tying blocks together on screen. Logic controller shall be programmed using programming tools as described in operator terminal section.
- H. Logic controller shall include support for intelligent field sensor. Display on field sensor shall be programmable at logic controller and include an operating mode and a field service mode. All button functions and display data shall be programmable to show specific controller data in each mode based on which button is pressed on the sensor. See sequence of operation for specific display requirements at intelligent field sensor.

PART 3 - SEQUENCE OF OPERATION

3.1 Refer to drawings for details.

SECTION 260010
BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Table of Contents, Division 26 - Electrical:

<u>SECTION NO.</u>	<u>SECTION TITLE</u>
260010	BASIC ELECTRICAL REQUIREMENTS
260060	POWER SYSTEM STUDY
260070	THEATRICAL SYSTEMS ELECTRICAL
260090	ELECTRICAL DEMOLITION
260519	BUILDING WIRE AND CABLE
260526	GROUNDING AND BONDING
260529	ELECTRICAL HANGERS AND SUPPORTS
260531	CONDUIT
260533	BOXES
260536	CABLE TRAYS
260546	SIGNAL SYSTEMS RACEWAY
260553	ELECTRICAL IDENTIFICATION
260926	LOW-VOLTAGE LIGHTING CONTROL
262213	DRY TYPE TRANSFORMERS
262416	PANELBOARDS
262419	INTEGRATED DISTRIBUTION ASSEMBLIES
262719	SURFACE RACEWAYS
262726	WIRING DEVICES
262816	OVERCURRENT PROTECTIVE DEVICES
262819	DISCONNECT SWITCHES
262900	MOTOR CONTROLS
264313	SURGE PROTECTIVE DEVICES
265100	INTERIOR & EXTERIOR LIGHTING
266113	FIRE ALARM SYSTEM
266516	SECURITY ALARM MONITORING SYSTEM
267113	TELECOMMUNICATION CABLING SYSTEM

B. Work included: This Section includes general administrative and procedural requirements for Division 26. The following administrative and procedural requirements are included in this Section to supplement the requirements specified in Division 01.

1. Quality assurance.
2. Definition of terms.
3. Submittals.
4. Coordination.
5. Record documents.
6. Operation and maintenance manuals.
7. Excavation
8. Rough-in.
9. Electrical installation.
10. Cutting, patching, painting and sealing.
11. Field quality control.

12. Cleaning.
 13. Project closeout.
- C. 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 and operable installation.
1. General and supplementary conditions: Drawings and general provisions of Contract and Division 01 of the Specifications, apply to all Division 26 Sections.
 2. Earthwork: Include trenching, backfilling, boring and soil compaction as required for the installation of underground conduit, in-grade pull boxes, vaults, lighting pole foundations, etc. Refer to Division 31, Earthwork.
 3. Selective demolition: Nondestructive removal of materials and equipment for reuse or salvage as indicated. Also dismantling electrical materials and equipment made obsolete by these installations. Refer to Division 02, Selective Demolition.
 4. Concrete Work: Include forming, steel bar reinforcing, cast-in- place concrete, finishing and grouting as required for under ground conduit encasement, light pole foundations, pull box slabs, vaults, housekeeping pads, etc. Also includes setting of floor boxes in existing concrete slabs, saw-cutting of existing slabs and grouting of conduits in saw-cut. Refer to Division 03, Concrete.
 5. Miscellaneous metal Work: Include fittings, brackets, backing, supports, rods, welding and pipe as required for support and bracing of raceways, lighting fixtures, panelboards, distribution boards, switchboards, motor control centers, etc. Refer to Division 05, Miscellaneous Metals.
 6. Miscellaneous lumber and framing Work: Include wood grounds, nailers, blocking, fasteners and anchorage for support of electrical materials and equipment. Refer to Division 06, Rough Carpentry.
 7. Moisture protection and smoke barrier penetrations: Include membrane clamps, sheet metal flashing, counter flashing, caulking and sealant as required for waterproofing of conduit penetrations and sealing penetrations in or through fire walls, floors, ceiling slabs and foundation walls. All penetrations through vapor barriers at slabs on grade shall be taped and made vaportight. Refer to Division 07, Thermal and Moisture Protection.
 8. Access panels and doors: Required in walls, ceilings and floors to provide access to electrical devices and equipment. Refer to Division 08, Access Doors also, Division 05, Metals.
 9. Painting: Include surface preparation, priming and finish coating as required for electrical cabinets, exposed conduit, pull and junction boxes, etc. where indicated as field painted in this Division. Refer to Division 09, Painting.
 10. Lighting fixture supports: Provide slack fixture support wire for lighting fixtures installed in acoustical tile or lay-in suspended ceilings. Refer to Division 09, Acoustical Treatment.
- D. Work furnished and installed under another Division requiring connections under this Division includes but is not limited to:
1. Electric motors.
 2. Package mechanical equipment: fans, fan coil units, pumps, boilers, compressors, etc.
 3. Flow switches and valve monitors for sprinkler system.
 4. Elevator controllers.
 5. Temperature control panel(s). (Line voltage only)
 6. Irrigation controller(s). (Line voltage only)

7. Kitchen equipment and appliances.
 8. Electric signage.
 9. Electric door locks.
 10. Door hold-open/release devices.
 11. Variable frequency drive units.
 12. Projection screens.
- E. Items furnished under another Division, but installed and connected under this Division includes but is not limited to:
1. Wall mounted control stations for motorized roll down and sliding doors.
 2. Electric fire sprinkler water flow bells.
 3. Speed control switches for ceiling exhaust fans.

1.02 QUALITY ASSURANCE

- A. Reference to Codes, Standards, Specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid. Such codes or standards shall be considered a part of this Specification as though fully repeated herein.
- B. When codes, standards, regulations, etc. allow Work of lesser quality or extent than is specified under this Division, nothing in said codes shall be construed or inferred authority for reducing the quality, requirements or extent of the Contract Documents. The Contract Documents address the minimum requirements for construction.
- C. Work shall be performed in accordance with all applicable requirements of the latest edition of all governing codes, rules and regulations including but not limited to the following minimum standards, whether statutory or not:
1. California Electric Code (CEC).
 2. California Building Code (CBC).
 3. California Fire Code (CFC).
 4. California Mechanical Code (CMC).
- D. Standards: Equipment and materials specified under this Division shall conform to the following standards where applicable:
- | | |
|-------|---|
| ACI | American Concrete Institute |
| ANSI | American National Standards Institute |
| ASTM | American Society for Testing Materials |
| CBM | Certified Ballast Manufacturers |
| ETL | Electrical Testing Laboratories |
| FS | Federal Specification |
| IEEE | Institute of Electrical and Electronics Engineers, Inc. |
| IPCEA | Insulated Power Cable Engineer Association |
| NEMA | National Electrical Manufacturer's Association |
| UL | Underwriters' Laboratories |
- E. Independent Testing Agency qualifications:
1. Testing Agency shall be an independent testing organization that will function as an unbiased authority, professionally independent of Manufacturer, Supplier and Contractor, furnishing and installing equipment or system evaluated by Testing Agency.

2. Testing Agency shall be regularly engaged in the testing of electrical equipment, devices, installations and systems.
 3. Testing Agency shall meet Federal Occupational Safety and Health Administration (OSHA) requirements for accreditation of independent testing laboratories, Title 9, Part 1907.
 4. On-site technical personnel shall be currently certified by the International Electrical Testing Association in electrical power distribution system testing.
 5. Testing Agency shall use technicians who are regularly employed by the firm for testing services.
 6. Contractor shall submit proof of above Testing Agency qualifications with bid documentation upon request.
- F. All base material shall be ASTM and/or ANSI standards.
- G. All electrical apparatus furnished under this Section shall conform to NEMA standards and the NEC and bear the UL label where such label is applicable.
- H. Certify that each welder performing Work has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone re-certification.

1.03 DEFINITION OF TERMS

- A. The following list of terms as used in the Division 26 documents shall be defined as follows:
1. "Provide": Shall mean furnish, install and connect unless otherwise indicated.
 2. "Furnish": Shall mean purchase and deliver to Project site.
 3. "Install": Shall mean to physically install the items in-place.
 4. "Connect": Shall mean make final electrical connections for a complete operating piece of equipment.
 5. "As directed": Shall be as directed by the Owner or their authorized Representative.
 6. "Utility Companies": Shall mean the company providing electrical, telephone or cable television services to the Project.

1.04 SUBMITTALS

- A. Format: Furnish submittal data neatly bound in an 8-1/2" x 11" folder or binder for each Specification Section with a table of contents listing materials by Section and paragraph number.
- B. Submittals shall consist of detailed Shop Drawings, Specifications, block wiring diagrams, "catalog cuts" and data sheets containing physical and dimensional information, performance data, electrical characteristics, materials used in fabrication and material finish. Clearly indicate by arrows or brackets precisely what is being submitted on and those optional accessories which are included and those which are excluded. Furnish quantities of each submittal as noted in Division 01.
- C. Each submittal shall be labeled with the Specification Section Number and shall be accompanied by a cover letter or shall bear a stamp stating that the submittal has been thoroughly reviewed by the Contractor and is in full compliance with the requirements of the Contract Documents. Cover letters shall list in full the items and data submitted. Failure to comply with this requirement shall constitute grounds for rejection of data.
- D. The Contractor shall submit detailed Drawings of all electrical equipment rooms and closets if the proposed installation layout differs from the construction documents. Physical size of electrical equipment indicated on the Drawings shall match those of the electrical equipment that is being submitted for review, i.e.: switchboards, panelboards, transformers, control

panels, etc. Minimum scale: 1/4" = 1'- 0". Revised electrical equipment layouts must be approved prior to release of order for equipment and prior to installation.

- E. As part of the equipment submittals, the Manufacturer shall provide anchorage calculations for floor and wall mounted electrical equipment so that it shall remain attached to the mounting surface after experiencing forces in conformance with CCR, Title 24, Table 23P, Part II and with Section 2312 "Earthquake Regulations" of the "Uniform Building Code" for Seismic Zone 4 Area, Importance Factor of 1.25. Structural Calculations shall be prepared and signed by a California Registered Structural Engineer. Specify proof loads for drilled-in anchors, if used.
- F. The Manufacturer shall recommend the method of anchoring the equipment to the mounting surface and shall provide the Contractor with the assembly dimensions, weights and approximate centers of gravity.
- G. All resubmittals shall include a cover letter that lists the action taken and revisions made to each Drawing and equipment data sheet in response to Submittal Review Comments. Resubmittal packages will not be reviewed unless accompanied by this cover letter. Failure to include this cover letter will constitute rejection of the resubmittal package.
- H. Shop Drawings for the following systems must be prepared via a computer aided drafting (CAD) system for submission by the Contractor. Electronic files are available for the contractor's use upon request.
 - 1. Fire alarm system, Section 266113.
 - 2. Security alarm monitoring system, Section 266516.
- I. Independent Testing Agency report:
 - 1. Testing Agency shall provide 3 copies of the complete testing report.
 - 2. Test report shall include the following:
 - a. Summary of Project.
 - b. Description of equipment.
 - c. Equipment used to conduct the test.
 - 1) Type.
 - 2) Manufacturer.
 - 3) Model number.
 - 4) Serial number.
 - 5) Date of last calibration.
 - 6) Documentation of calibration leading to NIST standards.
 - d. Description of test.
 - e. Test results, as compared to Manufacturers or industry accepted standards and tolerances.
 - f. Conclusion and recommendation.
 - g. Signature of responsible test organization authority.
 - 3. Furnish completed test report to Engineer no later than 30 days after completion of testing, unless otherwise directed.
- J. Substitutions:
 - 1. All requests for substitutions shall conform to the general requirements and procedure outlined in Division 01.

2. Where items are noted as "or equal," a product of equal design, construction and performance will be considered. Contractor must submit to the Engineer all pertinent test data, catalog cuts and product information required substantiating that the product is in fact equal to that specified. Only one substitution will be considered for each product specified.
3. Manufacturers' names and model numbers used in conjunction with materials, processes or equipment included in the Contract Documents are used to establish standards of quality, utility and appearance. Materials, processes or equipment, which in the opinion of the Engineer is equal in quality, utility and appearance, will be approved as substitutions to that specified.
4. Whenever any material, process or equipment is specified in accordance with a Federal specification, an ASTM standard, an ANSI specification, UL rating or other association standard, the Contractor shall present an affidavit from the Manufacturer certifying that the product complies with the particular standard specification. When requested by the Engineer, support test data to substantiate compliance shall be submitted by the Contractor at no additional cost.
5. Substitutions shall be equal, in the opinion of the Architect/Engineer, to the specified product. The burden of proof of such shall rest with the Contractor. When the Architect/Engineer in writing accepts a substitution, it is with the understanding that the Contractor guaranteed the substituted article or material to be equal to the one specified and dimensioned to fit within the construction. Approved substitutions shall not relieve the Contractor of responsibilities for the proper execution of the Work or from any provisions of the Specifications.
6. The Contractor shall be responsible for all expenses in connection with the substitution materials, processes and equipment, including the effect of the substitution on the Contractor, Subcontractor's or other Contractor's Work. No substitution of material, processes or equipment shall be permitted without written authorization of the Architect/Engineer. Any assumptions on the acceptability of a proposed substitution prior to acceptance by the Engineer are at the sole risk of the Contractor.

1.05 COORDINATION

A. Discrepancies:

1. In the event of discrepancies within the Contract Documents, the Engineer shall be so notified, within sufficient time, as delineated in Division 01, prior to the Bid Opening to allow the issuance of an Addendum.
2. If, in the event that time does not permit notification or clarification of discrepancies prior to the Bid Opening, the following shall apply: The Drawings govern in matters of quantity and the Specifications govern in matters of quality. In the event of conflict within the Drawings involving quantities or within the Specifications involving quantities or within the Specifications involving quality, the greater quantity and higher quality shall apply. Such discrepancies shall be noted and clarified in the Contractor's Bid. No additional allowances will be made because of errors, ambiguities or omissions that reasonably should have been discovered during the preparation of the Bid.

B. Project conditions:

1. Examination of Project site: The Contractor shall visit the Project site and thoroughly review the locale, working conditions, conflicting utilities and the conditions in which the Electrical Work will take place. Verify all existing conditions in the field. No allowances will be made subsequently for any costs that may be incurred because of any error or omission due to failure to examine the Project site and to notify the Engineer of any discrepancies between Contract Documents and actual Project site conditions.

2. Protection: Keep conduits, junction boxes, outlet boxes and other openings closed to prevent entry of foreign matter. Cover fixtures, equipment, devices and apparatus and protect them against dirt, paint, water, chemical or mechanical damage, before and during construction period. Prior to final acceptance, restore to original condition any fixture, apparatus or equipment damaged including restoration of damaged factory applied painted finishes. Protect bright finished surfaces and similar items until in service. No rust or damage will be permitted.
 3. Supervision: Contractor shall personally or through an authorized and competent representative constantly supervise the Work from beginning to completion and, within reason, keep the same foreman and workmen on the Project throughout the Project duration.
- C. Preparation:
1. Drawings:
 - a. Layout: General layout indicated on the Drawings shall be followed except where other Work may conflict with the Drawings.
 - b. Accuracy: Drawings for the Work under this Section are essentially diagrammatic within the constraints of the symbology applied.

1.06 RECORD DOCUMENTS

- A. Provide Project Record Drawings as described herein:
1. Drawings shall fully represent installed conditions including actual locations of outlets, true panelboard connections following phase balancing routines, correct conduit and wire sizing as well as routing, revised fixture schedule listing Manufacturers and products actually installed and revised panel schedules. Contractor shall record all changes in the Work during the course of construction on blue or black line prints. These prints shall be made subject of monthly review by the Owner's Representative to ascertain that they are current. If not current monthly payments may be withheld.
 2. Record Drawings shall be the transfer of information on these prints to the construction documents via computer aided drafting (CAD) process. A set of CAD files of the electrical documents will be provided to the Contractor in Autocad Release 2010 file format.
 3. Record drawing submissions shall be provided to the Engineer to review upon the completion of the following phases of Work:
 - a. Final electrical installation.
 4. Include in the record drawing submission the following shop drawing submission with all updated installation information:
 - a. Fire alarm system.
 - b. Security system.
 5. A single set of half size prints of the Record Drawings shall be submitted for review. Upon receipt of the Engineer's review comments, corrections shall be made and the Contractor shall provide the following:
 - a. Two sets of full size prints.
 - b. Four sets of half size prints.
 - c. One set of full size reproducibles.
 - d. The electronic drawing files, in Revit or AutoCAD file format, saved to a flash drive.
- B. Panel schedules:

1. Typewritten panel schedules shall be provided for panelboards indicating the loads served and the correct branch circuit number. Schedules shall be prepared on forms provided by the Manufacturer and inserted in the pocket of the inner door of each panelboard. See Section 262416: Panelboards for requirements.

1.07 OPERATION AND MAINTENANCE MANUALS

- A. Prior to Project closeout furnish to the Owner, six (6) hard back 3-ring binders containing all bulletins, operation and maintenance instructions, part lists, service telephone numbers and other pertinent information as noted in each Section all equipment furnished under Division 26. Binders shall be indexed into Division Sections and labeled for easy reference. Bulletins containing more information than the equipment concerned shall be properly stripped and assembled.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 EXCAVATION

- A. General: Cutting and digging shall be under the direct supervision of the General Contractor and included as necessary for the Work of this Section.
- B. Excavation for underground vaults and electrical structures: Conform to elevations and dimensions indicated within a tolerance of plus or minus 0.10 foot; plus a sufficient distance to permit placing and removal of concrete formwork, installation or services, other construction and for inspection.
 1. Excavate, by hand, areas within drip-line of large trees. Protect the root system for damage and dry-out. Maintain moist conditions for root system and over exposed roots with burlap. Paint root cuts of 1 inch in diameter and larger with emulsified asphalt tree paint.
 2. Take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed.
- C. Trenching: Excavate trenches for electrical installation as follows:
 1. Excavate trenches to the uniform width, sufficiently wide to provide ample working room and a minimum of 6 to 9 inches clearances on both side of raceways and equipment.
 2. Excavate trenches to depth indicated or required.
 3. Limit the length of open trench to that in which installations can be made and the trench backfilled within the same day.
 4. Where rock is encountered, carry excavation below required elevation and backfill with a layer of crushed stone or gravel prior to installation of raceways and equipment. Provide a minimum of 6 inches of stone or gravel cushion between rock bearing surface and electrical installations.
- D. Backfilling: Place soil materials in layers to required subgrade elevations for each area classification, using materials and methods specified in Division 31, Earthwork.
 1. Under building slabs, use drainage fill materials.

3.02 ROUGH-IN

- A. Contractor shall verify lines, levels and dimensions indicated on the Drawings and shall be responsible for the accuracy of the setting out of Work and for its strict conformance with existing conditions at the Project site.
- B. Verify final locations for rough-ins with field measurements and with the requirements for the actual equipment to be connected.

- C. Refer to equipment specification in Divisions 22 through 33 for rough-in requirements.

3.03 ELECTRICAL INSTALLATION

- A. Preparation, sequencing, handling and installation shall be in accordance with Manufacturer's written instructions and technical data particular to the product specified and/or accepted equal except as otherwise specified. Comply with the following requirements:
1. Shop Drawings prepared by Manufacturer.
 2. Verify all dimensions by field measurements.
 3. Arrange for chases, slots and openings in other building components during progress of construction, to allow for electrical installations.
 4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
 5. Sequence, coordinate and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
 6. Where mounting height is not detailed or dimensioned, contact the Architect for direction prior to proceeding with rough-in.
 7. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies and controlling agencies. Provide required connection for each service.
 8. Install systems, materials and equipment to conform with approved submittal data, including coordination Drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are indicated only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect.
 9. Install systems, materials and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
 10. Install electrical equipment to facilitate servicing, maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
 11. Coordinate electrical systems, equipment and materials installations with other building components.
 12. Provide access panel or doors where devices or equipment are concealed behind finished surfaces. Furnish and install access doors per the requirements of Division 08.
 13. Install systems, materials and equipment giving right-of-way priority to other systems that are required to maintain a specified slope.
 14. Conform to the National Electrical Contractor's Association "Standard of Installation" for general installation practice.

3.04 CUTTING, PATCHING, PAINTING AND SEALING

- A. Structural members shall in no case be drilled, bored or notched in such a manner that will impair their structural value. Cutting of holes, if required, shall be done with core drill and only with the approval of the Architect and Structural Engineer.
- B. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.

- C. Cut, remove and legally dispose of selected electrical equipment, components and materials as indicated, including but not limited to removal of electrical items indicated to be removed and items made obsolete by the new Work.
- D. Protect the structure, furnishings, finishes and adjacent materials not indicated or scheduled to be removed.
- E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
- F. Patch existing surfaces and building components using experienced installers and new materials matching existing materials and the original installation. For installers' qualifications refer to the materials and methods required for the surface and building components being patched.
- G. Application of joint sealers:
 - 1. General: Comply with joint sealer Manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.
 - 2. Installation of fire-stopping sealant: Install sealant, including forming, packing and other accessory materials, to fill openings around electrical services penetrating floors and walls, to provide fire-stops and fire-resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.

3.05 FIELD QUALITY CONTROL

- A. General testing requirements:
 - 1. The purpose of testing is to ensure that all tested electrical equipment, both Contractor and Owner supplied, is operational and within industry and Manufacturer's tolerances and is installed in accordance with design Specifications.
 - 2. Tests and inspections shall determine suitability for energization.
 - 3. Perform tests in presence of the Owner's Representative and furnish test equipment, facilities and technical personnel required to perform tests.
 - 4. Tests shall be conducted during the construction period and at completion to determine conformity with applicable codes and with these Specifications.
- B. Tests: In addition to specific system test described elsewhere, tests shall include:
 - 1. Equipment operations: Test motors for correct operation and rotation.
 - 2. Lighting control circuits: Test lighting circuits for correct operation through their control devices.
 - 3. Alarm and interlock systems: Produce malfunction symptoms in operating systems to test alarm and interlock systems. In addition, all specific tests described in the fire alarm system shall be performed.
 - 4. Circuit numbering verification: Select on a random basis various circuit breakers in the panelboards and cycle them on and off to verify compliance of the typed panel directories with actual field wiring.
 - 5. Voltage check:
 - a. At completion of job, check voltage at several points of utilization on the system that has been installed under this Contract. During test, energize all installed loads.
 - b. Adjust taps on transformers to give proper voltage, which is 118 to 122 volts for 120 volt nominal systems and proportionately equivalent for higher voltage systems. If

proper voltage cannot be obtained, inform the Owner and the serving Utility Company.

- C. Contractor shall provide test power required when testing equipment before service energization and coordinate availability of test power with General Contractor after service energization. The Contractor shall provide any specialized test power as needed or specified herein.
- D. Testing safety and precautions:
 - 1. Safety practices shall include the following requirements:
 - a. Applicable State and Local safety operating procedures.
 - b. OSHA.
 - c. NSC.
 - d. NFPA 70E.
 - 2. All tests shall be performed with apparatus de-energized and grounded except where otherwise specifically required ungrounded by test procedure.
- E. Calibration of test equipment:
 - 1. Testing Agency shall have calibration program that assures test instruments are maintained within rated accuracy.
 - 2. Instruments shall be calibrated in accordance with the following frequency schedule:
 - a. Field instruments: Analog, 6 month maximum; Digital, 12 months maximum.
 - b. Laboratory instruments: 12 months.
 - c. Leased specialty equipment: 12 months where accuracy is guaranteed by lessor.
 - 3. Dated calibration labels shall be visible on test equipment.
 - 4. Records, which show date and results of instruments calibrated or tested, must be kept up-to-date.
 - 5. Up-to-date instrument calibration instructions and procedures shall be maintained for test instrument.
 - 6. Calibration standards shall be of higher accuracy than instrument tested.
 - 7. Equipment used for field testing shall be more accurate than instrument being tested.
- F. Coordinate with General Contractor regarding testing schedule and availability of equipment ready for testing.
- G. Notify Owner and Engineer one week in advance of any testing.
- H. Any products which fail during the tests or are ruled unsatisfactory by the Owner's Representative shall be replaced, repaired or corrected as prescribed by the Owner's Representative at the expense of the Contractor. Tests shall be performed after repairs, replacements or corrections until satisfactory performance is demonstrated.
- I. Testing Agency shall maintain written record of tests and shall assemble and certify final test report.
- J. Include all test results in the maintenance manuals.

3.06 CLEANING

- A. Prior to energizing of electrical equipment, the Contractor shall thoroughly clean the interior of enclosures from construction debris, scrap wire, etc. using Manufacturer's approved methods and materials.

- B. Upon completion of Project, prior to final acceptance, the Contractor shall thoroughly clean both the interior and exterior of all electrical equipment per Manufacturers approved methods and materials. Remove paint splatters and other spots, dirt and debris.
- C. Touch-up paint any marks, blemishes or other finish damage suffered during installation.

3.07 PROJECT CLOSEOUT

- A. Training: At the time of completion, a period of not less than 24 hours shall be allotted by the Contractor for instruction of building operating and maintenance personnel in the use of all systems. This 24 hours training is in addition to any instruction time called out in the Specifications for specific systems, i.e., Fire Alarm, etc. All personnel shall be instructed at one time, the Contractor making all necessary arrangements with Manufacturer's Representative. The equipment Manufacturer shall be requested to provide product literature and application guides for the users' reference. Costs, if any, for the above services shall be paid by the Contractor. All training sessions shall be video recorded by the contractor; videos shall be saved in .mov, .wmv, or similar format, and saved to a flash drive for the owner.
- B. Special tools: Provide one of each tool required for proper operation and maintenance of the equipment provided under this Section. All tools shall be delivered to the Owner at the Project completion.
- C. Keying: Provide two keys for each lock furnished under this Section and turn over to Owner.

END OF SECTION

SECTION 260926
LOW-VOLTAGE LIGHTING CONTROL

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. Lighting Control local network.
 - 2. Lighting Control Panel
 - 3. Power Packs or 'Room Controllers'
 - 4. Occupancy Sensors.
 - 5. Daylight Sensors.
 - 6. Wall Switches and Dimmers
 - 7. Interface Modules.
 - 8. Network Controllers and other Network Components
 - 9. Configuration Tools.
 - 10. Power supplies.
 - 11. Equipment enclosures.
 - 12. Low-voltage cable interconnection between components.
- 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 23

1.02 REFERENCES

- A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:
 - 1. National Electrical Manufacturer Association (NEMA):
 - NEMA 250; Enclosures for Electrical Equipment.
 - NEMA ICS 1; Industrial Control and Systems.
 - NEMA ICS 4; Terminal Blocks and Industrial use.
 - NEMA ICS 6; Enclosures for Industrial Controls and Systems.
 - 2. Underwriters Laboratories, Inc. (UL):
 - UL 50; Cabinets and Boxes.
 - UL 773A; Nonindustrial Photoelectric Switches for Lighting Control.
 - UL 916; Energy Management.

1.03 SYSTEM DESCRIPTION

- A. The Lighting Control and Automation system as defined under this section covers the following equipment:
 - 1. Lighting Control Panel:

- a. Each LCP relay shall be programmed for individual or grouped "ON/OFF" control as desired by users. Circuits swept "OFF" at evening hours, weekends and holidays shall have manual override capabilities, which shall automatically be swept "OFF" again at the end of 1 hour(s). Time delays shall be programmable from two (2) minutes to twenty-four (24) hours.
 - b. Individual LCP relays shall be capable of programming to "flicker" five (5) minutes prior to each "OFF" sweep to allow for sufficient time to override.
2. Room Controllers or Power Packs – Self-configuring, digitally addressable one, two or three relays controllers with 0-10 volt control for ballasts (if applicable) and single relay application-specific plug load controllers.
 3. Occupancy Sensors – Self-configuring, digitally addressable and calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications.
 4. Daylight Sensors – Single-zone closed loop and multi-zone open loop daylighting sensors with two-way active infrared (IR) communications can provide switching or dimming control for daylight harvesting.
 5. Configuration Tools – Handheld remote for room configuration provides two way infrared (IR) communications to digital devices and allows complete configuration and reconfiguration of the device / room from up to 30 feet away. Unit to have Organic LED display, simple pushbutton interface, and allow send and receive of room variables and store of occupancy sensor settings. Computer software also customizes room settings.
 6. Handheld remotes for personal control – One-button dimming, two-button on/off, or five-button scene remotes provide control using infrared communications. Remote may be configured in the field to control selected loads or scenes without special tools.
 7. Lighting Control Local Network – Free topology, plug-in wiring system (Cat 5 or 5e) for power and data to room devices.
 8. Network Bridge – provides BACnet MS/TP-compliant digital networked communication between rooms, panels and the Segment Manager or building automation system (BAS).
 9. Segment Manager – provides web browser-based user interface for system control, scheduling, power monitoring, room device parameter administration and reporting.

1.04 LIGHTING CONTROL APPLICATIONS

- A. Unless relevant provisions of the applicable local Energy Codes are more stringent, provide a minimum application of lighting controls as follows:
 1. Space Control Requirements – Provide occupancy/vacancy sensors with Manual-ON functionality in all spaces except toilet rooms, storerooms, library stacks, or other applications where hands-free operation is desirable and Automatic-ON occupancy sensors are more appropriate. Provide Manual-ON occupancy/vacancy sensors for any enclosed office, conference room, meeting room, open plan system and training room. For spaces with multiple occupants, or where line-of-sight may be obscured, provide ceiling- or corner-mounted sensors and Manual-ON switches.
 2. Bi-Level Lighting – Provide multi-level controls in all spaces except toilet rooms, storerooms, library stacks, or applications where variable dimming is used.
 3. Task Lighting / Plug Loads – Provide automatic shut off of non essential plug loads and task lighting in all spaces except toilet rooms and storerooms. Provide Automatic-ON of plug loads whenever spaces are occupied. For spaces with multiple occupants a single shut off consistent with the overhead lighting may be used for the area.
 4. Daylit Areas – All luminaires within 15' of windows or within 7' of skylights (the daylit zone) shall be controlled separately from luminaires outside of daylit zones. Luminaires

closest to the daylight aperture shall be controlled separately from luminaires farther from the daylight aperture, within the daylight zone.

5. Daytime setpoints for total ambient illumination (combined daylight and electric light) level that initiate dimming shall be programmed to be not less than 125% of the nighttime maintained designed illumination levels.
 6. Multiple-leveled switched daylight harvesting controls may be utilized for areas marked on drawings.
 7. Provide smooth and continuous daylight dimming for areas marked on drawings. Daylighting control system may be designed to turn off electric lighting when daylight is at or above required lighting levels, only if system functions to turn lamps back on at dimmed level, rather than turning full-on prior to dimming.
- B. Additional controls.
1. Provide occupancy/vacancy sensors for any enclosed office, conference room, meeting room, and training room. For spaces with multiple occupants or where line-of-sight may be obscured, provide ceiling- or corner-mounted with manual-on switches.
 2. Conference, meeting, training, auditoriums, and multipurpose rooms shall have controls that allow for independent control of each local control zone. Rooms larger than 300 square feet shall instead have at least four (4) pre-set lighting scenes unless otherwise specified. Occupancy / vacancy sensors shall be provided to extinguish all lighting in the space.

1.05 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 to include:
 5. Plot plans and building floor plans, showing location of and conduit routing to all devices.
 - a. Point-to-Point wiring diagram in block or riser format showing all low-voltage lighting control components, conduit and wire types and sizes with cable legend.
 - b. Include elevations of main controller and relay panels.
 6. Furnish structural calculations for equipment anchorage as described in Section 260010: Basic Electrical Requirements.
 7. Submit Manufacturer's installation instructions.
 8. Complete bill of materials listing all components.
 9. Warranty.

1.06 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. Operation and maintenance manuals shall include the following:
 2. A detailed explanation of the operation of the system.

3. Instructions for routine maintenance.
4. Pictorial parts list and part numbers.
5. Schematic Drawings of wiring system, including relay panels, switches, controller, photocell, power supplies, etc.
6. Telephone numbers for the authorized parts and service distributors.
7. Final testing report.

1.07 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.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery: Low-voltage lighting control 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 MAINTENANCE

- A. Spare Parts:
 1. Provide 3 additional spare parts of each of the following product to be used for maintenance. Provide 25' terminated cable for each device.
 - a. Room Controller/Power Pack, single relay, 0-10V
 - b. Room Controller/Power Pack, dual relay, 0-10V
 - c. Occupancy Sensor
 - d. Daylight sensor
 - e. Wall Dimmer Switch
 - f. Network Bridge

1.10 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. Wattstopper 'DLM' (Basis of Design)
 2. SensorSwitch 'nLIGHT'

3. Encellium

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.02 GENERAL

- A. The components of the low-voltage lighting control system shall be Specification grade and shall be supplied by a single Manufacturer.
- B. Thoroughly review the operational and performance requirements of the system with the Manufacturer to verify the wiring and equipment requirements.
- C. Refer to the lighting control riser diagram on Drawings for major components and interconnections as well as system overview.
- D. Refer to low-voltage lighting control panel schedules on Drawings for list of low-voltage relays and circuits controlled.
- E. Refer to low-voltage switching station schedule on Drawings for switching requirements.
- F. The system shall interface with the EMCS system of Division 23.

2.03 LIGHTING CONTROL PANEL

- A. Modular relay panels shall consist of the following:
 - 1. Cabinet: NEMA 1 enclosure sized to accept up to 48 relays. Enclosure shall be 24" wide, with a height as required. Provide relays as indicated on the drawings.
 - 2. Interior: Bracket and circuit board back-panel with pre-mounted relays. Interiors shall be sized to accept the above quantity of relays and will provide true "ON/OFF" indication of relay status through LED's mounted on the circuit board. Each relay shall be capable of direct "ON/OFF" control by a low-voltage switch.
 - 3. Control relays: Heavy-duty momentary pulsed mechanically latching contactors. Operating voltage is 24 VAC; contacts are rated at 20 amps, 120 or 277 VAC ballast load.
 - 4. Power supply: Transformer assembly with two 40 VA transformers with separate secondaries; one providing power to relays, LED's and associated low-voltage switches and sensors, the second providing power to optional automation cards. Transformers include internal overcurrent protection with automatic reset and metal oxide varistor protection against powerline spikes. 115 VAC, 50/60Hz +/- 10%.
 - 5. Programmable intelligence cards: Provide one panel intelligence card for each panel to provide control logic and memory for operating panels independently. Intelligence card shall also support communications links over an RS-232 port and data line. Provide one relay driver card for every group of 12 relays or 3 programmable switches required.
 - 6. Programmable BMS interface module: Provide panel intelligence card at each panel to provide control logic and memory for integration with the building lighting system for scheduling and time clock functions.
 - 7. Cover: Standard surface mount, hinged, lockable cover with windows for viewing relay status indicators. A wiring schedule directory card shall be affixed to the rear of the cover.
- B. Programmable system switch panel: Programmable System Switch panels shall be capable of receiving 16 switch inputs. These inputs may be either 3 wires maintained (form C contact), momentary, or network (Cat 5) switch type. The System Switch panel shall transmit the switch ID (address/input) and the action "ON/OFF" whenever a switch changes state. The program installed on each panel intelligence card will determine the response to these switch inputs. Each switch panel shall have a two-digit address.
- C. Switches: Low-voltage switches with ganged coverplate where grouped. Color shall match that of wire devices.

2.04 SINGLE / DUAL RELAY WALL SWITCH OCCUPANCY SENSORS

- A. Manual-ON, Automatic-OFF passive infrared (PIR) wall switch occupancy sensor Furnish the Company's model which suits the electrical system parameters, and accommodates the square-foot coverage and wattage requirement for each area (and type of lighting) controlled.
- B. Manual-ON, Automatic-OFF ultrasonic wall switch occupancy sensor with Furnish the Company's model which suits the electrical system parameters, and accommodates the square-foot coverage and wattage requirement for each area (and type of lighting) controlled.
- C. Manual-ON, Automatic-OFF dual technology (passive infrared and ultrasonic) wall switch occupancy sensor Furnish the Company's model which suits the electrical system parameters, and accommodates the square-foot coverage and wattage requirement for each area (and type of lighting) controlled.

2.05 WALL OR CEILING MOUNTED OCCUPANCY SENSOR SYSTEM

- A. Wall or ceiling mounted (to suit installation) passive infrared (PIR), ultrasonic or dual technology digital (passive infrared and ultrasonic) occupancy sensor. Furnish the Company's system which accommodates the square-foot coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors and accessories which suit the lighting and electrical system parameters.
- B. Occupancy Sensors shall provide graphic LCD display for digital calibration and electronic documentation. Features include the following:
 - 1. Digital calibration and pushbutton programming for the following variables:
 - a. Sensitivity – 0-100% in 10% increments
 - b. Time delay – 1-30 minutes in 1 minute increments
 - c. Test mode – Five second time delay
 - d. Detection technology – PIR, Ultrasonic or Dual Technology activation and/or re-activation.
 - e. Walk-through mode
 - f. Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the local network.
 - 2. One or two RJ-45 port(s) for connection to local network.
 - 3. Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool and control by remote personal controls.
 - 4. Device Status LEDs including:
 - a. PIR Detection
 - b. Ultrasonic detection
 - c. Configuration mode
 - d. Load binding
 - 5. Assignment of occupancy sensor to a specific load within the room without wiring or special tools.
 - 6. Manual override of controlled loads.
- C. Units shall not have any dip switches or potentiometers for field settings.
- D. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology local network. No additional configuration will be required.

2.06 DIGITAL WALL SWITCHES

- A. Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5 and 8 button configuration; available in white, light almond, ivory, grey and black; compatible with wall plates with decorator opening. Wall switches shall include the following features:
 - 1. Two-way infrared (IR) transceiver for use with personal and configuration remote controls.
 - 2. Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.
 - 3. Red configuration LED on each switch that blinks to indicate data transmission.
 - 4. Blue Load/Scene Status LED on each switch button with the following characteristics:
 - a. Bi-level LED
 - b. Dim locator level indicates power to switch
 - c. Bright status level indicates that load or scene is active
 - 5. Dimming switches shall include seven bi-level LEDs to indicate load levels using 14 steps.
- B. Two RJ-45 ports for connection to local network.
- C. Multiple wall switches may be installed in a room by simply connecting them to the free topology local network. No additional configuration will be required to achieve multi-way switching.
- D. The following switch attributes may be changed or selected using a wireless configuration tool:
 - 1. Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).
 - 2. Individual button function may be configured to Toggle, On only or Off only.
 - 3. Individual scenes may be locked to prevent unauthorized change.
 - 4. Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.
 - 5. Ramp rate may be adjusted for each dimmer switch.
 - 6. Switch buttons may be bound to any load on a room controller and are not load type dependant; each button may be bound to multiple loads.

2.07 HANDHELD REMOTE CONTROLS

- A. Battery-operated handheld switches in 1, 2 and 5 button configuration for remote switching or dimming control. Remote controls shall include the following features:
 - 1. Two-way infrared (IR) transceiver for line of sight communication with local network within up to 30 feet.
 - 2. Blue LED on each button confirms button press.
 - 3. Load buttons may be bound to any load on a room controller and are not load type dependant; each button may be bound to multiple loads.
 - 4. Inactivity timeout to save battery life.
- B. A wall mount holster and mounting hardware shall be included with each remote control

2.08 ROOM CONTROLLERS

- A. Room Controllers automatically bind the room loads to the connected devices in the space without commissioning or the use of any tools. Room Controllers shall be provided to match the room lighting load and control requirements. The controllers will be simple to install and will not have, dip switches, potentiometers or require special configuration. The control units will include the following features:
 - 1. Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room.
 - 2. Simple replacement – Using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf unit without requiring any configuration or setup.
 - 3. Device Status LEDs to indicate:
 - a. Data transmission
 - b. Device has power
 - c. Status for each load
 - d. Configuration status
 - 4. Quick installation features including:
 - a. Standard junction box mounting
 - b. Quick low voltage connections using standard RJ-45 patch cable
 - 5. Plenum rated
 - 6. Manual override and LED indication for each load
 - 7. Dual voltage (120/277 VAC, 60 Hz)
 - 8. Zero cross circuitry for each load.
- B. On/Off Room Controllers shall include:
 - 1. One or two relay configuration
 - 2. Efficient 150 mA switching power supply
 - 3. Three RJ-45 local network ports
 - 4. Discrete model listed for connection to receptacles, for occupancy-based control of plug loads within the space.
 - a. One relay configuration only
 - b. Automatic-ON/OFF configuration
- C. On/Off/Dimming enhanced Room Controllers shall include:
 - 1. Real time current monitoring
 - 2. One, two or three relay configuration
 - 3. Efficient 250 mA switching power supply
 - 4. Four RJ-45 local network ports.
 - 5. One 0-10 volt analog output per relay for control of compatible ballasts and LED drivers.
 - 6. Optional Network Bridge for BACnet MS/TP communications (LMRC-3xx).
 - 7. The following dimming attributes may be changed or selected using a wireless configuration tool:
 - a. Establish preset level for each load from 0-100%

- b. Set high and low trim for each load
 - c. Set lamp burn in time for each load up to 100 hours
8. Discrete model listed for connection to receptacles, for occupancy-based control of plug loads within the space.
- a. One relay configuration only
 - b. Automatic-ON/OFF configuration

2.09 DIGITAL PHOTOSENSORS

- A. Digital photosensors work with room controllers to provide automatic switching or dimming daylight harvesting capabilities for any load type connected to a room controller. Closed loop photosensors measure the ambient light in the space and control a single lighting zone. Open loop photosensors measure incoming daylight in the space, and are capable of controlling up to three lighting zones. Photosensors shall be interchangeable without the need for rewiring.
- B. Digital photosensors include the following features:
- 1. An internal photodiode that measures only within the visible spectrum, and has a response curve that closely matches the photopic curve. The photodiode shall not measure energy in either the ultraviolet or infrared spectrums. The photocell shall have a sensitivity of less than 5% for any wavelengths less than 400 nanometers or greater than 700 nanometers.
 - 2. Sensor light level range shall be from 1-10,000 footcandles (fc).
 - 3. The capability of switching one-third, one-half or all lighting ON and OFF, or raising or lowering lighting levels, for each controlled zone, depending on the selection of room controller(s) and load binding to room controller(s).
 - 4. For switching daylight harvesting, the photosensor shall provide a deadband or a separation between the "ON Setpoint" and the "OFF Setpoint" that will prevent the lights from cycling after they turn off.
 - 5. For dimming daylight harvesting, the photosensor shall provide the option, when the daylight contribution is sufficient, of turning lights off or dimming lights to a user-selectable minimum level.
 - 6. Optional programmable wall switch override to allow occupants to reduce lighting level to increase energy savings or, if permitted by system administrator, raise and lower lighting levels for a selected period of time or cycle of occupancy.
 - 7. Infrared (IR) transceiver for configuration and/or commissioning with a handheld configuration tool, to transmit detected light level to wireless configuration tool, and for communication with personal remote controls.
 - 8. Red configuration LED that blinks to indicate data transmission.
 - 9. Blue status LED indicates test mode, override mode and load binding.
 - 10. Recessed switch to turn controlled load(s) ON and OFF.
 - 11. One RJ-45 port for connection to the local network.
 - 12. An adjustable head and a mounting bracket to accommodate multiple mounting methods and building materials. The photosensor may be mounted on a ceiling tile, skylight light well, suspended lighting fixture or backbox.
- C. Closed loop digital photosensors include the following additional features:
- 1. An internal photodiode that measures light in a 100 degree angle, cutting off the unwanted light from bright sources outside of this cone.

2. Automatic self-calibration, initiated from the photosensor, a wireless configuration tool or a PC with appropriate software.
 3. Automatically establishes setpoints following self-calibration.
 4. A sliding setpoint control algorithm for dimming daylight harvesting with a “Day Setpoint” and the “Night Setpoint” to prevent the lights from cycling.
- D. Open loop digital photosensors include the following additional features:
1. An internal photodiode that measures light in a 60 degree angle cutting off the unwanted light from the interior of the room.
 2. Automatically establishes setpoints following calibration using a wireless configuration tool or a PC with appropriate software.
 3. A proportional control algorithm for dimming daylight harvesting with a “Setpoint” to be maintained during operation.

2.10 LIGHTING CONTROL NETWORK

- A. The lighting control local network is a free topology lighting control physical connection and communication protocol designed to control a small area of a building. Digital room devices connect to the network using CAT 5e cables with RJ-45 connectors which provide both data and power to room devices. Features of the local network include:
1. Plug n’ Go automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached.
 2. Simple replacement of any device in the network with a standard off the shelf unit without requiring commissioning, configuration or setup.
 3. Push n’ Learn configuration to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices in the local network.
 4. Two-way infrared communications for control by handheld remotes, and configuration by a handheld tool including adjusting load parameters, sensor configuration and binding, within a line of sight of up to 30 feet from a sensor, wall switch or IR receiver.

2.11 CONFIGURATIONS TOOLS

- A. A configuration tool facilitates optional customization of local networks, and is used to set up open loop daylighting sensors. A wireless configuration tool features infrared communications, while PC software connects to each local network via a USB interface.
- B. Features and functionality of the wireless configuration tool shall include:
1. Two-way infrared (IR) communication with IR-enabled devices within a range of approximately 30 feet.
 2. High visibility organic LED (OLED) display, pushbutton user interface and menu-driven operation.
 3. Read, modify and send parameters for occupancy sensors, daylighting sensors, room controllers and buttons on digital wall switches.
 4. Save up to nine occupancy sensor setting profiles, and apply profiles to selected sensors.
 5. Temporarily adjust light level of any load(s) on the local network, and incorporate those levels in scene setting.
 6. Adjust or fine-tune daylighting settings established during auto-commissioning, and input light level data to complete commissioning of open loop daylighting controls.

2.12 NETWORK BRIDGE

- A. The network bridge connects a local network to a BACnet-compliant network for communication between rooms, panels and a segment manager or BAS. Each local network shall include a network bridge component to provide a connection to the local network room devices. The network bridge shall use industry standard BACnet MS/TP network communication.
1. The network bridge may be incorporated directly into the room controller hardware (LMRC-3xx Room Controllers) or be provided as a separate module connected on the local network through an available RJ-45 port.
 2. Provide Plug n' Go operation to automatically discover all room devices connected to the local network and make all device parameters visible to the segment manager via the segment network. No commissioning shall be required for set up of the network bridge on the local network.
 3. The network bridge shall automatically create standard BACnet objects for selected room device parameters to allow any BACnet-compliant BAS to include lighting control and power monitoring features as provided by the lighting control devices on each local network. Standard BACnet objects shall be provided as follows:
 - a. Read/write the normal or after hours schedule state for the room
 - b. Read the detection state of the occupancy sensor
 - c. Read/write the On/Off state of loads
 - d. Read/write the dimmed light level of loads
 - e. Read the button states of switches
 - f. Read total current in amps, and total power in watts through the room controller
 - g. Read/write occupancy sensor time delay, PIR sensitivity and ultrasonic sensitivity settings
 - h. Activate a preset scene for the room
 - i. Read/write daylight sensor fade time and day and night setpoints
 - j. Read the current light level, in footcandles, from interior and exterior photosensors and photocells
 - k. Set daylight sensor operating mode
 - l. Read/write wall switch lock status

2.13 SEGMENT MANAGER

- A. The lighting control system shall include at least one segment manager to manage network communication. It shall be capable of serving up a graphical user interface via a standard web browser. Each segment manager shall have support for one, two or three segment networks as required and allow for control of a maximum of 127 local networks (rooms) and/or lighting control panels per segment network.
- B. Operational features of the Segment Manager shall include the following:
1. Connection to PC or LAN via standard Ethernet TCP/IP.
 2. Easy to learn and use graphical user interface, compatible with Internet Explorer 8, or equal browser.
 3. Log in security capable of restricting some users to view-only or other limited operations.
 4. Automatic discovery of all devices on the segment network(s). Commissioning beyond activation of the discovery function shall not be required.

5. After discovery, all rooms and panels shall be presented in a standard navigation tree format. Selecting a device from the tree will allow the device settings and operational parameters to be viewed and changed by the user.
6. Ability to view and modify room device operational parameters. It shall be possible to set device parameters independently for normal hours and after hours operation.
7. Ability to set up schedules for rooms and panels. Schedules shall automatically set controlled zones or areas to either a normal hours or after hours mode of operation.
8. Ability to group rooms and loads for common control by schedules, switches or network commands.
9. Ability to monitor connected load current and display power consumption for areas equipped with room controllers incorporating the integral current monitoring feature.
10. Provide seamless integration with the BAS via BACnet IP

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Contractor shall thoroughly examine Project site conditions for acceptance of low-voltage lighting control installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.02 INSTALLATION

- A. When using wire for connections other than the local network (Cat 5e with RJ-45 connectors), provide detailed point to point wiring diagrams for every termination. Provide wire specifications and wire colors to simplify contactor termination requirements
- B. Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated.
- C. Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings.
 1. Adjust time delay so that controlled area remains lighted for 5 minutes after occupant leaves area.
- D. Provide written or computer-generated documentation on the commissioning of the system including room by room description including:
 1. Sensor parameters, time delays, sensitivities, and daylighting setpoints.
 2. Sequence of operation, (e.g. manual ON, Auto OFF. etc.)
 3. Load Parameters (e.g. blink warning, etc.)
- E. Re-commissioning – After 30 days from occupancy re-calibrate all sensor time delays and sensitivities to meet the Owner's Project Requirements. Provide a detailed report to the Architect / Owner of re-commissioning activity.

3.03 PROGRAMMING

- A. Programming of the low-voltage lighting control system shall be by a factory-authorized agent of the Manufacturer of the system. All programming, testing, trouble shooting, etc. shall be included in this contract.

3.04 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 low-voltage lighting control system.

- B. At least three weeks 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.
- C. Prefunctional resting:
 - 1. Visual and mechanical inspection:
 - a. Inspect for physical damage, defects alignment and fit.
 - b. Perform mechanical operational tests in accordance with Manufacturer's instructions.
 - c. Compare nameplate information and connections to Contract Documents.
 - d. Check tightness of all control and power connections.
 - e. Check that all covers, barriers and doors are secure.
 - 2. Contractor shall provide all necessary programming assistance to set up and program the low-voltage lighting control equipment.
 - 3. Electrical tests:
 - a. The system shall be completely tested in accordance with operational parameters and Manufacturer's instructions. Any problem shall be documented and corrected.
 - b. Test all control circuits and verify proper operation of all lighting circuits throughout the control system.
 - c. Ensure the lighting zone controls match that of the schedules on the Contract Documents.
 - d. Verify the proper integration with the mechanical control system for override control and monitoring of low-voltage lighting control system.
 - e. Provide a complete report listing every device, the date it was tested, the results and the date retested (if failure occurred during the previous test). The test report shall indicate that every device tested successfully.
- 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 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.

3.05 TRAINING

- A. Factory authorized service representative shall conduct a 4 hour training session for Owner's Representatives upon completion and acceptance of system. Instruction shall include operation, programming and maintenance of equipment.
- B. Contractor shall schedule training with a minimum of 7 days advanced notice.

END OF SECTION

SECTION 27 41 16

PRODUCTION AV SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY:

- A. Section Includes: Services as listed herein and related to the furnishing, installation, and commissioning of audio, video and communications equipment.
- B. Related Documents: The Conditions of the Contract and Division 01 – General Requirements apply to this section as fully as if repeated herein.
- C. Related Sections: Coordinate with the following sections in carrying out this work:
 - 1. Section 11 61 33 – Stage Rigging
 - 2. Section 11 61 83 – Production Lighting Control
 - 3. Division 26 – Electrical

1.02 REFERENCES:

- A. Comply with all national, state and local regulations and the procedures and requirements of the local authorities. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.
 - 1. Codes:
 - a. California Building Code (CBC)
 - b. California Electric Code (CEC)
 - c. National Electric Code (NEC)
 - 2. Standards & Organizations:
 - a. National Fire Protection Association (NFPA)
 - b. Federal Communications Commission (FCC)
 - c. ANSI American National Standards Institute
 - d. ASA American Standards Association
 - e. ASTM American Society for Testing Materials
 - f. EIA/TIA Electronic Industries Association/Telecommunications Industries Association
 - g. ETL Electrical Testing Laboratories
 - h. ISO International Standards Organization
 - i. NEMA National Electrical Manufacturer's Association
 - j. UL Underwriter's Laboratories
 - k. ESTA Entertainment Services and Technology Association
- B. Equipment shall be provided in accordance with the related trade and regulatory guidelines including but not limited to UL, NEC, IEEE, and all manufacturer's recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers' warranties.
- C. Labor shall be provided in accordance with applicable labor regulations and practices.

1.03 DEFINITIONS:

- A. Refer to the General Conditions for definitions.
- B. Architect: For the scope in this Section, authorized personnel representing Owner and the Theater Consultant.

1.04 SYSTEM DESCRIPTION:

- A. Theatre
 - 1. Audio- Reinforcement
 - a. The reinforcement audio system is comprised of a digital mixer for events requiring a live operator, and an automatic mixing system for events that do not require a live operator. The digital mixer shall also be provided with expansion cards and accessories as indicated in the equipment list and Drawings.

- b. The internal programming of the DSP is under the scope of this work, and shall be submitted for approval during the shop drawing process. The contractor is responsible to provide standard & customary DSP blocks, including necessary EQ, protection limiting, etc.
 - c. The system will use a digital audio snake, utilizing Dante protocol. Provide expansion cards, stage input/output devices, cases, cables, and accessories as indicated in the equipment list.
 - d. The DSP/matrix shall be capable of providing multiple inputs & outputs. All DSP programming is the responsibility of the AV contractor. DSP programming shall be carried out by a factory-certified programmer.
 - e. An Ethernet switch and associated patchbays shall be provided to support the AV network functions in the auditorium.
 - f. Two CD players with theatre-specific functionality shall be provided for events requiring audio playback.
 - g. A rack-mounted Apple Macintosh computer with Apple keyboard and mouse shall be provided primarily for multi-channel audio playback, but can also be used for console programming and DSP unit control. The computer shall be configured per audio playback software manufacturer recommendation, and connected to the MIDI output of the digital console for triggering cues. The computer shall have the following options (or better at time of purchase):
 - 1) 2.6 GHz Quad Core i7 Processor
 - 2) 8.0 GB RAM
 - 3) 1TB Fusion hard drive
 - 4) Wireless Apple Mouse & Keyboard
 - 5) Mac and Windows OS installed (via Parallels)
 - h. Two channels of wireless microphone shall be provided, complete with antenna combiner and remote-mount active antennas.
 - i. The reinforcement and playback loudspeaker system is comprised of a left/center/right system with subwoofers, front fills, underbalcony fills, and surround/effects speakers.
 - j. Provide all required mounting hardware and engineering for all AV devices mounted overhead.
 - k. All visible loudspeakers shall be provided in a custom color as determined by the architect during the shop drawing phase. Coordinate exact mounting conditions with architect, structural engineer & general contractor.
 - l. An audio patchbay shall be provided. See patchbay section below.
2. Video
- a. A production video switcher and scaler shall be provided to handle signals from all video devices, including on-stage laptop computer inputs, DVD/VHS, blu-ray, and other inputs as indicated on the Drawings. The on-stage laptop computer inputs shall use fiber optic cable as their means of transport from the stage to the booth. The switcher shall be fully HDCP compliant and support EDID.
 - b. The video scaler shall be properly configured to accept any aspect ratio or resolution, and modify the image for proper viewing on the projection screen. This function shall be automatic, and require no additional configuration from user.
 - c. A portable remote control for the video switcher shall be provided when more sophisticated control is required.
 - d. A 12,000-lumen (or better) video projector shall be provided. The projector shall have a native resolution of 1920x1200, with a native aspect ratio of 16:10. Provide all necessary mounting as shown in the drawings.
 - e. The projection screen shall be provided with the following:
 - 1) Motorized
 - 2) Low Voltage Control Unit
 - 3) 1.6:1 aspect ratio
 - 4) Black case
 - 5) Matte white front projection surface, with black backing.

- 6) Additional black drop shall be provided as necessary to allow the bottom of the screen to hang at 3'-0" above stage floor in regular use.
 - 7) An extra 12" of black drop beyond that required to achieve 3'-0" above floor shall be provided to accommodate unforeseen field conditions.
 - 8) Sized as indicated in the 274116-A equipment list.
 - f. Provide a proper lens as required to fill the projection screen. The zoom ratio should be selected so the resultant setting is near the middle of the lens' zoom capability.
 - g. Stage and control booth video monitoring shall be via HDCP-compliant LCD rack-mount monitor/receiver.
 - h. Dual 7" LCD panels shall be provided in the portable stage manager's rack, for viewing fixed camera video signals.
 - i. A blu-ray/DVD player with shall be provided with rackmount and RS-232 controls.
 - j. A fixed-mount color HD camera shall be provided to feed the FOH/BOH television outlets. Additionally, an SD camera with low-light capability shall be provided with IR illuminators for viewing the stage when in blackout.
 - k. A video patchbay, for composite and HD-SDI video shall be provided. See patchbay specification section below.
 - l. A modulated television (MATV/CATV) system shall be provided, in conjunction with the building-wide system. Two HD modulators shall be provided. Coordinate channel selection with any incoming campus/city CATV services.
 - m. Provide and install wall mounts for all displays. Displays are part of the FFE package, which is not part of this scope.
3. Assistive Listening
 - a. An ADA-compliant FM-based assistive listening system shall be provided.
 - b. Receivers, headphones & batteries are NIC, and will be provided under separate package.
 4. Production Intercom
 - a. A two-channel production intercom system shall be provided to allow communications between the control booth and stage platform/backstage areas.
 - b. The production intercom main station shall be capable of firing an outboard relay, in conjunction with the 70V override system described above.
 - c. The production intercom shall be capable of outputting a line-level signal from a microphone mounted on the front panel.
 - d. A wireless intercom system with four beltpacks and headsets and accessories as listed in the equipment list shall be provided and connected to the wired system. Antennas shall mount external to the equipment rack.
 5. Program/Paging
 - a. An expansion of the main audio DSP unit shall provide routing & processing for the program/paging system.
 - b. A dedicated network switch shall be provided to support the Dante/AVB audio system. The switch shall be installed internal to the equipment rack, and no patchbay shall be used. No front-side access to the switch shall be provided, in order to prevent erroneous disconnection.
 - c. A remote input device shall be provided at the scene shop, and the scene shop shall be zoned separately.
 - d. All GPIO connections shall be made as shown on the drawings.
 - e. A panel with control buttons shall be provided, allowing for MUTE functions at FOH and BOH, as well as activation of the HOUSE PAGE function.
 - 1) The mute buttons shall illuminate to provide system-wide status of the mute function.
 - 2) The house page button shall illuminate to provide status of the house page function. This button shall also have a safety cover to prevent accidental activation.

- 3) When the "house page" is pressed at the same time as the "announce" button on the intercom base station, the audio from the intercom base station microphone shall be routed to the paging horns in the theatre.
 - f. An announcement recorder / player shall be provided as part of the audio DSP unit, with remote triggering from the house manager's station.
 - 1) Triggering shall from the house manager panel.
 - 2) The button shall illuminate to indicate "busy" status of the playback unit.
 - 3) The contractor shall provide a recording of chimes for initial use as the audience recall.
 - g. A custom volume-control override relay shall be provided. The system shall essentially remove the local 70V volume control from the line, allowing any BOH page to be heard, regardless of local volume position. A local key-switch override shall be provided at "SAK" positions, while the same shall be accomplished with a toggle switch at "SAT" positions. See drawings for further information. Local relay-type volume control overrides are not acceptable.
 - h. Two paging horns shall be provided at the theater, at locations indicated on the Drawings. The horns shall activate when both "announce" (intercom unit) and "house page" (custom panel) are pressed at the same time.
 - i. A custom portable stage manager's panel shall be provided, with remote intercom station and paging, custom button panel and rack-mounted light. A multi-cable extension shall be provided. The multi-cable connectors and extension cable shall be manufactured by Wireworks, and shall utilize the special "Broadway latching system", as opposed to the standard latching system. See additional information below.
6. Control System
 - a. A touch screen based control system shall be provided for control over all applicable AV devices in the theatre.
 - b. Connection points shall be distributed around the room in panels, to allow for connection of control system devices.
 - c. 7" color touchscreens shall be provided at locations shown on the drawings.
 - d. The control system shall connect via serial port to the architectural lighting system for preset recall. Coordinate with theatrical lighting contractor for necessary information.
 - e. All control system programming is the responsibility of the AV contractor, and shall be submitted during the shop drawing phase for approval.
7. Control System Programming
 - a. Touchpanels shall be configured with the most often-used device functions. Do not attempt to put every possible device function on the touchpanel.
 - b. The touchpanel shall be configured to work in two modes: manual and automatic.
 - 1) When in manual mode, all functions shall be "single function" buttons.
 - a) A password must be entered to access manual mode.
 - 2) In manual mode, access to advanced controls shall be possible, such as:
 - a) Automixer, Wireless Mic, Video Source & Main System Volume
 - b) Blu-Ray Player functions
 - c) System On/Off
 - d) Projector On/Off/Mute
 - e) Screen Up/Down/Stop and Lift Up/Down/Stop
 - f) Architectural Lighting Preset Recall (coordinate with 116183)
 - g) Other functions as required
 - 3) In Automatic mode, the user shall choose either "presentation with audio and video" or "presentation with audio only". After choosing, the system shall activate the appropriate macros to enable the system to display the chosen source. In either event, the automix jacks and wireless microphones shall be active.
 - 4) Volume controls for "video playback" and "mic level" shall be always accessible.
 - 5) A projector mute function shall be provided, utilizing the projector's mechanical dowser (if available). If no mechanical dowser is available, mute image.

- 6) The projector shut-off shall include a timer to prevent the user from trying to turn the projector on within a manufacturer-recommended amount of time. During this time-out period, all other touchpanel functions shall remain active.
 - c. Touchpanel programming is the responsibility of the contractor. An outline has been made above, but does not include all functions required. The contractor is responsible to design a graphic user interface using the following guidelines:
 - 1) In automatic mode, use must be able to complete any function within two button presses.
 - 2) More important functions shall be more prominent on the interface.
 - 3) Like functions shall appear at the same place on every screen.
 - 4) Nesting menus are not allowed.
 - d. The base template for the touchpanel shall be from the stock Crestron SmartGraphics line, with customization as necessary. The template colors shall be modified to match school colors, and the splash screen shall show the school's logo.
- B. Drama Classroom
1. Provide a portable audio cart with digital mixer, (2) CD players, 4-ch audio amplifier and other accessories as indicated. The output of the amplifier will connect to (4) loudspeakers, mounted to the pipe grid with yokes & c-clamps.
 2. The classroom audio system is to be provided by campus forces, and does not interface with the portable audio system.
- C. Recording Studio
1. The contractor shall deliver a fully-functional "turn-key" recording studio.
 2. The recording studio shall support the digital recording of audio from the studio or the adjacent music classrooms. Infrastructure shall be provided to bring analog and digital signals from other spaces.
 3. A multi-track capable digital recording system shall be provided, complete with digital recording console and computer-based recording software and necessary input/output devices using the Thunderbolt interface.
 4. Outboard analog devices shall be provided and available on the patchbay. The devices shall be located in the rack spaces of the main console furniture unit.
 5. The computer shall be Apple Macintosh desktop style, and shall be configured based on the recording software manufacturer's typical hardware requirements. Additional requirements include:
 - a. One quad-core processor (or better)
 - b. 16.0 GB internal RAM
 - c. (4) 1.0 TB Hard Drive for storage
 - d. One outboard superdrive optical drive
 6. The contractor shall be responsible to ensure that necessary parameters of the recording software are accessible via the digital console.
 7. A pair of 24" digital video monitors on articulating arms shall be used for local video monitoring of computer & console functions.
 8. A pair of 40" monitors shall be positioned above the vocal booth window so that all class members may see. The 40" monitors shall be fed with a discreet digital video signal from the computer, via Thunderbolt to HDMI converter and HDCP compliant HDMI link. The 40" monitors shall be configured to be part of the CPU's desktop.
 9. A digital musician-monitoring system shall be provided, and allow for each musician to have control over their own multi-track mix using local mixing devices and headphones.
 10. A far-field self-powered surround audio monitoring system with subwoofer shall be provided.
 11. A longframe ¼" audio patchbay, with programmable normals shall be provided for audio signal as shown on the drawings.
 12. A remote-control breaker panel shall be provided by electrical. A remote control panel shall be provided by the AV contractor to start up/shut down the entire system.

13. A UPS (Uninterruptable Power Supply) shall be provided for all computer-based equipment. The UPS shall be fanless, and rack-mounted.
 14. Recording lights shall be provided, at locations as shown on the drawings. A relay and switch shall be provided to activate the lights.
 15. Custom studio furniture shall be provided. Base model furniture model C24 1-2 shall include:
 - a. (qty 1) C24 desk
 - b. (qty 2) 3RU top racks
 - c. (qty 1) 12RU slant racks
 - d. (qty 1) 12RU isobox
 - e. (qty 1) keyboard pull-out tray
 - f. (qty 3) 14RU slant racks w/ countertop
 - g. The source of the furniture shall be:
 - 1) Sound Construction & Supply; 1328 Vashti Street, Nashville, TN 37207; Phone: 615.226.5150; Fax: 615.226.5149; Contact: Todd Beeten
- D. Choir/ Band/Piano Room (typ 3)
1. Provide a simple audio playback system with mixer, speakers, amplifier, and accessories. Configure system to accept an audio input from the classroom AV system.
 2. Provide a simple audio recording system with mixer with CD/Flash recorder and (2) hanging ceiling microphones.
 3. Clearly label each mixer with "PLAYBACK" or "RECORDING"
 4. Provide a stand-alone AV rack for all equipment, complete with wood sides/top and front door. Provide (2) thermostat-controlled fans to assist with heat removal. See drawings for additional information.
 5. Provide and install all necessary equipment and accessories for a complete and working system.
- E. Classroom AV systems
1. Provide and install ceiling projector mounts for classroom systems.
 2. All wire, installation, equipment and configuration of classroom systems are provided by owner.
- F. Portable Equipment
- a. Not in contract.

1.05 CURRENT TECHNOLOGY:

- A. Only the most current hardware and software shall be provided. In no case will discontinued or superseded products be acceptable. If the manufacturer has developed and successfully released products that meet or exceed the criteria within this specification, the Contractor shall notify the Architect and submit the new product for review. If accepted, the products shall be provided at no additional cost to the Owner. Software upgrades and authorized support services for its proper integration into the system shall be provided at no cost to the Owner throughout the warranty period.
- B. In the event of known product defaults or recall, the Contractor shall immediately notify the Architect and make immediate arrangements for remedy.
- C. None of the stipulations herein shall be grounds for revision to the Project schedule.
- D. See related procedures under Warranties in this Section.

1.06 SUBSTITUTIONS:

- A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by Architect in accordance with Section 01 2513 – Product Options and Substitutions. Requests shall be made in a timely fashion so as to not affect the Project schedule in either case of the substitution being accepted or rejected.

- B. Documentation for the substitution shall be submitted with supporting material and shall including the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The Architect shall be the sole evaluator of the fitness of the substitution.
- C. All expenses related to the substitution including, but not be limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.07 SUBMITTALS:

- A. If permitted under Section 01 33 00 – Submittal Procedures, all submittals shall be made in electronic format.
 - 1. Files shall be in .pdf format, and submitted via CD or DVD.
 - 2. Clearly indicate submittal number and description in the file name of the document.
 - 3. Each document shall be a separate file.
 - 4. Markups will be made electronically, and the submittal returned via CD or DVD.
- B. Submittals shall be made in a timely fashion so as to not affect the Project schedule, and shall allow for adequate time for review and resubmittal. Partial submittals will not be acceptable and will be returned without review.
- C. Submittals shall be reviewed and field dimensions verified prior to commencing acquisition for, and fabrication of the Work in this section. All services and parts of the work in this section shall be verified through the submittal process.
- D. Prior to commencing work on shop drawings, the contractor shall facilitate a meeting between the contractor and Architect and his consultant to “walk through” the AV systems.
- E. Conduit, Backboxes and Electrical Systems Verification Letter:
 - 1. Within 30 days of contract award, the AV contractor shall review all relevant information pertaining to the AV systems low-voltage conduit, backboxes, and linevoltage electrical work to be performed by Division 26. A formal memo, outlining acceptance (or desired changes) of the contract drawing shall be provided. Failure to provide this memo indicates acceptance of, and liability for, the conduit, backboxes and electrical systems as indicated in the Drawings.
- F. Shop Drawings:
 - 1. Submit full-size (minimum 30” x 42”) scaled shop drawings that show the following:
 - a. Installation requirements and mounting conditions.
 - b. For loudspeaker clusters, or any device suspended from above: Provide stamped structural drawings by a structural engineer licensed in the State California.
 - c. Full system riser diagram(s) illustrating interconnection of system components, wiring requirements, back box sizes and any special installation considerations.
 - d. Block diagrams, showing equipment interconnection.
 - e. Internal DSP programming (may be submitted as software file, or in flowchart form on paper)
 - f. Equipment rack and patchpanel drawings.
 - g. Full-scale drawings of custom plates.
 - h. Run sheets or field wiring drawings.
 - i. Equipment modification drawings, including statement of purpose for modification and agreement to provide full manufacturer warranty, if modifications cause a voided warranty.
 - j. Final schematic drawings of any custom circuitry.
 - k. Detailed equipment list, including quantity, manufacturer and model.
 - l. Detailed product drawings, as applicable to the project.
 - m. Copies of contract drawings will not be accepted as shop drawings, and will be returned without review.
 - 2. AV Control System Touchpanels:

- a. Provide an electronic file for approval of working touchpanel files. File shall be in a format that both consultant and Owner can use on any windows-based computer (with required software installation.)
 - b. Provide any required viewing software.
 - c. Touchpanel design subcontractor is responsible for design of touchpanel layouts, but shall be subject to consultant and Architect approval.
3. Acceptance of any submitted data or shop drawings for material, equipment, apparatus, devices, arrangement and layout shall not relieve contractor from responsibility of furnishing same of proper dimensions and weight, capacities, sizes, quantity, and installation details to perform efficiently the requirements and intents of the systems design. Such acceptance shall not relieve the contractor from responsibility for error, omissions or inadequacies of any sort on submitted data or shop drawings.
- G. Product Data:
1. Submit a detailed equipment list, including manufacturer, model number, description and quantity for each item.
 2. Do not submit equipment cut sheets, except for custom or non-standard devices.
- H. Samples:
1. Submit samples for review. Samples may include, but are not limited to:
 - a. Connector, panel and cable assemblies
 - b. Panel finish samples
 - c. Custom switch, button or similar assemblies
- I. Record Documents: Submit record documents in accordance with Section 01 78 39 – Project Record Documents.
1. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
 2. Submit copies of “as-builts” including:
 - a. Shop drawings, product data, operations and instructions manuals for all products provided.
 - b. Equipment list, with manufacturer, model number, and serial number for all installed devices.
 - c. Electronic backup on Compact Disc of control systems or DSP systems programming.
 - d. Care and maintenance instructions, service line and online contacts.
 - e. Warranty documents.
- J. Submittal procedures and quantities are specified in Section 01 33 00 – Submittal Procedures.

1.08 WARRANTY:

- A. Warranty shall provide coverage of material and product defects and assembly workmanship or installation for a period of two years following the date of acceptance by the Architect.
- B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor.
- C. The Contractor shall bear all costs that arise as a result of the warranty claim, including, but not limited to, the use of temporary replacement components, additional Owner staffing or overtime, shipping, cancelled uses or performances.
- D. Activate all manufacturers' warranties in the name of the Owner, within one week of the date of acceptance.
- E. Provide two return visits following system acceptance to fine tune or repair any items requested by the Owner:
 1. 30-40 days following acceptance
 2. 1 year following acceptance

1.09 QUALITY ASSURANCE:

- A. Equipment in this Section shall be provided by specialty subcontractors and manufacturers meeting the qualifications listed herein.

- B. Specialty subcontractor shall have been continuously engaged in the sales and integration of audio, video and communications equipment similar to that specified herein for a minimum of 10 years.
- C. Specialty subcontractors shall have at time of bid and continuously maintain throughout the project and warranty period a C-7 and/or C-10 California Specialty Contractor's license appropriate for the work in this Section.
- D. Specialty subcontractors shall employ field service technicians within a four hour driving distance from the Project site.
- E. All equipment shall be UL listed and bear the appropriate labels.

1.10 DELIVERY, STORAGE AND HANDLING:

- A. Packing shall prevent damage to the equipment during transit. Costs to repair or replace all equipment damaged during the course of the contract services shall be borne by the Contractor.
- B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible to properly sequence the work and to protect from damage during delivery, handling, storage and installation.
- C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.
 - 1. Devices shall not be delivered to the project site until the project is suitably clean and all adjacent finish work that may be painted or produce dust has been completed. The contract shall provide and maintain complete protection of all devices until the Project has been made available for occupancy by the Owner. The contractor shall thoroughly clean and remove any dirt or dust that infiltrates system components and be responsible for timely replacement of any damaged components.
 - 2. Device labels and connectors shall be delivered with temporary dust and paint protection installed.

1.11 PROJECT CONDITIONS:

- A. Defects in the field which may impact the work in this Section shall be reported to the Architect and corrected in accordance with the requirements of the applicable Section of Work prior to commencement of the Work in this Section.

1.12 MAINTENANCE:

- A. Provide maintenance stock of user-serviceable components within the system. Maintenance stock shall be packaged in labeled long term storage packaging and turned over to the Owner at time of system commissioning.
- B. Maintenance stock shall include:
 - 1. Four fuses of each type in the system.
 - 2. Five connectors of each type in the system.
 - 3. Six spare keys of each type in the system.
 - 4. Components recommended by the manufacturer.
 - 5. Any non-standard tools required for Owner service.
 - 6. Four spare lamps for each type in the system.

PART 2 - PRODUCTS

2.01 PRE-APPROVED SPECIALTY SUBCONTRACTORS

- A. The following AV systems contractors are pre-approved to complete the work in this section:

Coda Technology Group
Attn: Mark Latimer
1370 Redwood Way, Suite C
Petaluma, CA 94954
Phone: 707.795.3522
Fax: 707.795.3526

ICS Integration, Inc.
Attn: Mark Berlo
550 Parrott Street, Unit #40
San Jose, California 95112
Phone: (408) 491-6000
Fax: (408) 998-0100

PCD, Inc.
Attn: Henry Beaumont
1032 Maxwell Drive
Santa Rosa, CA 95401
Phone: (707) 546-3633
Fax: (707) 575-6818

- B. All other shall submit qualifications for approval. In order to qualify, the contractor shall submit the following information to the Architect for review:
1. Five years of financial reports.
 2. List of personnel who will be working on this Project, including skills, experience, and accreditations.
 3. List of union affiliations, contractor licenses, and other applicable trade certifications.
 4. List of projects completed within the past 5 years, with references. Provide phone and/or e-mail addresses for reference contacts.
 5. Proof that at least 5 jobs in the past 5 years have a minimum contract value equal to or greater than the project listed herein.
 6. Proof of bonding and insurance.

2.02 MANUFACTURERS:

- A. AV equipment in this Section shall be provided by specialty manufacturers providing products meeting the specifications herein.
- B. Provide all equipment as listed in 274116-A, equipment list.

2.03 SYSTEMS:

- A. Audio Systems General Requirements:
1. Grounding: All grounding in racks is the responsibility of the AV contractor. All devices shall be appropriately grounded to the isolated grounding system busbar.
 2. Un-Balanced Devices: Provide a balancing transformer for any unbalanced device, at both input and output.
 3. Loudspeaker Rigging: All overhead loudspeaker rigging shall be reviewed and stamped by a licensed structural engineer working in the State of California. The contractor is responsible to secure the structural stamp, including all expenses associated therein.
- B. Video Systems General Requirements:
1. Signal-to-noise ratio (peak to RMS) unweighted DC to 4.2MHz: 55dB minimum
 2. Crosstalk: Unweighted DC to 4.2MHz: 45dB minimum
 3. Frequency Response: Within plus or minus .5 dB to 4.2 MHz
 4. Line and field tilt: 2% maximum
 5. Differential Gain: 3% maximum
 6. Differential Phase: 2 degree maximum
 7. Video System timing: Sync coincidence within 50 nanoseconds

8. Color timing: Within 2 degrees at 3.58 MHz
- C. Modulated (CATV) Video Systems General Requirements:
 1. Cable Distribution System: The cable distribution system shall consist of coaxial cables, user interfaces, signal taps, splitters, RF amplifiers, signal equalizers, power supplies, and ancillary hardware as required to meet the system requirements specified below.
 2. The signal level of each channel at each TV outlet shall be +5 dBmV, plus or minus 3 dBmV.
 3. The system shall meet the following minimum parameters at each TV outlet:
 - a. Signal-To-Noise Ratio: 43 dB
 - b. Cross Modulation: -46 dB
 - c. Hum Modulation: -55 dB
 - d. Return Loss: 14 dB
 - e. Isolation (outlet-outlet): 24 dB
 - f. Aural Carrier Level: 13 dB to 17 dB below visual
 - g. Impedance: 75 ohm

2.04 MATERIALS:

- A. All components supplied under this Section shall be new. Used or factory reconditioned components will not be acceptable.
- B. Floor-standing 19" Equipment Rack (Theatre Amp Room):
 1. Provide Middle Atlantic WRK series. See drawings for exact size.
 2. Provided with solid rear locking door.
 - a. At Gymnasium: Provide with solid front locking door.
 3. Useable height shall be 44 rackspaces, useable depth shall be 30.75".
 4. 2,500 pound weight capacity.
 5. All structural elements shall be finished in black powder coat.
 6. Rack shall be UL Listed.
 7. Provide the following options:
 8. Provide the following options:
 - a. Removable keylocked side panels, model # SPN-xxx. As required.
 - b. Top panel with 3-1/2" service plate model #MW-10FT. One per rack.
 - c. Lacer strip, heavily perforated, 77" long, model # LACE. Two per rack.
 - d. Rear rail kit, 11-gauge, 10-32 threaded, model # WRK-RRxxx. One per rack.
 - e. Copper Bus Bar, model #BB-xx. One per rack.
 - f. Magnetic Work Light, model #WL-60. One per rack.
 - g. Custom rack mounts for equipment without rack ears, model #RSH-series.
 9. Mount racks as necessary to meet Zone 4 / NFPA 5000 seismic requirements, based on manufacturer recommendations.
 10. Provide the following for thermal management:
 - a. 10" fan, model #FAN-10. One per rack.
 - b. 10" fan guard, model #GUARD-10. One per rack.
 - c. Vent Blockers, model VBK-W27-W32. As required.
 - d. Proportional Speed Thermostatic Fan Control, model #FC-4. One per rack group.
 - e. Vent panels at bottom of rack, model VT-series. As required.
 11. Provide the following for power management:
 - a. Modular power raceway, model #MPR-x. One per rack.
 - b. Remote-switched 20A Isolated Ground outlets, model RLM-20IG.
 - c. Sequencing Controller, model #USC-6R.
 - d. Non-switching front-mounted convenience outlets. Minimum one duplex outlet per rack. Provide Triplite DRS-1215 or equal.
 - e. 20A Remote power module, model #RLM-20-1C. As required.
 - f. 30A Remote power module, model #RLM-30-L530-1. As required.
 - g. Provide jumpers and accessories as required.

- C. Floor Standing Swing-Out 19" Equipment Rack (Theater Stage & Booth):
 - 1. Provide Middle Atlantic SR-series. See drawings for exact sizes.
 - 2. 500 lb. weight capacity.
 - 3. All structural elements shall be finished in black powder coat.
 - 4. Rack shall be UL Listed.
 - 5. Provide the following options:
 - a. Solid Front Door, model #FD-xx.
 - b. Lacer strip, heavily perforated, 77" long, model # LACE. Two per rack.
 - c. Copper Bus Bar, model #BB-xx. One per rack.
 - d. Magnetic Work Light, model #WL-60. One per rack.
 - e. Custom rack mounts for equipment without rack ears, model #RSH-series.
 - 6. Provide the following for power management:
 - a. Modular power raceway, model #MPR-XX. One per rack.
 - b. Remote-switched 20A Isolated Ground outlets, model RLM-20IG. Quantity as required. Connect to master sequencing controller.
 - c. Non-switching front-mounted convenience outlets. Minimum one duplex outlet per rack. Provide Triplite DRS-1215 or equal.
 - d. Provide jumpers and accessories as required.
- D. Casework-Mounted Pull-out 19" Equipment Rack (Band/Choir/Piano):
 - 1. Provide Middle Atlantic Slim 5 series.
 - 2. Useable racking height shall be as shown in the equipment list; useable depth shall be 26-inches.
 - 3. 400 pound weight capacity.
 - 4. All structural elements shall be finished in black powder coat.
 - 5. Rack shall be UL Listed.
 - 6. Provide the following options:
 - a. "Light Walnut" top and side panels, model # TSP-5-xx-LW. As required.
 - b. Lacer bar. One per rack.
 - c. Rear rail kit, model #5ARxx. One per rack.
 - d. Custom rack mounts for equipment without rack ears, model #RSH-series.
 - e. Blank panels to fill empty spaces, model SB-xx
 - 7. Provide a rack-mounted sequenced power distribution panel as indicated in the equipment list.
 - 8. Provide the following for thermal management:
 - a. Dual rack-mount fan panel with thermostat, model UQFP-2. One per rack.
 - b. Vent panels at bottom of rack, model VT-series. One per rack.
- E. Connectors:
 - 1. Microphone and Line Level Audio
 - a. XLR-M, 3-pin:
 - 1) For panel-mount, Provide Neutrik NC3MD-L-1, 3-pole male XLR connector in black.
 - 2) For cable-end, provide Neutrik NC3MXX, 3-pole male connector.
 - b. XLR-F, 3-pin, Standard
 - 1) For panel-mount, Provide Neutrik NC3FD-L-1, 3-pole female XLR connector in black.
 - 2) For cable-end, provide Neutrik NC3FXX, 3-pole female connector.
 - c. XLR-F, 3-pin, Automixing (BLUE)
 - 1) For panel-mount, Provide Whirlwind WC3F, 3-pole female XLR connector in blue color shell.
 - 2) No colored trim rings allowed, such as Neutrik.
 - d. 1/4" Tip/Ring/Sleeve
 - 1) For panel-mount, Provide Neutrik NJ3FP6C, locking tip/ring/sleeve connector.
 - 2) For cable-end, provide Neutrik NP3X, tip/ring/sleeve connector.

- e. Phono
 - 1) For panel-mount, Provide Neutrik NF-2D series, with appropriate color isolation washer.
 - 2) For cable-end, provide Neutrik NF2C-B-2 "Profi" connector.
- f. MASS Multi-pin
 - 1) The MASS series of cables (with the exception of the 12-pair model) is a sexless multi-pin cabling system. Care shall be taken to configure the connectors appropriately.
 - 2) Configure MASS connectors using the manufacturer-recommended wiring scheme.
 - 3) Chassis Mount
 - a) 12-pair cable, provide W1CF, 39-pin chassis-mount female
 - b) 16-pair cable, provide W5CRP MicroMASS 48 pin chassis-mount
 - c) 28-pair cable, provide W6CRP MicroMASS 84 pin chassis-mount
 - d) 40-pair cable, provide W3CRP MASS 122 pin chassis-mount
 - e) 58-pair cable, provide W4CRP MASS 176 pin chassis-mount
 - 4) Cable End
 - a) 12-pair cable, provide W1IF or W1IM, 39-pin inline connector (as required)
 - b) 16-pair cable, provide W5IRP MicroMASS 48 pin inline connector
 - c) 28-pair cable, provide W6IRP MicroMASS 84 pin inline connector
 - d) 40-pair cable, provide W3IRP MASS 122 pin inline connector
 - e) 58-pair cable, provide W4IRP MASS 176 pin inline connector
 - 5) Solder Cup style connectors are not acceptable.
- 2. Wireworks AV-2000 "G-Block" multi-pin
 - a. This system is designed to handle both audio and video in the same connector, and is only used in cases where a portable stage manager's console exists.
 - b. For panel-mount, provide one G1/G2 male shell and strain relief, loaded with the application-appropriate modules (audio, video or data).
 - c. For cable-end, provide one G1/G2 female shell and strain relief, loaded with the application-appropriate modules (audio, video or data).
 - d. Provide Broadway Latching System (BLS) for all G-Block applications.
 - e. Provide the following repair kit for G-Block connectors:
 - 1) 10% spares of both male and female 16-gage contact
 - 2) 10% spares of both male and female coaxial contact
 - 3) 10% spares of Broadway latching system latches and keepers
 - 4) One coaxial extraction tool
 - 5) One coaxial crimp tool
 - 6) One 16-gage extraction tool
 - 7) One 16-gage crimp tool
- 3. Production Intercom:
 - a. XLR-M, 3-pin, Intercom (RED)
 - 1) For panel-mount, Provide Whirlwind WC3M, 3-pole male XLR connector in red color shell.
 - 2) No colored trim rings allowed, such as Neutrik.
- 4. Integrated Control Systems:
 - a. For panel-mount in configurations using legacy data and power bus (AxLink or Cresnet), provide Neutrik NC4FD-L-1, 4-pole female XLR connector.
 - b. For panel-mount in configurations using networked control bus, refer to RJ-45 data information below.
 - c. Cable-end configurations are project dependent. See drawings.
- 5. Loudspeaker:
 - a. For panel-mount in 2 or 4-conductor applications, use Neutrik Speakon NL4MP 4-pole connector.

- b. For panel-mount in 8-conductor applications, use Neutrik Speakon NL8MPR 8- pole connector.
 - c. For cable-end in 2 or 4-conductor applications, use Neutrik Speakon NL4FC 4- pole connector.
 - d. For cable-end in 8-conductor applications, use Neutrik Speakon NL8FC 8-pole connector.
6. Video:
- a. Production Video:
 - 1) For panel-mount, Provide Neutrik NBB75DFIB, Recessed bulkhead jack, feed through, isolated connector.
 - 2) For cable-end, provide Neutrik NBNC75P-series, push-pull style connector. Use appropriate connector for cable specified.
 - b. "F" Connector:
 - 1) For panel-mount, provide Cencom GF81 inline barrel connector with 1 GHz minimum performance.
 - 2) For cable-end, provide Cencom Superlock compression connector with 1 GHz minimum performance.
7. Data:
- a. RJ-45
 - 1) For panel-mount, provide Neutrik Ethercon NE8FDP-B feed-thru connector in black.
 - 2) For cable end, provide Neutrik Ethercon NE8MC-series connectors.
 - b. Fiber
 - 1) For panel-mount, provide Neutrik Opticalcon NO2-4FD feed-thru panel mount connectors.
 - 2) For cable end, provide Neutrik Opticalcon cables in quantities shown in 274116-A equipment list.
- F. Patchbays:
- 1. Microphone and Line Level Audio:
 - a. Provide Bittree 489 programmable series with 3-pin molex style termination with the following options:
 - 1) Longframe ¼"-style connectors
 - 2) 2x26 jacks with 12" deep chassis
 - 3) 2 designation strips in over/under configuration
 - 4) Mono spacing, 2 RU
 - 5) Isolated Grounding
 - 6) Normals per Drawings
 - 7) Black in color
 - 8) Paper designation strips. Provide .doc file to Owner for future use.
 - 9) Provide Middle Atlantic "CLAW" patchcord holder, one per rack.
 - b. Patchbay layout shall be in standard "output at top, inputs at bottom" scheme with clear method for showing normals. Contractor shall be responsible for exact patchbay layout.
 - c. Labeling shall be as follows:
 - 1) All labeling shall exactly match circuit in field.
 - 2) Labeling shall be sequential per circuit type, beginning at 1.
 - d. Or equal by AVP, Inc.
 - 2. Loudspeaker:
 - a. Provide AVP, Inc. WK-U212E3-NL4MP series with solder termination and the following options:
 - 1) 2x12 jacks with 12" deep chassis
 - 2) 2 designation strips in over/under configuration
 - 3) 2 RU
 - 4) Black in color

- 5) Paper designation strips. Provide .doc file to Owner for future use.
- b. Provide 2 output jacks from each amplifier channel. Configure as follows:
 - 1) Amplifier "A", Channel One Jacks:
 - a) Pins 1+/1- : Amp Channel One
 - b) Pins 2+/2-: Amp Channel Two
 - 2) Amplifier "A", Channel Two Jacks:
 - a) Pins 1+/1- : Amp Channel Two
 - b) Pins 2+/2-: No Connection
 - c) See Drawings for additional information.
 - d) Provide Middle Atlantic "CLAW" patchcord holder, one per rack.
3. Composite/HD-SDI Production Video:
 - a. Provide Bittree Video WECO Composite series Hi-Definition patchbay.
 - b. Provide the following configuration:
 - 1) WECO-style connectors
 - 2) 2x26 jacks with 12" deep chassis
 - 3) 2 designation strips in over/under configuration
 - 4) 2 RU
 - 5) Normals per Drawings
 - 6) Black in color
 - 7) Paper designation strips. Provide .doc file to Owner for future use.
 - 8) Provide Middle Atlantic "CLAW" patchcord holder, one per rack.
 - c. Or equal by AVP, Inc.
4. Data:
 - a. RJ-45
 - 1) Leviton Gigamax 6-series patchbays.
 - b. Fiber
 - 1) Corning Cable Systems LanScape CCH-series patchbays.

2.05 PANELS:

- A. General: The control receptacle panels shall consist of the appropriate connectors required for the system.
- B. Physical:
 1. Faceplates shall be 0.080" aluminum, edges eased, finished in fine texture, scratchresistant powder coat, with fasteners countersunk.
 - a. Panels specified as flush mounted shall overlap back box by 1/2". Surface mounted panels shall match back box size with no gaps or overlap.
 - b. Coordinate back box type, size and mounting with Division 26 - Electrical.
 2. Color shall be black unless otherwise noted.
 3. Panels noted as custom color shall be factory powder coated a color selected by the Architect. Legends shall be laser etched.
 4. Laser etched labels 1/4" high characters minimum, unless otherwise noted.
 - a. Labeling shall be as indicated on the Drawings.
 - b. Use Arial font.
 5. Wall mounted panels shall mount into an industry standard back box, depending on size and quantity of connectors.
 6. Rack mounted panels shall mount within industry standard equipment racks.
 7. Panels mounted in floor boxes shall include a translucent flexible vinyl dirt guard as indicated on Drawings.
 8. Provide complete hardware for mounting on gridiron hangers where indicated on the Drawings.
 9. Provide black aluminum cable tie-off bars on all panels 8" wide and larger, as indicated on the Drawings.
 - a. Keystone Electronics Corporation "Aluminum Oval Instrumentation Handles", part number 546, 5" wide x 2" deep handle. www.keyelco.com; 800-221- 5510

- C. Floor Pockets:
 - 1. Provide flush, floor mounted pockets with hinged steel cover and cable slot. Finish flat black, unless otherwise noted.
 - 2. Provide interior, flexible translucent PVC dirt guard to cover receptacles. Labels shall remain visible.
 - 3. Provide floor pocket backboxes and pour pans (if conditions warrant) to Division 26 - Electrical for installation.

PART 3 - EXECUTION

3.01 INSTALLATION- GENERAL:

- A. Coordinate with Division 26 - Electrical for the proper installation of the conduit, backboxes, and electrical service as specified herein.
- B. Coordinate scheduling and access with the Contractor and provide personnel lifts or ladders as required for access to the AV equipment.
- C. Remove all packing materials from the Project Site. Insert operations and maintenance information into the Project record documents as specified above in Submittals.
- D. Record Block Diagram: Post a laminated 11x17 as-built block diagram of the entire system (split into multiple sheets as necessary), and physically attached to the equipment rack in a logical location for Owner reference.

3.02 CABLE INSTALLATION:

- A. Mark cables, regardless of length, with permanent, non-handwritten number or letter cable markers within 6-inches of both ends. There shall be no unmarked cables in the system. Marking codes used on cables shall correspond to codes used on Drawings and schedules.
- B. As indicated on the Drawings, group cables according to signal type. Up to 6 separate conduit systems may be in place, divided as follows:
 - 1. A: Microphone Level Audio
 - 2. B: Line Level Audio
 - 3. C: Video and Communication Level
 - 4. D: Loudspeaker Level
 - 5. E: Empty/Future expansion
 - 6. F: Fiber Optic Level
- C. As much as possible, maintain separation of signal types when outside of conduit.
- D. No cable shall be installed with a bend radius less than recommended by the manufacturer.
- E. Cables types shall be as indicated on the Drawings. In plenum spaces, provide the plenum version of the specified cable type.

3.03 PROTECTION OF PROPERTY:

- A. Contractor is responsible to provide protection for all equipment, tools and materials delivered to the Project Site prior to final acceptance by Owner. Any loss or damage is the responsibility of the contractor, until final acceptance by Owner.

3.04 SEQUENCING:

- A. The contractor shall not install any electronic equipment until the room where the equipment shall be located has been finally painted or otherwise finished, and cleaned by the Contractor or Owner's Representative. Any damage to equipment resulting from failure to follow this requirement will result in the contractor replacing the damaged equipment at their cost.

3.05 COMMISSIONING AND DEMONSTRATION:

- A. Coordinate with Division 26 - Electrical.
- B. Appropriately trained personnel shall review, test, program and otherwise complete the system, following completion of installation.

- C. Upon completion of the installation, the Contractor shall notify the Architect that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the Architect's schedule.
- D. Audio System Tuning:
 - 1. Following complete system installation, each device shall be set for correct gain-staging.
 - a. This is best accomplished with an oscilloscope and a 400Hz tone generator, but other methods may be used.
 - b. If the system has been set correctly, the console's VU meters will be at zero when the system is accomplishing the specified dB-SPL level. Every device in the audio signal path should clip at the same level, maximizing headroom and keeping the noise floor to a minimum.
 - 2. System shall be tuned prior to final checkout by contractor, using a computer-based audio analysis program, such as SMAART, TEF, or SIMM. A factory-certified individual shall carry out the tuning.
- E. Cable Television System Tuning:
 - 1. Following complete installation, each device in the CATV system shall be tuned to exact an output of +5 dBmV, +/- 3 dBmV at the television output.
 - 2. Audio input at the modulator shall be set in accordance with the gain staging requirements covered in the audio sections.
 - 3. Video input at the modulator shall be set per manufacturer's guidelines.
- F. Provide to the Architect and or his Consultant the following upon arrival:
 - 1. Measurements of impedance of each loudspeaker prior to connecting it to an amplifier.
 - 2. Measurements confirming the polarity of each loudspeaker, from output of console through entire system.
 - 3. Measurements showing all Ethernet wiring complies with Category 5e or Category 6 requirements for full bandwidth operation.
 - 4. Verification that every line has been sweep tested and conforms to standard requirements per signal level.
 - 5. Measurements showing CATV output voltage at each TV outlet.
 - 6. Demonstration of input and output of signal throughout the entire audio system.
- G. Make available for review by the Architect and or his Consultant:
 - 1. All components for physical inspection and inventory.
 - 2. A computer to access any DSP units.
 - 3. All installed devices in full operation, with no temporary equipment in place.
 - 4. All portable devices, fully complete, and available to test at all plug-in locations.
 - 5. Test equipment, including:
 - a. High quality media for every presentation source
 - b. Video and RGBHV test generators
 - c. Portable TV with CATV receiver input
 - d. AC voltmeter
 - e. Sound level meter
 - f. Portable amplified loudspeaker
 - g. Waveform monitor (oscilloscope)
 - h. Audio analysis equipment (provides real time display, pink noise source, test oscillator, level and THD+N measurements)
 - i. Cablesets, adapters, and connectors for inserting the test equipment into and out of the system's user interfaces and connector plates.
- H. The Contractor shall be liable for any return visits by the Architect and/or his consultant as a result of incomplete or incorrect installation, or erroneous representation that the Systems are complete and ready for the Architect to carry out its work.
- I. The Contractor shall arrange for access as necessary for inspection of equipment by the Architect and or his consultant

- J. Upon completion of the commissioning, Contractor shall demonstrate operation and maintenance of the system to the Owner. Coordinate with the Owner's schedules two weeks in advance minimum.

3.06 TRAINING:

- A. Training shall include, but not be limited to:
 - 1. Safety precautions.
 - 2. Identification of all elements provided under this section.
 - 3. Maintenance, diagnostics and trouble shooting.
 - 4. Operation of system, including necessary software training.
 - 5. Operations and maintenance manual orientation.
- B. Provide 8 hours of training, minimum, split over two consecutive days.

3.07 PROJECT CLOSEOUT:

- A. See submittal section above for required closeout documents.

3.08 APPENDIX:

- A. 27 41 16-A Equipment List

**Solano College Theatre
 AV Systems Equipment List
 Section 274116**

- Notes: 1. Conduit, backboxes and electrical power required for AV systems are provided under division 26 work.
 2. This list contains key components, but does not list every piece needed for a complete system.
 Contractor is responsible to provide a complete and working system, regardless of the completeness of this list.
 3. A/R= As Required
 4. OFCI= Owner Furnished, Contractor Installed

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
MAIN THEATRE					
	Audio System				
	<i>Mixer/MultiChannel</i>				
1MA	Digital Audio Mixer	Yamaha	QL5	1	provide console lights & dust cover
2MA	Digital Audio Mixer, Remote Input, 16x8	Yamaha	RIO 1608-D	2	
3MA	Rackmount Light/Power Unit for Remote Input	Furman	PL-8C	2	
4MA	Road Case for Remote Input Units	Anvil	ATA-Style	2	
5MA	Ruggedized CAT cable w/ Ethercon, 25'-0"	Gepco	A/R	4	ethercon both ends
6MA	Ruggedized CAT cable w/ Ethercon, 50'-0"	Gepco	A/R	2	ethercon both ends
7MA	MASS to Fan-Out, Console I/O Snake, 25', 58-pr	Whirlwind	FM Series	1	Mix
8MA	<i>Automixer/DSP</i>				
9MA	Audio DSP matrix / automixer	Biamp	Tesira Server I/O	1	
10MA	Audio DSP Dante card, 64x64	Biamp	DAN-1	1	
11MA	Audio DSP Input card, 4-ch	Biamp	SIC-4	5	
12MA	Audio DSP Output card, 4-ch	Biamp	SOC-4	4	
13MA	<i>Outboard Equipment Rack</i>				
14MA	Rackmount Light/Power Unit	Furman	PL-8C	1	
15MA	CD Playback	Tascam	CD-500B	2	
16MA	Computer-Based Effects Playback Computer	Apple	Mac Mini	1	see specs for further info, provide key/mouse
17MA	Outboard optical drive	Apple	Superdrive	1	
18MA	Wireless keyboard & mouse	Apple	A/R	1	
19MA	Mac Mini Rackmount	Sonnettech	RackMac mini		
20MA	Computer-Based Effects Playback Software	Figure 53	Q-Lab Pro Audio	1	
21MA	Dante Virtual Soundcard Software	Audinate	Virtual Soundcard	1	
22MA	Rack Mounted Keyboard shelf	Middle Atlantic	KB-SS	1	
23MA	19" LCD Monitor	Samsung	Syncmaster Series	1	
24MA	Monitor Mount, desktop style	Ergotron	A/R	1	bolt to top of rolling rack
25MA	USB to MIDI interface	M-Audio	MIDISport 2x2	1	
26MA	Multi-Format I/O Panel	Contractor	Custom	1	see drawings
27MA	Custom Snake, 25'-0"	Whirlwind	A/R	1	

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
28MA	Rack Mounted Drawer	Middle Atlantic	A/R	1	fill empty spaces
29MA	Rolling Rack Case, 20RU	Anvil Style ATA	A/R	1	no SKB
30MA	Wireless Mic System				
31MA	Wireless Mic Handheld TX & RX	Sennheiser	ew 335 G3	2	provide rack mount
32MA	Bodypack Transmitter	Sennheiser	SK 300 G3	2	
33MA	Bodypack Microphones	Countryman	B-3	3	Beige color
34MA	Antenna Distribution	Sennheiser	ASA 1/NT	1	
35MA	Directional Antennas	Sennheiser	A 12AD	2	provide mounting
36MA	Battery Pack	Sennheiser	BA 2015	4	
37MA	Battery Charger	Sennheiser	L2015 & LA2	2	
38MA	Loudspeaker System				
39MA	Main Loudspeaker, Center	JBL	AM 7215/26	1	BiAmp
40MA	Main Loudspeaker, L/R	JBL	AM 7215/95	2	BiAmp
40MA	Pit Fill Loudspeakers	JBL	AM 5212/26	1	Full Range
41MA	Delay Loudspeaker	JBL	AM 5212/95	2	Full Range
41MA	Subwoofer Loudspeaker, "SW"	JBL	ASB 7118	2	
42MA	Audio Amplifier, 4-ch, HF, 250W, 8 ohm	Lab Gruppen	C 10-4X	1	
42MA	Audio Amplifier, 4-ch, LF, 1200W, 8 ohm	Lab Gruppen	C 68-4	1	
43MA	Audio Amplifier, 2-ch, Sub, 2400W	Lab Gruppen	FP 3400	1	
43MA	Audio Amplifier, 4-ch, 250W, patch	Lab Gruppen	C 16-4X	2	
44MA	Utility				
44MA	Audio Patchbay, 1/4" longframe	Bitree/AVP	A/R	A/R	see specs for further info
45MA	Audio Combining Networks	Radio Design Labs	STD-600	2	
45MA	Audio Isolation Transformers	Radio Design Labs	TX-AT1	2	
46MA	Ethernet Switch "A" & "E", Dante Compatible	Cisco	A/R	2	
46MA	Data Patchbay / RJ-45	Leviton	Gigamax Series	A/R	see specs for further info
47MA	Loudspeaker Patchbay	AVP	WK-U212E3-NL-4MP	A/R	see specs for further info
47MA	Equipment Racks & Accessories, Booth & Amp	Middle Atlantic	WRK series	A/R	see specs for further info
48MA	Equipment Racks & Accessories, Stage, Control Suite	Middle Atlantic	SR Series	A/R	see specs for further info
49AV	Rack Drawer	Middle Atlantic	D4	4	2 @ booth, 2 @ stage
48MA	Power Raceway	Middle Atlantic	MPR Series	A/R	
49MA	Motorized Breaker Control	LynTec	SS2-LRP	1	
49MA	UPS Unit	Middle Atlantic	UPS-1000R-8IP	2	1x: Booth, 1x: Amp
50MA					
50MA					
51MA	Miscellaneous Hardware				
51MA	Wire & Cable				
52MA	Labor				

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	Video Systems				
	<i>Switching/Transport</i>				
1VI	AV Switcher	Extron	IN1608	1	
2VI	HDMI/VGA Transmitter, Decora	Extron	DTP T UWP 332 D	2	stage
3VI	HDMI/VGA Transmitter, Brick	Extron	DTP T USW 333	1	Portable
4VI	HDMI/VGA Receiver	Extron	DTP HDMI 330 RX	2	Portable & Projector
5VI	HDMI/VGA Transmitter, Brick, Portable Case	Pelican	A/R	1	
6VI	Ruggedized STP CAT cable, 25'-0"	Gepco	A/R	1	ethercon one end for brick TX
7VI	<i>Projection</i>				
8VI	Video Projector, 12k lumen, 1920x1200, DLP	Digital Projection	Mvision WUXGA 930	1	
9VI	Video Projector Lens	Digital Projection	A/R	1	
10VI	Video Projector, Spare Lamp Module, Long Life	Digital Projection	A/R	2	
11VI	Projector Lift, 16' travel	DDI Lifts	DL3W-16	1	
12VI	Ceiling Closure Frame	DDI Lifts	OPT-1	1	
13VI	Projector Mounting Adapter	DDI Lifts	XXX	1	match projector
14VI	Prewire Option	DDI Lifts	OPT-11B	1	
15VI	Projection Screen, 16:10 ratio, motorized roll down	Da-Lite	Prof. Electrol	1	Size:~134" x 214" plus ~ 7.5' black drop
16VI	Projection Screen, Low Voltage Control	Da-Lite	LVC	1	
17VI	<i>Monitoring / Playback</i>				
18VI	16" Color Monitor & Receiver, HDCP, Tuner	Viewsonic	VT1602-L	2	(1x stage right rack, 1x booth)
19VI	16" Color Monitor & Receiver Rackmount	Middle Atlantic	RSH Series	2	
20VI	Blu-Ray Player, RS-232	Oppo	BDP-103	1	or equal
21VI	<i>Utility</i>				
22VI	HD Color Camera, Fixed	Marshall	CV340-CSB	2	Configure (1) for low-light/IR use
23VI	HD Color Camera Lens	A/R	A/R	2	provide full stage shot
24VI	Camera Mount	Contractor	A/R	2	
25VI	Infrared Illuminator, 120-degree, 850nm, Long Range	Axon	Orion-L	2	or equal; provide with c-clamp
26VI	Composite Video DA, 1x6	Extron	DA 6V EQ	2	Provide Rack mount
27VI	HD-SDI DA, 1x4	Black Magic Design	Mini Converter SDI Distribution	2	Provide Rack mount
28VI	Small LCD monitor wall mount	Chief Mfg	LTMU	6	or equal; support spaces
29VI	Large LCD monitor wall mount	Chief Mfg	XTMU	2	or equal; lobby
30VI	<i>Cable TV</i>				
31VI	CATV Modulator, Clear QAM & IP, 2-ch	Contemporary Research	QMOD-SDI2	1	provide rack mount
32VI	CATV Passive Combiner & Amplifier	Blonder Tongue	HAD-8-860-20	1	
33VI	CATV Accessories	Blonder Tongue	As Required	A/R	taps, splitters, etc.
34VI	<i>Portable SM Station</i>				
35VI	Dual 7" LCD Monitor, Rackmount, HD-SDI & CV	DataVideo	TLM-702HD	1	SM Station
36VI	Portable Case for 7" Color monitor	SKB	A/R	1	
37VI					
38VI					
39VI	Miscellaneous Hardware				
40VI	Wire & Cable				
41VI	Labor				

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	Assistive Listening				
1AL	FM Transmitter	Listen Technologies	LT-800	1	
2AL	FM Transmitter Rackmount	Listen Technologies	LA-326	1	
3AL	FM Transmitter Antenna	Listen Technologies	LA-125	1	
4AL					
5AL					
6AL	Miscellaneous Hardware				
7AL	Wire & Cable				
8AL	Labor				
	Production Intercom				
1PI	Remote Station, 2 ch	Clear-Com	RM-702	2	Portable SM, Stage
2PI	Master Station, 2 ch	Clear-Com	MS-702	1	Booth
3PI	Custom Button Panel	Custom	Custom	3	Portable SM, Stage, Booth
4PI	Gooseneck Mic	Clear-Com	GM-9	3	
5PI	Wall Station	Clear-Com	HB-702	2	1x: Green Room; 1x: HM
6PI	Handset w/ Cradle & earset kill switch	Clear-Com	HS-6	2	For HB-702; use right-angle XLR.
7PI	Wireless Intercom System	HME	DX210 System	1	w/(4) beltpacks & pouch, (5) HS-15 headsets, (8) batteries, (1) AC40A battery charger
8PI	Wireless Intercom Antenna Rack Kit	HME	RMK 1-RU	1	
9PI					
10PI					
11PI	Miscellaneous Hardware				
12PI	Wire & Cable				
13PI	Labor				
	Program & Paging				
1PM	Microphone for PGM system	Audio-Technica	AT8035	1	
2PM	Shock Mount for PGM Mic	Audio-Technica	AT8415	1	Provide c-clamp; mount to catwalk rail
3PM	Audio DSP Logic Expansion	Biamp	Tesira EX-LOGIC	3	use main DSP
4PM	Dante Line Input, Decora	AtteroTech	unD3IO	1	scene shop
5PM	Amplifier for PGM Systems, 2-CH, 70V, 300w/ch	QSC	ISA 300Ti	2	
6PM	Program/Paging Speakers- Ceiling (SC)	Electro-Voice	EVID C4.2	29	
7PM	Program/Paging Speakers- High Ceiling (SHC)	Electro-Voice	EVID C8.2HC	0	
8PM	Program/Paging Speakers- Pendant (SHP)	Soundtube	RS500i	16	
9PM	Paging Horn, 70v	TOA	CS-304	2	
10PM	70V Volume Control "SA"	Atlas	AT-100-RM	5	
11PM	70V Volume Control w/ Toggle Override "SAT"	Atlas/ Custom	AT-100-RM & Toggle	5	
12PM	70V Volume Control w/ Key Override "SAK"	Atlas/ Custom	AT-100-RM & Key	8	

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
DRAMA CLASSROOM					
	<i>Classroom AV System</i>				
	<i>Not In Contract</i>				
	Drama AV System				
1AV	Rackmount Light/Power Unit	Furman	PL-8C	1	
2AV	Digital Mixer	Yamaha	QL1	1	
3AV	CD Playback	Tascam	CD-500B	2	
4AV	Loudspeaker Amplifier, 4-ch	Lab Gruppen	E 10-4x	1	
5AV	25' loudspeaker extension cord	A/R	A/R	1	
6AV	25' electrical power extension cord	A/R	A/R	1	
7AV	Tilt-Up Rolling Rack	SKB Cases	Mighty Gig Rig	1	
8AV	Tilt-Up Rolling Rack, Expander	SKB Cases	Mighty Gig Rig Expander	1	
9AV	Tilt-Up Rolling Rack, AV Shelf	SKB Cases	Mighty Gig Rig AV Shelf	1	
10AV	Tilt-Up Rolling Rack, 6RU Rear Rail Kit	SKB Cases	Mighty Gig Rig Rear Rails	1	
11AV	Tilt-Up Rolling Rack, Gig Dolly	SKB Cases	Gig Dolly	1	
12AV	4RU Rack Drawer	Middle Atlantic	A/R	1	
13AV	<i>Pipe Grid</i>				
14AV	Loudspeaker, Passive	JBL	AC18/26	4	provide yoke & (2) c-clamps
15AV					
16AV					
17AV	Miscellaneous Hardware				
18AV	Wire & Cable				
19AV	Labor				

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
RECORDING STUDIO					
	Audio Recording- Control Room				
1AV	Digital Mixing Console	Avid	C 24	1	
2AV	Digital Mixing Console, Cable Kit	Avid	C 24 Cable Kit	1	
3AV	Digital Mixing Console, Aviom Interface	Aviom	AN-16i	1	Musician Monitor
4AV	4-ch Outboard Mic PreAmp	Neve	Portico 5024	1	
5AV	Summing Mixer, 16-ch	Neve	5059 Satellite	1	
6AV	Recording Computer				
7AV	Recording Computer w/ wireless kybd & mouse	Apple	Mac Pro Cylinder	1	see specs for further info
8AV	Outboard optical drive	Apple	Superdrive	1	
9AV	Computer-Based Recording Software	Avid	ProTools HD	1	latest version
10AV	Computer-Based Recording Digital Audio I/O interface	Avid	ProTools HD Thunderbolt	1	
11AV	Computer-Based Recording Digital Audio I/O	Avid	ProTools HD I/O 16x16 Analog	1	
12AV	Dante Virtual Soundcard Software	Audinate	Virtual Soundcard	1	
13AV	Computer-Based Recording MIDI I/O	M-Audio	MIDISport 4x4	1	
14AV	Portable Hard Drive, 2TB	Glyph	Studio Mini	2	provide USB3.0 cables & rack mount
15AV	Monitoring-Audio				
16AV	Control Room Monitoring Loudspeaker L/R/Sub, Powered	Genelec	8030.LSE Stereo Pak	1	
17AV	Monitoring Loudspeaker, Wall Mount	Omnimount	A/R	2	
18AV	Studio Room Monitor Mic	Crown	PZM-11-LL	3	
19AV	Studio Room Monitor Mic PSU/Power Injector	Crown	PH-1A / PS-24	1	
20AV	Musician Monitoring System; Distribution Hub	Aviom	D800- Dante	1	
21AV	Monitoring- Video				
22AV	24" LED Monitor, DVI, HDCP Compliant	Samsung	A/R	2	
23AV	24" LED Monitor; Articulating Mounting Arms	Ergotron	Neoflex LCD Arm	2	
24AV	40" LCD Monitor, HDMI Input	Samsung	400FP3	2	or equal
25AV	40" LCD Monitor Mount	Chief Mfg	A/R	2	
26AV	Thunderbolt to HDMI	Black Magic	UltraStudio Mini Monitor	4	
27AV	Long-Length HDMI Cable	FSR	Digital Ribbon	2	
28AV	Utility				
29AV	Audio Patchbay, 1/4" longframe, Programmable	Bitree	489 Programmable Series	A/R	see specs for further info
30AV	Ethernet Switch, Gigabit, 24 port; Rackmount, Dante	Cisco	A/R	1	or equal
31AV	Data Patchbay / RJ-45 (Data)	Leviton	Gigamax 5e Series	A/R	see specs for further info
32AV	Audio Combining Networks	Radio Design Labs	STD-600	2	
33AV	Audio Isolation Transformers	Radio Design Labs	TX-AT1	2	
34AV	Power sequencing control	LynTec	SS2LRP	1	connect to motorized breakers
35AV	Power Raceway	Middle Atlantic	PD-915R	2	
36AV	UPS System	Furman	F1000-UPS	1	

Section 31 0000
EARTHWORK AND GRADING

PART 1 – GENERAL

1.1 SUMMARY

- A. This section describes general requirements, products, and methods of execution relating to on-site earthwork. Any work within the public right-of-way shall be constructed to the standards of Solano County, and the State of California Department of Transportation. Earthwork includes, but is not limited to, the following:
 - 1. Grading.
 - 2. Material.
 - 3. Excavation.
 - 4. Filling and Backfilling.
 - 5. Soil Sterilant.
 - 6. Termiticide.

- B. Provide labor, material and equipment and services necessary to complete the excavations, recompaction and finish grading as specified and indicated on Plans.
 - 1. Obtain permit from local authorities.
 - 2. Provide surveying for grading operations.
 - 3. Provide shoring design.
 - 4. Provide dewatering operations.
 - 5. Provide Site grading, cut, fill and finish.
 - 6. Provide excavation and backfill for filling construction, including trenches within building lines.
 - 7. Preparation for subgrade for building slabs, walks, pavements, and landscaping.
 - 8. Provide distribution of stockpiled topsoil.
 - 9. Provide sub-base course for walks and pavements.
 - 10. Provide sand and gravel for capillary break/moisture barrier under building slabs.
 - 11. Provide sub-surface drainage backfill for walls and trenches.
 - 12. Provide Engineered fills for building slabs and foundations.

- C. The work includes removal and legal disposal off the site of debris, rubbish and other materials resulting from clearing and grubbing operations.

- D. Work specified in Related Sections:
 - 1. Section 31 1000 – SITE PREPARATION.
 - 2. Section 31 2333 – TRENCHING, BACKFILLING AND COMPACTING.

1.2 DEFINITIONS

- A. Engineered Fill:
 - 1. Soil or soil-rock material approved by Project Manager and transported to the site by the Contractor in order to raise grades or to backfill excavations.
 - 2. The District's Testing Agency will make sufficient tests and/or observations for the purpose of issuing a written statement that specification requirement.

- B. On-site Material: Soil or earth material obtained from required on-site excavation.

- C. Excavation: Consists of the removal of material encountered to subgrade elevations and the re-use or disposal of materials removed.
- D. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below sub-base, drainage fill, or topsoil materials.
- E. Borrow: Soil material obtained off-site when sufficient approved soil material is not available from excavations.
- F. Base Course: The layer placed between the sub-base and surface pavement in a paving system.
- G. Relative Compaction: In-place dry density of soil expressed as percentage of maximum dry density of same materials, as determined by laboratory test procedure American Society for Testing and Materials (ASTM) D1557.
- H. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below top soil, rock base course, or drainage fill.

1.3 SYSTEM DESCRIPTIONS

- A. Requirements:
 - 1. Grades and elevations are to be established with reference to bench marks referenced on Plans.
 - 2. Maintain Engineering markers such as monuments, bench marks and location stakes. If disturbed or destroyed, replace.
- B. Criteria:
 - 1. The character of the material to be excavated or used for subgrade is not necessarily as indicated.
 - 2. Ground water elevations indicated are those existing at the time subsurface investigations were made and do not necessarily represent ground water elevation at the time of construction.
 - 3. Blasting will not be permitted.
 - 4. Remove material in an approved manner.
- C. Shoring Design: Where shoring is required by State Law or determined by the Contractor to be necessary, provide proposed excavation shoring method for review prior to commencement of excavation requiring shoring. Include the following information:
 - 1. Basic design assumptions.
 - 2. Design Calculations.
 - 3. Describe materials or shoring system to be used.
 - 4. Indicate whether or not any components will remain after filling or backfilling.
 - 5. The shop plans for the proposed shoring system.
 - 6. Coordinate with the Construction Documents and identify any proposed modifications or deviations.
 - 7. Certification of the above by a registered professional civil or structural Project Manager licensed by the State of California.
- D. Dewatering Plan: Based upon site surface and subsurface conditions, including available geotechnical and hydrological data, provide a system to perform the following:
 - 1. Lower the ground water level two feet below the bottom of excavation.
 - 2. Relieve the hydrostatic pressure below the subgrade to prevent uplift.
 - 3. Prevent surface drainage from accumulating within work area.

4. Legally discharge and dispose of excess water.
5. Submit description of basic components of proposed dewatering system and its planned method of operation.

E. Safety:

1. The Contractor shall take all necessary precautions to eliminate the exposure of workers, students, staff and the public to asbestos fibers, including but not limited to: dust control measures and measures included in Section 93106 and Section 93105 of California Code of Regulations, Title 17.

1.4 SUBMITTALS

- A. Comply with provisions of Section 01 3300 - SUBMITTALS.
- B. Product Data: Manufacturer's literature and data, including, where applicable, capacity, labels, or other markings on equipment made to the specified standards for materials, for the following:
 1. Imported materials.
 2. Class II aggregate base (CDT Section 26).
 3. Storm Water Pollution Prevention / Erosion Control Plans.
 4. Permit/Notice of Intent (N.O.I.), for discharge of storm run-off from the construction site.
 5. Soil Sterilant.
 6. Termiticide.
- C. Test Reports: Submit following reports for import material directly to Project Manager from the Contractor's testing services:
 1. Test reports on borrow material.
 2. Density test reports.
 3. One optimum moisture-maximum density curve for each type of soil encountered.
 4. Report of actual unconfined compressive strength and/or results of bearing test of each strata tested.
 5. At least one laboratory optimum moisture - maximum dry density curve for each type of soil encountered.
- D. Shoring Design: Submit 4 copies of shoring design and shop plans; none will be returned unless a concern is observed.
- E. Submit description of dewatering methods proposed for use.
- F. Submit description of vibratory compactors proposed for use when requesting placement of backfill and fill materials in layers greater than 6 inches thick.
- G. Samples:
 1. 20-lb. Samples, sealed in air-tight containers, of each proposed fill and backfill soil material from on-site or borrow sources.
 2. 12-by-12 inch sample of filter fabric.

1.5 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies:
 1. Comply with State of California Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."
 2. Comply with State of California Code of Regulations (CCR).

3. Comply with State of California Construction Safety Orders, Latest Edition (CAL/OSHA).
 4. San Mateo Department of Public Works, Standards and Specifications and Plans.
- B. Soil Testing:
1. District will engage a geotechnical testing agency, to include testing soil materials proposed for use in the work and for quality control testing during excavation and fill operations.
- C. Codes and Standards:
1. Perform excavation work in compliance with applicable requirements of authorities having jurisdiction.
 2. Storm Water Pollution Prevention and Monitoring Plan to be prepared by others.
 3. Statewide General Permit to Discharge Storm Water associated with construction activity.
- D. Comply with the latest editions of the following Standards and Regulations:
1. American Society for Testing and Materials (ASTM):
 - a. C33: Concrete Aggregates.
 - b. C125: Standard Terminology Relating to Concrete and Concrete Aggregates.
 - c. C136: Sieve Analysis of Fine and Coarse Aggregates.
 - d. C566: Total Evaporable Moisture Content of Aggregate by Drying.
 - e. D421: Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants.
 - f. D422: Particle Size Analysis of Soil.
 - g. D854: Specific Gravity of Soils.
 - h. D1556: Density of Soil by the Sand Cone Method.
 - i. D1557: Laboratory Compaction Characteristics of Soil Using Modified Effort
 - j. D2216: Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures.
 - k. D2487: Classification of Soils for Engineering Purposes.
 - l. D2922: Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
 - m. D2937: Density of Soil in Place by Drive Cylinder Method.
 - n. D3017: Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
 - o. D4318: Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 2. California Code of Regulations, Title 24, Part 2 - Basic Building Regulations, Chapter 24 - Excavations, Foundations, and Retaining Walls.
 3. California Department of Transportation (CDT) Standard Specifications:
 - a. Section 17: Watering
 - b. Section 18: Dust Palliative
 - c. Section 19: Earthwork.
 4. CAL/OSHA, Title 8.
 5. Other authorities having jurisdiction
- E. Geotechnical Engineering Services:
1. Geotechnical Engineer will observe grading observations during preparation onsite, excavation, and compaction of fill materials.
 2. Make visits to site to familiarize himself generally with progress and quality of work.
 3. Make field observations and tests to enable him to form opinions regarding adequacy of site preparation, acceptability of fill materials and extent to which earthwork construction and relative compaction comply with specifications requirements.
 4. Examine conditions exposed in foundation excavations.
- F. Site Information:

1. Soil borings and other exploratory operations may be made by Contractor at no cost to District. Submit proposed boring locations for review prior to performing the work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect materials of this section before, during and after installation; objects designated to be retained; and the installed work of other trades.
- B. In the event of damage to any of these items, immediately make repairs or replacements necessary to the acceptance of the Project Manager and at no additional cost to the District.
- C. Comply with provisions of Section 01 5000 - TEMPORARY FACILITIES AND CONTROLS where necessary to control dust and noise on and near the work caused by operations during performance of the Work.

1.7 PROJECT CONDITIONS

- A. Environmental Requirements:
 1. When unfavorable weather conditions necessitate interrupting filling and grading operations, prepare areas by compaction of surface and grading to avoid collection of water.
 2. Provide adequate temporary drainage to prevent erosion.
 3. After interruption, reestablish compaction specified in last layer before resuming work.
 4. Protect existing storm drainage system from silt and debris resulting from construction activities. If contamination occurs, remove contamination at no cost to District.
 5. Protect existing streams, ditches and storm drain inlets from water-borne soil by means of straw bale dikes, filter fiber dams, or other methods as approved by the Project Manager.
- B. Barricade open excavations and post with warning lights.
 1. Comply with requirements of Section 01 5000 - TEMPORARY FACILITIES AND CONTROLS.
 2. Operate warning lights as recommended by authorities having jurisdiction.
 3. Protect structures, utilities, sidewalks, pavements, and other facilities immediately adjacent to excavations, from damages caused by settlement, lateral movement, undermining, washout and other hazards.
- C. Protection of Subgrade: Do not allow equipment to pump or rut subgrade, stripped areas, footing excavations, or other areas prepared for project.
- D. At Contractor's option, a working pad of granular material may be laid to protect footing and floor subgrade soils from disruption by traffic during wet conditions.
- E. Transport all excess soils materials by legally approved methods to disposal areas.
 1. Coordinate with the Project Manager.
 2. Sufficient topsoil and fill material shall be retained from the site to complete project requirements.
 3. Any additional topsoil and fill requirements shall be the responsibility of the Contractor.
- F. Use of explosives will not be permitted.
- G. Dust Control Requirements: At all times during earthwork operations and until final completion and acceptance of the earthwork, the Contractor shall prevent the formation of an airborne dust and dirt nuisance from interfering with the surrounding normal operations. The Contractor shall

effectively stabilize the site of work in such a manner that it will confine dust particles to the immediate surface of the work and to obtain a minimum of 40 percent emissions reduction by applying a dust palliative. The dust palliative shall be non-petroleum based. Water alone is not considered to be a dust palliative. The dust palliative shall be applied at the rate and method in conformance with Section 18, "Dust Palliative," of the CDT Standard Specifications and as recommended and/or specified by the manufacturer. Contractor shall assume liability for all claims related to dust and dirt nuisances.

1.8 EXISTING UTILITIES

- A. The Contractor shall contact local utility agencies prior to construction and arrange for the shut-off of all utilities serving the buildings to be demolished. Coordinate work required to abandon active lines with the Project Manager and the District.
- B. Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during excavation operations.
- C. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult utility Project Manager immediately for directions.
 - 1. Cooperate with the District and public and private utility companies in keeping their respective services and facilities in operation.
 - 2. Repair damaged utilities to the satisfaction of the utility District.
- D. Do not interrupt existing utilities serving facilities occupied and used by the District or others, except when permitted in writing by Project Manager and then only after acceptable temporary utility services have been provided.

1.9 SEQUENCING AND SCHEDULING

- A. The sequence of operations shall be reviewed by the Project Manager prior to commencement of any work.
- B. Coordinate operations with relocation of existing utilities.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. General:
 - 1. Fill material will be subject to approval of the Geotechnical Engineer.
 - 2. For approval of imported fill material, notify the Project Manager at least 7 days in advance of intention to import material, designated proposed borrow area, and permit the Geotechnical Engineer to sample as necessary from borrow area for purpose of making acceptance tests to prove quality of material.
 - 3. The Geotechnical Engineer's report on acceptability shall be final and binding.
 - 4. During grading operations, soil types other than those analyzed in the geotechnical report for the project, may be encountered.
 - 5. Consult the Geotechnical Engineer to determine the suitability of these soils.
- B. Engineered Fill Material: Soil excavated from site or imported conforming to requirements for fill material.

1. Imported materials should have a plasticity index not less than 5 nor greater than 15, as determined by ASTM D4318; and expansion index not exceeding 20, as determined by UBC Specification 29-2; and a particle size not exceeding 3 inches as determined by ASTM D422.C.
- C. Topsoil: Friable clay loam surface soil found in a depth of not less than 10 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones and other objects over 2 inches in diameter, and without weeds, roots and other objectionable material.
 1. Use topsoil for top 2 feet of fill against exterior walls, except at paving, sidewalks, and slabs.
 2. Topsoil may also be used beyond the area within 5 feet of building, except under paving and sidewalks.
 3. Confirm suitability of stockpiled materials.
- D. Sand: Clean, well-graded fine to coarse sand with not more than 2 percent passing the #200 sieve based on wet sieve analysis.
 1. Provide 2-inch layer under building slabs on grade or as specified by the geotechnical report for this project.
 2. Provide at other locations indicated.
 3. Where coarse sand is required, provide sand no finer than No. 40 sieve.
- E. Graded Rock Base:
 1. Bedding for utility piping: Washed, uniformly graded mineral aggregate ASTM D448 with percentage composition of dry weight conforming with following limits:
 - a. Passing 1-inch Sieve: 100 percent.
 - b. Passing 3/4-inch Sieve: 90-100 percent.
 - c. Passing No. 4 Sieve: 0-10 percent.
 2. Base at Slab-on-Grade: As specified in the geotechnical report for this project.
 3. Absorption of water to saturated-surface dry condition shall not exceed 3 percent of oven-dry weight of a sample.
- F. Backfill material for use behind retaining walls shall be a granular material consisting of sand, broken rock, or a mixture of sand and gravel containing no size larger than 2 ½ inches and not more than 15 percent passing the No. 200 sieve.
- G. Imported Fill Requirements: Imported fill, where required, shall be non-expansive granular soil, free of organic matter and deleterious substances. Imported fill material shall conform to the following requirements:
 1. Grading:

<u>U. S. Sieve Size</u>	<u>Percentage Passing Sieve</u>
2 ½ inch	100
No. 8	25-45
No. 200	0-10
 2. Be thoroughly compactable without excessive voids.
 3. Meet the following plasticity requirements:
 - a. Maximum Plasticity Index of 12, as determined by ASTM D4318.
 - b. Maximum Liquid Limit of 35, as determined by ASTM D4318.
- H. Imported Fill for Planting Areas: Imported fill for use in planting areas shall be sandy loam weed free soil. Submit analysis from certified Soil and Plant Lab. Coordinate with Landscape Engineer.
- I. Pea Gravel: 3/8 inch to ½ inch washed, uncrushed gravel. Use at drainage pipe and at other locations indicated.

- J. Filter Fabric: Provide filter fabrics that meet or exceed the listed minimum physical properties determined according to ASTM D4759 and the referenced standard test method in parentheses.
 - 1. Grab Tensile Strength (ASTM D4632): 100 lb.
 - 2. Apparent Opening Size (ASTM D4751): #100 U.S. Standard sieve.
 - 3. Permeability (ASTM D4491): 150 gallons per minute per square foot.

- K. Drainage Pipe:
 - 1. Perforated corrugated plastic drainage tubing meeting ASTM F405, with continuous integral nylon filter screen.
 - 2. Acceptable Manufacturers and Products: Advanced Drainage Systems "DrainGuard," Hancor "Agri-Flow."
 - 3. Provide couplings, elbows and other fittings as recommended by pipe manufacturer.

- L. Water: Clean and free from deleterious amounts of acids, alkalis, salts and organic matter.

2.2 SOIL STERILANT

- A. Soil Sterilant shall be Treflan E.C. or approved equivalent.

2.3 TERMITICIDE

- A. Termiticide shall be Permethrin, Denon, or approved equivalent.

PART 3 – EXECUTION

3.1 GENERAL

- A. Prior to commencement of earthwork, become thoroughly familiar with site conditions.

- B. In the event discrepancies are found, immediately notify the Project Manager in writing, indicating the nature and extent of differing conditions.

- C. No earthwork shall be performed without physical presence or acceptance of the Geotechnical Engineer.

- D. The Geotechnical Engineer's acceptance is required by these specifications; notify the Project Manager at least 48 hours prior to commencing any phase of earthwork.
 - 1. No phase of work shall proceed until prior phase has been accepted by the Geotechnical Engineer.
 - 2. Work shall not be covered up or continued until acceptance of the Geotechnical Engineer shall give written notice of conformance with the specifications upon completion of grading.

- E. Compacting:
 - 1. Compact by power tamping, rolling or combinations thereof as accepted by the Geotechnical Engineer.
 - a. Where impractical to use rollers in close proximity to walls, stairs, etc., compact by mechanical tamping.
 - b. Scarify and recompact any layer not attaining compaction until required density is

obtained.

2. Compaction by flooding, ponding or jetting will not be permitted, unless specifically accepted by the Geotechnical Engineer.

F. Hazardous Materials

1. If any materials are encountered that may be hazardous (as defined in Section 25117 of the California Health and Safety Code), inform the Project Manager verbally within 24 hours and in writing within 2 business days. Upon discovery, material is to remain undisturbed until investigation by Project Manager is complete. The removal and disposal of hazardous materials, if discovered, is not part of the scope of work of this Division for this project.

3.2 SITE PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities which are to remain from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations. Set up tree protection measures prior to commencing grading or demolition operations.

B. Clearing and Grubbing:

1. Remove from area of designated project earthwork all improvements and obstructions, including designated concrete curbs or slabs, asphaltic concrete, all tree and shrub roots, any buried utility and irrigation lines, and other matter determined by the Geotechnical Engineer to be deleterious.
 - a. In all new planting areas, remove existing base material.
 - b. Use only hand methods for grubbing inside the drip line of trees indicated to be left standing.
2. Retain on the site all trees and shrubs, unless otherwise indicated on the plans as existing trees to be removed.
3. Remove or fill existing basements left from removed structures as appropriate to areas. Compact in accordance with requirements of these specifications.
4. Removed material shall become property of the Contractor and shall be removed from site, unless otherwise indicated on the plans or specified herein.
5. Holes resulting from removal of underground obstructions that extend below finish grades shall be cleared and backfilled with Engineered fill.
6. Existing Trees to remain:
 - a. Verify the locations of existing trees to be preserved.
 - b. Replace existing trees to remain that are damaged during construction at no additional cost to the District and provide replacement specimens of same species per coordination with the Project Manager.
 - c. Carefully make clean cuts at roots and branches of trees indicated to be left standing, where such roots and branches obstruct new construction. Paint cuts over ½ inch in size with tree pruning compound.
7. Contact District Arborist 48 hours prior to cutting any trees.

C. Topsoil:

1. Strip topsoil to whatever depths encountered in manner to prevent intermingling with the underlying subsoil or other objectionable material.
2. Remove heavy growths of grass from areas before stripping. Where trees are indicated to be left standing, stop topsoil stripping a sufficient distance to prevent damage to the main root system.
3. Stockpile topsoil in storage piles to freely drain surface water.
4. Cover storage piles if required to prevent windblown dust.

3.3 EXISTING UTILITIES

- A. Protect existing utilities that are to remain in operation as specified.
- B. Demolish and completely remove from the site existing underground utilities indicated and/or required to be removed in order to complete the work. See Section 31 1000 – SITE PREPARATION.
- C. Movement of construction machinery and equipment over existing pipes and utilities during construction shall be at contractor's risk.
- D. Excavation made with power-driven equipment is not permitted within 2 feet of any known utility or subsurface structure.
 - 1. Use hand or light equipment for excavating immediately adjacent to or for excavations exposing a utility or buried structure.
 - 2. Start hand or light equipment excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured.
 - 3. Preserve and irrigate removed sections of existing turf for salvage and/or replacement and restoration.
 - 4. Support uncovered lines or other existing work affected by excavation until approval for backfill is obtained.
 - 5. Report damage of utility line or subsurface structures immediately to Project Manager.

3.4 PREPARATION OF SUBGRADE

- A. Expansive soils are anticipated to basement depth.
 - 1. Review the necessity for overexcavation of expansive soils.
- B. Scarify building pad, exterior flatwork and pavement subgrade to a depth of at least 8 inches and work until uniform and free from large clods.
 - 1. Bring expansive subgrades to 2 to 5 percentage points above the optimum moisture content and compact to 90 percent of the maximum laboratory dry density, in accordance with ASTM D1557.
 - 2. Bring nonexpansive subgrades to or slightly above the optimum moisture content and compact to 90 percent of the maximum laboratory dry density in accordance with ASTM D1557.
 - 3. Increase compaction of the upper 12 - 18 inches of pavement subgrades to 95 percent of the maximum laboratory dry density per ASTM D1557 for nonexpansive subgrades.

3.5 DEWATERING

- A. Do not allow water from surface drainage or underground sources to accumulate in excavations, unfinished fills, or other low areas.
- B. Provide and maintain ample means and devices to remove water promptly and dispose properly of water entering excavations or other parts of the work to prevent softening of exposed surfaces.
- C. Dewater by methods which will ensure dry excavation and preservation of finish lines and grades of excavation bottoms.
- D. Prior to excavating below ground water level, place dewatering system in operation.

1. Lower the ground water level a minimum of 2 feet below the bottom of the excavation.
 2. Relieve the hydrostatic pressure in pervious zones below the subgrade elevation to prevent uplift.
 3. Use screens and gravel packs as necessary to prevent removal of fines from the soil.
- E. Operate the dewatering system continuously, 24 hours a day, 7 days a week until construction work below existing ground water level is completed.
1. Measure and record the performance of the dewatering system.
 - a. Perform at the same time each day.
 - b. Use piezometers and observation wells.
 2. After placement of initial slabs and backfill, the ground water level may be allowed to rise.
 3. At no time allow ground water to rise higher than 1 foot below the prevailing level of excavation or backfill.
 4. Have a back-up pump and system available for immediate use.
- G. Dispose of water away from the work in suitable manner without damage to adjacent property or menace to public health.
- G. Do not drain water into work being built or under construction without prior acceptance of the Project Manager.
- H. Protect existing storm drainage system from silt and debris resulting from construction activities. If contamination occurs, remove contamination at no cost to the District.

3.6 SITE EXCAVATION

- A. General
1. All supports, shoring, and sheet piling required for the sides of excavations or for protection of adjacent existing improvements shall be provided and maintained by the Contractor. The adequacy of such systems shall be the complete responsibility of the Contractor.
 2. Earth and rock, regardless of character and subsurface conditions, shall be excavated to depths shown on plans and to the neat dimensions of the footings wherever practicable, to permit pouring of footings and grade beams without use of side forms, except at slab perimeters.
 3. Large rocks, pieces of concrete or other obstructions, if encountered during the excavation/scarifying operations, shall be removed and disposed of by the Contractor off the site in a legal manner.
 4. Where footing excavation is too deep, backfill shall be concrete. Where footings are overdug laterally, side forms shall be employed for backfill with rock fill or concrete backfill shall be used (Contractor's option).
 5. Where forming is required, only that excavation necessary to permit placing and removal of forms shall be done.
 6. Bottoms of all footings and foundations trenches shall be subject to testing by the Geotechnical Engineer. Corrective measures as directed by the Project Manager shall be executed promptly.
- B. Excavate subgrade as required to allow for finish grades shown on plans, as required for structural fill or otherwise required for proper completion of the work.
- C. Remove and replace subgrade materials designated by Geotechnical Engineer as unsuitable.

3.7 FILL AND COMPACTING

- A. See Section 31 2333 - TRENCHING, BACKFILLING AND COMPACTING for fill and compacting requirements.

3.8 MOISTURE CONTROL

- A. Do not place, spread or roll fill material during unfavorable weather conditions or when fill material is excessively wet.
- B. Do not resume operations until moisture content and fill density are satisfactory to the Geotechnical Engineer.
- C. Provide berms or channels to prevent surface water from flooding excavations. Promptly remove water collecting in depressions.
- D. Where soil has been softened or eroded by flooding or by placement during unfavorable weather, remove damaged areas and recompact as described for fill and compaction.
 - 1. Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material.
 - 2. Prevent free water appearing on surface during or subsequent to compaction operation.
 - 3. Remove and replace, or scarify and air dry, soil material too wet to permit compaction to specified density.
 - 4. Soil material removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.9 GRADING

- A. General: Uniformly grade areas of work including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.
 - 1. All areas covered by the project, including excavated and filled areas and adjacent transition areas, shall be uniformly graded so that finished surfaces are at the elevations established by the plans. Planter areas to receive future topsoil shall be graded below finished grade to allow for such material.
 - 2. Finished surfaces and surfaces to receive paving and aggregate base shall be smooth, compacted, and free from irregular surface drainage.
 - 3. Ditches, gutters, and swales shall be finished to permit proper surface drainage.
 - 4. All surface areas, except paved and sloped embankments exceeding 8:1, shall be hydroseeded.
- B. Grading Tolerances:
 - 1. Excavations shall not exceed 0.10-foot variation from dimensions and elevations shown or noted, unless otherwise approved by Project Manager.
 - 2. Fill and backfill shall be placed with tolerance of plus or minus 0.10 foot if placed in layers.
 - 3. Grading shall be done within plus or minus 0.10 foot typically; areas under slabs, walks or pavements shall be graded within tolerance of 0 to 0.10 foot.
 - 4. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 foot above or below required subgrade elevations.
 - 5. Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 0.10 foot above or below required subgrade elevation.
 - 6. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with

finish surface not more than ½ inch above or below required subgrade elevation.

- C. Compaction: After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

3.10 SOIL STERILIZATION

- A. General: Soil sterilant shall be applied to prepared subgrade or after installation of rock or aggregate base as recommended by the manufacturer. Sterilant shall be applied uniformly at the rate recommended by the manufacturer to all areas beneath asphalt concrete pavement, brick pavement, concrete pavement, or on-grade concrete slabs including sidewalks, curbs, and gutters and areas between the inner and outer security fences. In addition to ground areas treated, sterilant shall be applied below expansion or control joints, and at all areas where pipe, ducts, or other features penetrate slabs.

3.11 TERMITICIDE

- A. Termiticide shall be applied to soils as recommended by the manufacturer. Termiticide shall be applied uniformly at the rate recommended by the manufacturer to all areas beneath and around wood frame structures.

3.12 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Removal of Excess Excavated Material: Excess material shall be removed by the Contractor off the site in a legal manner.
- B. Testing Agency Services: Allow testing agency to inspect and test each subgrade and each fill or backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.
 - 1. Perform field in-place density tests according to ASTM D1556 (sand cone method), ASTM D2167 (Rubber Balloon Method), or ASTM D2937 (Drive Cylinder Method), as applicable.
 - a. Field in-place density tests may also be performed by the nuclear method according to ASTM D2922, provided that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D1556. With each density calibration check, check the calibration curves furnished with the moisture gauges according to ASTM D3017.
 - b. When field in-place density tests are performed using nuclear methods, make calibration checks of both density and moisture gauges at beginning of work on each different type of material encountered, and at intervals as directed by the Project Manager.
 - 2. Footing Subgrade: At footing subgrades, perform at least one test of each soil stratum to verify design bearing capacities. Subsequent verifications and approval of other footing subgrades may be based on a visual comparison of each subgrade with related tested strata when acceptable to the Project Manager.
 - 3. Paved and Building Slab Areas; At subgrade and at each compacted fill and backfill layer, perform at least one field in-place density test for every 2,000 square feet or less of paved area or building slab, but in no case fewer than three tests.
 - 4. Foundation Wall Backfill: In each compacted backfill layer, perform at least one field in place density test for each 100 feet or less of wall length, but no fewer than two tests along a wall face.
 - 5. Trench Backfill: In each compacted initial and final backfill layer, perform at least one field in-place density test for each 150 feet or less of trench, but not fewer than two tests.

- C. Number and location of test shall be at option of the Geotechnical Engineer.
- D. When testing agency reports that subgrades, fills, or backfills are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, recompact and retest until required density is obtained.
- E. After grading is completed and the testing agency has completed observation of the work, permit no further excavation or filling, except as approved by Project Manager.

3.13 PROTECTION

- A. Protect newly graded areas from traffic and erosion. Install erosion control mat and straw wattles as directed by the Project Manager. Keep free of trash and debris.
- B. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- C. Where completed compacted areas are disturbed by subsequent construction operation or adverse weather, scarify surface, reshape, compact to required density and provide other corrective work, including retesting, prior to further construction.

END OF DOCUMENT

Section 31 1000
SITE PREPARATION

PART 1 – GENERAL

1.1 SUMMARY

- A. This section describes general requirements, products, and methods of execution relating to site preparation, unless otherwise noted. This section applies to:
 - 1. Surface and subsurface demolition.
 - 2. Backfilling of excavations and depressions.
 - 3. Coordination, demolition and/or relocation of existing utilities.
 - 4. Prior to start of demolition of facilities, shut off, disconnect, cut, and cap where required, underground utility services to facilities.
 - 5. Removal of A.C. pavement driveway and concrete pavement, concrete pads, and A.C. curbing.
 - 6. Removal of cyclone wire, wood fences and barricades.
 - 7. Removal of storm drainage piping, catch basins, and manholes.
 - 8. Removal of vegetation and trees as specified herein.
- B. Contractor shall provide labor, material and equipment required for demolishing, cutting, removing and disposing of existing construction as designated and shown on the Plans for the following as required, unless otherwise noted.
- C. The work includes removal and legal disposal off the site of debris, rubbish and other materials resulting from clearing and grubbing operations.
- D. Related Sections:
 - 1. Section 31 0000 – EARTHWORK AND GRADING.
 - 2. Section 31 2333 – TRENCHING, BACKFILLING AND COMPACTING.

1.2 SUBMITTALS

- A. Comply with requirements of Section 01 3300 - SUBMITTALS.
- B. Submit all permits and certificates required for the project, for record purposes.
- C. Demolition schedule and proposed methods and operations.
- D. Permits and notices authorizing demolition.
- E. Letter or certificates of severance of utilities services from the affected agencies or utilities.
- F. Proposed haul route(s) from the demolition worksite to an authorized disposal site.
- G. Permit for transport and disposal of debris.
- H. Make arrangements of disposing of waste and excess materials at a legally licensed landfill/disposal facility outside worksite and pay cost thereof.
- I. Photograph existing conditions of existing structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations. File photographs with Project Manager prior to start of work.

- J. Submit Proposed dust control measures.
- K. Submit Proposed noise control measures.
- L. Work Schedule: Submit a proposed schedule of work items to be performed, and a description of how the work is to be accomplished, for the Project Manager's review.
- M. Report of inspections conducted with the Project Manager before and after performing work.

1.3 QUALITY ASSURANCE

- A. Comply with the following Standards: American National Standards Institute, Inc. "American National Standard Safety Requirements for Demolition" (ANSI A10.6 and A10.8).
- B. Regulatory Agencies:
 - 1. Comply with rules and regulations of State of California, California Code of Regulations, Title 8, Industrial Relations, Chapter 4, Subchapter 4, "Construction Safety Order."
 - 2. Comply with applicable local and state agencies having jurisdiction.
 - 3. Comply with governing EPA notification regulations.
- B. Secure all required Permits or Certificates for demolition or discontinuance of utilities, prior to beginning the work.

1.4 PROJECT CONDITIONS

- A. Disposition of Existing Improvements:
 - 1. All materials indicated to be removed shall become the property of the Contractor; dispose of these outside the project site.
 - a. Do not dispose of removed materials to the general public by sale, gift or in any other manner at the Site.
 - b. These provisions shall not be construed as limiting or prohibiting sale or disposal of such materials at the Site to duly licensed Contractors or material suppliers, provided materials are removed from the construction site by the Contractor.
 - 2. All removal of debris from the site, including removal of inventory to site of storage, is part of this Contract and shall be done by Contractor's employees and no others.
- B. Salvage and Reuse:
 - 1. Where units or items of existing work are designated to be removed and reused in the new work or are to become salvage, remove such units or items carefully.
 - a. Use tools and methods that will not damage such units or items.
 - b. Protect underlying or adjoining work from damage.
 - c. Salvaged items shall be cleaned by the Contractor.
- C. Protection:
 - 1. Erect and maintain temporary bracing, shoring, lights, barricades, except construction barricades for subsequent new construction, warning signs, and guards necessary to protect public, the District's employees, finishes, improvements to remain and adjoining property from damage, all in accordance with applicable regulations.
 - 2. Wet down areas affected by this work as required preventing dust and dirt from rising.
- D. Scheduling:

1. Coordinate with the District in scheduling noisy or dirty work.
 2. Schedule work at the District's convenience to cause minimal interference with the District's normal operations.
 3. Jackhammering shall be coordinated with the District and College to minimize disturbance of classes.
- E. Traffic Circulations: Ensure minimum interference with roads, streets, driveways, sidewalks, and adjacent facilities.
1. Do not close or obstruct public thoroughfares without first obtaining the required permit or permission of the responsible jurisdiction.
 2. Where closing of a vehicular or pedestrian traffic circulation route is necessary, provide adequate directional signs to minimize the potential for confusion.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine areas affected by work of this Section and verify following:
1. Disconnection of utilities as required.
 2. That utilities serving occupied portions of buildings on and off the site will not be disturbed or that temporary utility services have been provided.
 3. Removal by the District of the District's personal property, movable furniture and equipment items not designated for relocation.
- B. Where existing conditions conflict with representations of the Construction Documents, notify the Project Manager and obtain clarifications. Do not perform work affecting the conflicting conditions until clarification of the conflict is received.

3.2 PREPARATION

- A. Verify that the area to be demolished or removed has been vacated, or adequate space made available to perform the work.
- B. Arrange for, and verify termination of utility services to include removing meters and capping of lines.
- C. Lay out cutting work at Job Site and coordinate with related work for which cutting is required.

3.3 DEMOLITION

- A. If confirmed or suspected hazardous materials are encountered during operations, stop operations immediately and notify the Project Manager.
- B. Perform work in accordance with ANSI A10.6_1969 unless otherwise noted.
- C. Provide noise and dust abatement as required to prevent contamination of adjacent areas.
1. Remove all materials not designated as salvage, in their entirety.

2. Remove building foundations in their entirety, unless otherwise indicated on the plans.
- D. Fill voids in the land left by the removal of existing structures as follows:
 1. In accordance with the requirements of Section 31 0000 – EARTHWORK AND GRADING. Grade finished remaining surface to the contours shown, or if not shown, to match the existing natural contours.
- E. Lower, or remove, heavy structural framing members by hoist or crane.
- F. Concrete and Masonry:
 1. Demolish concrete and masonry in sections, less than 3 feet in any direction.
 2. Method of cutting shall be limited to saw cutting and torch.

3.4 CUTTING

- A. Make new openings neat.
- B. Do not cut or alter structural members and any utilities including appurtenances unless indicated to do so in the Construction Documents, or written approval is received from the Project Manager.
- C. Take care not to damage reinforcing or structural steel scheduled to remain in place.
- D. Concrete: Cut new openings in concrete by coring and saw cutting. Saw run-bys will not be permitted.

3.5 PREPARATION FOR NEW FINISH WORK

- A. Where demolished surfaces are scheduled to receive new finishes, Contractor shall restore such substrate to a condition ready to receive the scheduled new finishes, including grinding or leveling.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
- B. Burning of demolished materials off District's property in a legal manner.

3.7 FIELD QUALITY CONTROL

- A. See Section 31 2333 – TRENCHING, BACKFILLING and COMPACTING for fill and compacting requirements.

3.8 MOISTURE CONTROL

- A. The Project Manager will accompany the Contractor before and after performance of work to observe physical condition of existing structures or improvements involved.

END OF DOCUMENT

Section 31 2333
TRENCHING, BACKFILLING AND COMPACTING

PART 1 – GENERAL

1.1 SUMMARY

- A. Provide labor, material, equipment, and services necessary to complete the backfilling and compacting as necessary for this project. Section includes, but is not limited to:
 - 1. Select Backfill Material.
 - 2. Aggregate Base.
 - 3. Detectable Tape.
 - 4. Trench Excavation.
 - 5. Pipe Bedding.
 - 6. Trench Backfill.
 - 7. Trench Surfacing.

- B. Work specified in Related Sections:
 - 1. Section 31 1000 – SITE PREPARATION
 - 2. Section 31 0000 – EARTHWORK AND GRADING
 - 3. Section 33 1000 – WATER SYSTEMS
 - 4. Section 33 3000 – SANITARY SEWER
 - 5. Section 33 4000 – STORM DRAINAGE

1.2 DEFINITIONS

- A. Engineered Fill:
 - 1. Soil or soil rock material approved by the Project Manager and transported to the site by the Contractor in order to raise grades or to backfill excavations.
 - 2. Contractor shall provide sufficient tests, and a written statement that all materials brought onto the project site comply with specification requirements.

- B. Excavation: Consists of the removal of material encountered to subgrade elevations.

- C. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below base.

- D. Base: The layer placed between the subgrade and surface pavement in a paving system.

- E. Relative Compaction: In place dry density of soil expressed as percentage of maximum dry density of same materials, as determined by laboratory test procedure American Society for Testing and Materials (ASTM) D1557.

1.3 SYSTEM DESCRIPTIONS

- A. Requirements:
 - 1. Comply with the recommendations of the Geotechnical Engineer.
 - 2. Protect existing trees to remain. No grading is permitted under the drip line of protected trees.
 - 3. Excavations for appurtenant structures, such as, but not limited to, manholes, transition structures, junction structure, vaults, valve boxes, catch basins, thrust blocks, and boring pits, shall be deemed to be in the category of trench excavation.
 - 4. Unless otherwise indicated in the Plans, all excavation for pipelines shall be open cut.

1.4 SUBMITTALS

- A. Comply with provisions of Section 01 3300 – SUBMITTALS.
- B. Test Reports: Submit the following report for import material directly to the Project Manager from the Contractor's testing services:
 - 1. Compaction test reports for aggregate base.
- C. Submit description of compactors proposed for use when requesting placement of base material.

1.5 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies:
 - 1. Comply with State of California Business and Transportation Agency, Department of Transportation (Caltrans) latest edition of "Standard Specifications." (CSS).
 - 2. Comply with State of California Code of Regulations (CCR).
 - 3. Comply with State of California Construction Safety Orders, Latest Edition (CAL/OSHA).
- B. Soil Testing:
 - 1. District to engage a geotechnical testing agency, to include compaction testing and for quality control testing during fill operations.
 - 2. Test results will be submitted to the Project Manager.
- C. Codes and Standards:
 - 1. Perform excavation work in compliance with applicable requirements of authorities having jurisdiction.
 - 2. California Department of Transportation (CDT):
 - a. Section 19: Earthwork.
 - b. Standard Test Methods: No. 202.
 - 3. American Society for Testing and Materials (ASTM):
 - a. D1556: Density of Soil by the Sand Cone Method.
 - b. D1557: Moisture Density Relations of Soils and Soil Aggregate Mixtures

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect materials before, during and after installation.
- B. Comply with provisions of Section 01 5000 - TEMPORARY FACILITIES AND CONTROLS where necessary to control dust and noise on and near the work caused by operations during construction activities.

1.7 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Protect existing storm drainage system from silt and debris resulting from construction activities. If contamination occurs, remove contamination at no cost to the District.
 - 2. Protect existing streams, ditches and storm drain inlets during work on this project.
- B. Barricade open excavations and post with warning lights.
 - 1. Comply with requirements of Section 01 5000 - TEMPORARY FACILITIES AND CONTROLS.
 - 2. Operate warning lights and barricades as required.

3. Protect structures, utilities, sidewalks, pavements, and other facilities immediately adjacent to excavations, from damages caused by settlement, lateral movement, undermining, washout, and other hazards.
- C. Protection of Subgrade: Do not allow equipment to pump or rut subgrade, stripped areas, footing excavations, or other areas prepared for project.
- D. Transport all excess soils materials by legally approved methods to disposal areas.
 1. Coordinate with the Project Manager.
 2. Any additional fill requirements shall be the responsibility of the Contractor.

1.8 EXISTING UTILITIES

- A. Locate existing underground utilities in the areas of work. For utilities that are to remain in place, provide adequate means of protection during excavation operations.
 1. Locating of existing underground utilities shall include but not be limited to pot holing prior to the start of construction.
- B. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult Project Manager, Facilities, and/or utility agency immediately for directions.
 1. Cooperate with the Project Manager and public and private utility companies in keeping their respective services and facilities in operation.
 2. Repair damaged utilities to the satisfaction of the agency with jurisdiction.
- C. Do not interrupt existing utilities serving facilities occupied and used by the District or others, except when permitted in writing by the Project Manager and then only after acceptable temporary utility services have been provided.

1.9 SEQUENCING AND SCHEDULING

- A. The sequence of operations shall be reviewed by the Project Manager prior to commencement of any work.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. General:
 1. Import materials will be subject to approval of the Geotechnical Engineer.
 2. For approval of imported fill material, notify the Project Manager at least 7 days in advance of intention to import material.
- B. Select backfill material shall be gravel, free of clay or organic matter and shall conform to the following gradation:

<u>Sieve Size</u>	<u>Percentage Passing</u>
1 inch	100
¾ inch	90 – 100
No. 4	35 – 60
No. 200	2 – 9

- C. For gas pipe and fuel piping select backfill shall be clean, graded building sand conforming to the following gradation:

<u>Sieve Size</u>	<u>Percentage Passing</u>
No. 4	100
No. 200	0 – 5

- D. Water: Clean and free from deleterious amounts of acids, alkalis, salts and organic matter.

2.2 BURIED WARNING AND IDENTIFICATION TAPE

- A. Polyethylene plastic and metallic core or metallic faced, acid and alkali resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 75 mm 3 inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.
1. Warning Tape Color Codes.
Red: Electric.
Yellow: Gas, Oil; Dangerous Materials.
Orange: Telephone and Other Communications.
Blue: Water Systems.
Green: Sewer Systems.
White: Steam Systems.
Gray: Compressed Air.
 2. Warning Tape for Metallic Piping: Acid and alkali resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.
 3. Detectable Warning Tape for Non Metallic Piping: Polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of the tape shall be 0.004 inch. Tape shall have a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 920 mm 3 feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

2.3 DETECTION WIRE FOR NON-METALLIC PIPING

- A. Detection wire shall be insulated single strand, solid copper with a minimum of 12 AWG.

PART 3 – EXECUTION

3.1 GENERAL

- A. Prior to commencement of work, become thoroughly familiar with site conditions.
- B. In the event discrepancies are found, immediately notify the Project Manager in writing, indicating the nature and extent of differing conditions.

- C. Backfill excavations as promptly as work permits.
- D. Do not place Engineered fill or backfill until rubbish and deleterious materials have been removed and areas have been approved by the Project Manager.
- E. Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.
- F. In excavations, use satisfactory excavated or borrow material.
- G. Under grassed areas, use satisfactory excavated or borrow material.

3.2 COMPACTING

- A. Compact by power tamping, rolling or combinations thereof.
 - 1. Where impractical to use rollers in close proximity to walls, stairs, etc., compact by mechanical tamping.
 - 2. Scarify and recompact any layer not attaining compaction until required density is obtained.

3.3 SITE PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, which are to remain, from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Protect existing storm drainage system from silt and debris resulting from construction activities. If contamination occurs, remove contamination at no cost to the District.

3.4 EXISTING UTILITIES

- A. Identify the location of existing utilities.
 - 1. Prior to trenching, the Contractor shall excavate at locations specifically indicated on the Plans, if any, and where new lines cross other utilities of uncertain depth and determine the elevation of the utility in question to ensure that the new line will clear the potential obstruction.
 - 2. The Contractor shall contact Underground Service Alert (USA) at 1 800 227 2600 for assistance in locating existing utilities.
 - 3. If, after the excavation, a crossing utility does present an obstruction, then the line and grade of the new line will be adjusted as directed by the Project Manager to clear the utility.
- B. Protect all existing utilities to remain in operation.
- C. Movement of construction machinery and equipment over existing pipes and utilities during construction shall be at Contractor's risk.
- E. Excavation made with power driven equipment is not permitted within 2 feet of any known utility or subsurface structure.
 - 1. Use hand or light equipment for excavating immediately adjacent to known utilities or for excavations exposing a utility or buried structure.
 - 2. Start hand or light equipment excavation on each side of the indicated obstruction and

- continue until the obstruction is uncovered or until clearance for the new grade is assured.
- 3. Support uncovered lines or other existing work affected by excavation until approval for backfill is obtained.
- 4. Report damage of utility line or subsurface structures immediately to the Project Manager.

F. Backfill trenches resulting from utility removal in lifts of 8 inches maximum.

3.5 TRENCH EXCAVATION

A. General

- 1. Excavation shall include removal of all water and materials that interfere with construction. The Contractor shall remove any water which may be encountered in the trench by pumping or other methods during the pipe laying, bedding and backfill operations. Material shall be sufficiently dry to permit approved jointing.
- 2. Excavation shall include the construction and maintenance of bridges required for vehicular and pedestrian traffic, support for adjoining utilities.
- 3. The Contractor shall be responsible to safely direct vehicular and pedestrian traffic through or around his/her work area at all times.
- 4. The Contractor shall relocate, reconstruct, replace or repair, at his/her own expense, all improvements which are in the line of construction or which may be damaged, removed, disrupted or otherwise disturbed by the Contractor.

B. Existing Paving and Concrete:

- 1. Existing pavement over trench shall be sawcut, removed, and hauled away from the job. Existing pavement shall be neatly sawcut along the limits of excavations.
- 2. Existing concrete over the trench shall be sawcut to a full depth in straight lines either parallel to the curb or a right angles to the alignment of the sidewalk.
- 3. Boards or other suitable material shall be placed under equipment outrigging to prevent damage to paved surfaces.

C. Trench Width:

- 1. The maximum allowable trench widths at the top of the pipe shall be as follows:

<u>Pipe Type</u>	<u>Trench Width (Maximum)</u>
Copper	Outside diameter of barrel plus 18 inches
Plastic	"
Vitrified Clay	"
Ductile Iron	"
Reinforced Concrete	"
- a. The maximum trench width shall be inclusive of all shoring.
- b. If the maximum trench width is exceeded, the State's representative may direct the Contractor to encase or cradle the pipe in concrete at no additional charge.
- 2. For pipes 3 inch diameter and larger, the free working space on each side of the pipe barrel shall not be less than 6 inches.

D. Open Trench:

- 1. The maximum length of open trench shall be 300 feet or the distance necessary to accommodate the amount of pipe installed in a single day, whichever is greater. No trench shall be left open at the end of the day.
- 2. Provisions for trench crossings and free access shall be made at all street crossings, driveways, water gate valves, and fire hydrants.

- E. Excavation Bracing:
1. The excavation shall be supported and excavation operations shall be conducted in accordance with the California Industrial Accident Commission and CAL/OSHA.
 2. The Contractor shall, at his/her own expense, furnish, put in place, and maintain such sheeting and bracing as may be required to support the sides of all excavations (whether above or below the pipe grade), and to prevent any movement which could in any way diminish the required trench section or otherwise injure or delay the work. The sheeting and bracing shall be withdrawn in a manner such as to prevent any earth movement that might overload the pipe.
- F. Excavated Material:
1. All excavated material not required for backfill shall be immediately removed and properly disposed of in a legal manner by the Contractor.
 2. Material excavated in streets and roadways shall be laid alongside the trench no closer than 2 feet from the trench edge and kept trimmed to minimize inconvenience to public traffic.
 3. Provisions shall be made whereby all storm and wastewater can flow uninterrupted in gutters or drainage channels.

3.6 PIPE BEDDING

- A. Bedding Excavation: The trench shall be excavated below the grade of the pipe bottom to the following minimum depths:

<u>Pipe Type</u>	<u>Depth</u>
Copper	6 inch
Reinforced Concrete	6 inch
Plastic: 2 inch diameter and smaller	6 inch
Plastic: over 2 inch diameter	6 inch
Ductile Iron	6 inch

1. Stabilization of Trench Bottom: When the trench bottom is unstable due to wet or spongy foundation, trench bottom shall be stabilized with gravel or crushed rock. The State's inspector will determine the suitability of the trench bottom and the amount of gravel or crushed rock needed to stabilize a soft foundation. Soft material shall be removed and replaced with gravel or crushed rock as necessary.
2. Placement of Bedding Material: The trench bottom shall be cleaned to remove all loose native material prior to placing select backfill material. Sufficient select backfill material shall be placed in trench and tamped to bring trench bottom up to grade of the bottom of pipe. The relative compaction of tamped material shall be not less than 95 percent. It is the intention of these requirements to provide uniform bearing under the full length of pipe to a minimum width of 60 percent of the external diameter.

3.7 TRENCH BACKFILL

- A. Initial Backfill:
1. Prior to trench backfill, the condition of the trench and laying of pipe must be inspected and approved by the Inspector of Record.
 2. Select backfill material shall be used for initial backfill. After the pipe has been properly laid and inspected, select backfill material shall be placed on both sides of the pipe and compacted to final depth as follows:

Pipe Type	Depth
Copper	12 inches above top of pipe
Plastic: less than 3 inches diameter	12 inches above top of pipe
Plastic: 3 inches diameter and larger	12 inches above top of pipe
Ductile Iron	12 inches above top of pipe
Reinforced Concrete	12 inches above top of pipe

3. Compaction: Initial backfill compaction shall be by mechanical means. The initial backfill material shall be hand tamped in layers not exceeding 4 inches in uncompacted depth and shall be brought up uniformly on both sides of the pipe to avoid bending or distortional stress. After hand tamping, the relative compaction of the initial backfill material shall be not less than 95 percent.
4. Pipe Detection: In trenches containing pressurized plastic pipes, tracer wire shall be placed directly above the pipe and shall be connected to all valves, existing exposed tracer wires, and other appurtenances as appropriate.

B. Subsequent Backfill:

1. Above the level of initial backfill, the trench shall be backfilled with non-expansive native material from trench excavation or with imported select backfill material (Contractor's option). Subsequent backfill shall be free of vegetable matter, stones or lumps exceeding 3 inches in greatest dimension, and other unsatisfactory material. The Inspector of Record shall approve the backfill material prior to placement.
2. Subsequent backfill compaction shall be by mechanical means with backfill material placed in layers not exceeding 8 inches in loose depth. Each layer shall be thoroughly compacted before succeeding layers are placed. The use of machine tampers, except manually held types, shall not be permitted.
3. Subsequent backfill shall be compacted to a relative compaction of not less than 95 percent.

C. Jetting and Ponding:

1. Jetting of trench backfill is not permitted.

D. Compaction Testing:

1. Compaction testing shall be in accordance with California Test Method ASTM D1556 or D1557.

3.8 TRENCH SURFACING

A. Unpaved Areas:

1. In unimproved areas, the trench surface shall be restored to its original condition. No mounds of earth shall be left along the trench. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
2. Where completed compacted areas are disturbed by subsequent construction operation or adverse weather, scarify surface, reshape, compact to required density and provide other corrective work, including retesting, prior to further construction.

B. Temporary Surfacing:

1. Temporary surfacing shall be a minimum of 2 inches of cutback asphalt on 10 inches of Class 2 aggregate base and shall be placed at all trench locations subject to vehicular or pedestrian traffic.
2. Temporary surfacing shall be laid within one day after backfilling (except where the Contractor elects to place permanent surfacing within this time period).
3. Before the trenching area is opened for traffic, all excess dirt, rock, and debris shall be

removed, the street surface shall be swept clean and the pavement shall be washed down with a water truck and pressure nozzle.

4. Temporary surfacing shall be maintained to prevent the occurrence of mudholes and prevent the surface from settling below 1 inch or rising more than 1 inch from the existing pavement grade.

3.9 FILL AND COMPACTING

- A. General Requirements:
 1. Backfill excavations as promptly as work permits.
 2. Do not place Engineered fill or backfill until rubbish and deleterious materials have been removed and areas have been approved by the Project Manager.
 3. Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.
 4. In excavations, use satisfactory excavated or borrow material.
 5. Under grassed areas, use satisfactory excavated or borrow material.
- B. After subgrade compaction has been approved by the Geotechnical Engineer, spread the Engineered fill materials in 6 to 8 inch loose lifts and uniformly mixed during the spreading operation.
 1. Bring non expansive fill materials to or slightly above the optimum moisture content and compacted to at least 95 percent of the maximum laboratory dry density, per ASTM D1557.
 2. Bring non expansive aggregate fill materials to or slightly above the optimum moisture content and compacted to at least 95 percent of the maximum laboratory dry density, per ASTM D1557.
 3. Do not compact the top 12 inches of soil in the planting areas.
 4. Fill sections greater than 5 feet in depth shall be compacted to at least 95 percent.
- C. Repeat compaction procedure until proper grade is attained.
- D. Rocks generated during site earthwork may be used in fill when conforming to material specifications.

3.10 MOISTURE CONTROL

- A. Do not resume operations until moisture content and fill density are satisfactory to the Inspector.

3.11 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Testing Services: Allow testing agency to test each backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.
- B. When testing agency reports that backfills are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, recompact and retest until required density is obtained.

3.12 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

- B. Where completed compacted areas are disturbed by subsequent construction operation or adverse weather, scarify surface, reshape, compact to required density and provide other corrective work, including retesting, prior to further construction.

3.13 CLEAN-UP

- A. Remove all debris, equipment, tools and materials upon completion prior to final inspections to the satisfactions of the Project Manager.
- B. In unpaved areas without landscaping, cover with straw erosion control blanket. Follow manufacturer's recommendations for installation. Provide and place straw wattles or biodegradable fiber logs across the slope at the midpoint and along the downhill edge of site. No soil is to be left uncovered at the completion of construction.

END OF DOCUMENT

Section 32 1233
PAVING AND SURFACING

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes (but is not necessarily limited to):
 - 1. Asphalt Concrete Paving.
 - 2. Concrete Paving.
 - 3. Liquid Asphalt and Asphalt Emulsion.
 - 4. Aggregate Base.

- B. Related work furnished under other sections but conforming to the provisions of this section:
 - 1. Subgrade preparation.
 - 2. Aggregate Base installation.

- C. Related Sections:
 - 1. Section 02 4100 - DEMOLITION

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. A615: Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
 - 2. C150: Portland Cement.
 - 3. D1557: Moisture Unit Weight Relations of Soils and Aggregate Mixtures Using a 10 lb (4.5 kg) Rammer and 18 in. (457 mm) Drop.
 - 4. D1682: Breaking Loads and Elongation of Textile Fabrics.

- B. California Code of Regulations (CCR): Title 24, Chapter 2_71, Site development Requirements for Handicapped Accessibility.

- C. California Department of Transportation (C.D.T.):
 - 1. Standard Specifications:
 - a. Section 26 Aggregate Bases.
 - b. Section 37 Bituminous Seals.
 - c. Section 39 Asphalt Concrete.
 - d. Section 51 Concrete Structures.
 - e. Section 52 Reinforcement.
 - f. Section 73 Concrete Curbs and Sidewalks.
 - g. Section 84 Traffic Stripes and Pavement Markings
 - h. Section 90 Portland Cement Concrete.
 - i. Section 92 Asphalts.
 - j. Section 93 Liquid Asphalts.
 - k. Section 94 Asphaltic Emulsions.
 - 2. Traffic Manual.
 - 3. Highway Design.

- D. Institute of Transportation Engineers: Transportation and Traffic Engineering Handbook.

1.3 SUBMITTALS

- A. Requirements: Refer to Section 01 3300 - SUBMITTALS.
- B. Asphalt Concrete Paving:
 - 1. Provide two copies of material certificates signed by the material producer and the Contractor, certifying that each material item complies with or exceeds specified requirements.
 - 2. The Contractor shall furnish a certified weight or load slip for each load of material used in the construction of the asphalt concrete pavement.
- C. Concrete Paving: The Contractor shall furnish mill test reports on the cement, reinforcement bars, and aggregates, showing compliance with the respective specifications. The Testing Engineer may make concrete test cylinders and slump tests as deemed necessary to determine compliance with the Specifications.
- D. Liquid Asphalt.
- E. Pavement Reinforcement Fabric.
- F. Tack Coat.
- G. Pavement Reinforcement Mesh.
- H. Structural Geotextile Fabric.

1.4 PROJECT CONDITIONS

- A. Liquid Asphalt and Asphalt Emulsion:
 - 1. Prime coat, seal coat, and paint binder shall be applied only when the ambient temperature is above 50° Fahrenheit and when temperature has not been below 35° Fahrenheit for 12 hours immediately prior to application.
 - 2. Prime coat, fog coat, seal coat, and paint binder shall not be applied when base or surfaces are wet or contain excess moisture.
- B. Asphalt Concrete Paving: Asphalt concrete surfaces shall be constructed only when ambient temperature is above 50° Fahrenheit and when base is dry.

1.5 GENERAL DESIGN CRITERIA

- A. Services Areas: Approach ramps, driveways, and paved work areas in excess of 4 percent slope shall be provided with a rough texture for non-skid surface.
- B. Walks and Paths: Concrete exterior slabs (walks, terraces, etc.) shall have a pitch of at least 1 percent.

- C. Pavement Markings: All traffic control striping and pavement markings shall conform to the standards illustrated in the C.D.T. Standard Plans Book issued May 2006, General Road Work Section.

PART 2 – PRODUCTS

2.1 PAVING MATERIALS

- A. Aggregate Base: Aggregate base shall conform to Caltrans Class 2 (R value 78 min) aggregate base, 3/4" maximum size, as specified in Section 26 of the C.D.T. Standard Specifications.

- B. Asphalt Concrete Paving:
 - 1. Paving asphalt to be mixed with aggregate shall be steam-refined asphalt, AR_4000, conforming to Section 92 of the C.D.T. Standard Specifications.
 - 2. Mineral aggregate shall be Type B mineral aggregate as specified in Section 39 of the C.D.T. Standard Specifications.
 - 3. Maximum aggregate size shall be as follows:

<u>A.C. Thickness</u>	<u>Max. Ag.</u>
a. 3/4" - 1 1/2"	1/2"
b. 2 & 2 1/2"	1/2"
c. 3" & 4"	3/4"
 - 4. Liquid asphalt for prime coat shall be Grade SC_70 in conformance with Section 93 of the C.D.T. Standard Specifications.
 - 5. Asphaltic emulsion for paint binder, fog coat, and seal coat shall be emulsified asphalt, Type SS_1h, conforming to Section 94 of the C.D.T. Standard Specifications.

- C. Portland Cement Concrete:
 - 1. Concrete shall be Class A concrete conforming to Section 90 of the C.D.T. Standard Specifications.
 - 2. Cement shall be Type II cement conforming to ASTM C150 as modified by Section 90 of the C.D.T. Standard Specifications.
 - 3. Aggregate shall be 3/4_inch maximum size conforming to Section 90 of the C.D.T. Standard Specifications.
 - 4. Water shall be potable and free of organic matter and injurious amounts of oil, acid, alkali, or other deleterious substances.
 - 5. Reinforcing bars shall be deformed and shall conform to ASTM A615.
 - 6. Filled joints, unless noted otherwise on the Drawings, shall be 1/4_inch thick, the full depth of the concrete section and conforming to Section 51 of the C.D.T. Standard Specifications.
 - 7. Joint filler shall conform to Section 51 of the C.D.T. Standard Specifications for pre-molded expansion joint filler and expanded polystyrene joint filler.
 - 8. No admixtures will be allowed without prior approval of the Project Manager.

- D. Pavement Reinforcement Fabric: Pavement reinforcement fabric shall meet Caltrans Section 88-1.02, BP Petromat or approved equivalent.

- E. Crack Sealant:
 - 1. Crack sealant shall be rubberized hot-pour type and shall meet ASTM D 3405, Husky 1611 or approved equivalent.
 - 2. Blotting Agent shall be one of: Screened sand, cement, or fly ash.

- F. Tack coat: Tack coat shall meet Caltrans Section 39-4.02.
- G. Pavement reinforcement mesh: Pavement reinforcement mesh for use in Type 2 Overlay shall be Glasgrid Model 8501 or approved equivalent.
- H. Structural geotextile fabric: Structural geotextile fabric shall be Mirafi 500X or approved equivalent.
- I. Pavement Stripes and Markings: Pavement Stripes and Markings shall meet Caltrans Section 84-3.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Subgrade and Aggregate Base:
 - 1. Prepare a subgrade and over excavation paragraph reference 3.4 of Section 31 0000 - EARTHWORK AND GRADING.
 - 2. Aggregate base shall be compacted to 95 percent ASTM D1557. Sections 26-1.04B and 26-1.05 of the C.D.T. Standard Specifications shall apply.
 - 3. Soil sterilant shall be applied to prepared subgrade or after installation of rock or aggregate base uniformly at the rate recommended by the manufacturer.
- B. Crack Sealing:
 - 1. Before sealing, cracks shall be cleared of dirt, dust, and all other deleterious materials to a depth of ¼-inch to ½-inch.
 - 2. Cracks 1/8-inch in width and greater shall be sealed.
 - 3. Application of crack sealer shall be in accordance with the manufacturer's recommendations unless otherwise directed.

3.2 ASPHALT CONCRETE PAVING

- A. General:
 - 1. Asphalt concrete shall be proportioned, mixed, placed, spread, and compacted in conformance with Section 39 of the C.D.T. Standard Specifications.
 - 2. Before placing asphalt concrete on untreated base, a liquid asphalt prime coat shall be applied to the base course in conformance with Section 39 of the C.D.T. Standard Specifications. Prime coat shall be applied at the rate of 0.25 gallons per square yard.
 - 3. Before placing asphalt concrete, an asphalt emulsion tack coat shall be applied to all vertical surfaces of existing pavement, curbs, gutters, construction joints, and all existing pavement to be surfaced, in conformance with Section 39 of the C.D.T. Standard Specifications.
 - 4. Spreading and compacting asphalt concrete shall be performed in accordance with Section 39 of the C.D.T. Standard Specifications.
 - 5. Fog seal shall be applied to all finished surfaces of asphalt concrete pavement at a rate of 0.05 gallons per square yard, in accordance with Section 37 of the C.D.T. Standard Specifications.
 - 6. After fog seal has been applied, ample time shall be allowed for drying before traffic is allowed on the pavement or paint striping is applied.

7. Install traffic stripes and pavement markings in accordance with Section 84-3 of the C.D.T. Standard Specifications.

3.3 CONCRETE CONSTRUCTION

A. General:

1. All concrete shall be mixed in accordance with applicable provisions of Section 90 of the C.D.T. Standards Specifications.
2. Construction of concrete substructures shall conform to applicable provisions of Section 51 of the C.D.T. Standard Specifications. Unless noted otherwise in the Specifications, all exposed surfaces of structure shall have Class 1 surface finish or finished to match existing adjacent paving.
3. No pigment shall be used in curing compounds for construction of concrete curbs, gutters, and structures.
4. All work shall be subject to field inspection. No concrete shall be placed until the Project Manager has approved the forms and reinforcement.
5. Expansion joints on curbs and gutters shall be placed 20 feet on centers, adjacent to structures, and at all returns, and shall be filled with joint filler. Control joints shall be formed 10 feet on centers. The score shall 1-inch deep minimum.
6. Concrete shall not be dropped freely where reinforcing bars will cause segregation, nor shall it be dropped freely more than 6 feet. Spouts, elephant trunks, or other approved means shall be used to prevent segregation.

3.4 FIELD QUALITY CONTROL

A. Asphalt Concrete Paving:

1. The specified thickness of the finished pavement shall be the minimum acceptable.
2. Conforms shall form a smooth, pond-free transition between existing and new pavement.
3. Depressions in paving between high spots are not to exceed 1/8_inch when measured below a 10 feet long straight edged placed anywhere on surface in any direction.
4. The finished asphalt pavement shall have positive drainage without ponding.

3.5 CLEANUP

A. General:

1. Surplus material remaining upon completion of paving operations shall become the property of the Contractor, to be removed from the work site and disposed of in a lawful manner.
2. Surfaces shall be left in a clean, neat, and workmanlike condition, and all construction waste, rubbish, and debris shall be removed from the work site and disposed of in a lawful manner.

END OF DOCUMENT

SECTION 32 1313
CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete sidewalks, stair steps, and integral curbs.

1.02 RELATED REQUIREMENTS

- A. Section 03 2000 - Concrete Reinforcing.
- B. Section 03 3000 - Cast-in-Place Concrete.
- C. Section 03 3100 - Concrete Formwork
- D. Section 07 9005 - Joint Sealers: Sealant for joints.
- E. Section 31 0000 - Earthwork and Grading: Preparation of site for paving and base and preparation of subsoil at pavement perimeter for planting.
- F. Section 32 1233 - Paving and Surfacing
- G. Section 32 1726 - Tactile Warning Surfacing: Plastic tactile and detectable warning tiles for pedestrian walking surfaces.

1.03 REFERENCE STANDARDS

- A. ACI 301 - Specifications for Structural Concrete; American Concrete Institute International; 2010 (Errata 2012).
- B. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2014.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on joint filler, admixtures, and curing compound.

PART 2 PRODUCTS

2.01 PAVING ASSEMBLIES

- A. Comply with applicable requirements of ACI 301.
- B. Concrete Sidewalks: 3,000 psi (20.7 MPa) 28 day concrete, 4 inches (100 mm) thick, standard gray color Portland cement.

2.02 FORM MATERIALS

- A. Form Materials: Conform to ACI 301.

2.03 REINFORCEMENT

- A. Reinforcing Steel and Welded Wire Reinforcement: Types specified in Section 03 2000.

2.04 CONCRETE MATERIALS

- A. Obtain cementitious materials from same source throughout.
- B. Concrete Materials: As specified in Section 03 3000.

2.05 CONCRETE MIX DESIGN

2.06 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

3.02 SUBBASE

- A. See Section 32 1123 for construction of base course for work of this Section.

3.03 PREPARATION

- A. Moisten base to minimize absorption of water from fresh concrete.
- B. Coat surfaces of manhole frames with oil to prevent bond with concrete pavement.

3.04 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.

3.05 REINFORCEMENT

- A. Place reinforcement as indicated.

3.06 PLACING CONCRETE

- A. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.

3.07 JOINTS

- A. Align curb, gutter, and sidewalk joints.
- B. Place 3/8 inch (10 mm) wide expansion joints at 20 foot (6 m) intervals and to separate paving from vertical surfaces and other components and in pattern indicated.

3.08 FINISHING

- A. Area Paving: Light broom, texture perpendicular to pavement direction.
- B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch (6 mm) radius.

3.09 JOINT SEALING

- A. See Section 07 9005 for joint sealer requirements.

3.10 TOLERANCES

- A. Maximum Variation of Surface Flatness: 1/4 inch (6 mm) in 10 ft (3 m).

3.11 PROTECTION

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

END OF SECTION

SECTION 32 1726
TACTILE WARNING SURFACING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Plastic tactile and detectable warning tiles for pedestrian walking surfaces.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete for sidewalks and platforms.
- B. Section 07 9005 - Joint Sealers: Perimeter and joint sealant for tiles.
- C. Section 32 1233 - Paving and Surfacing: Crosswalk and curb markings.
- D. Section 32 1313 - Concrete Paving: Concrete sidewalks.

1.03 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. 49 CFR 27, 37, and 38 - Standards for Accessible Transportation Facilities, Final Rule; Department of Transportation; current edition.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2010.
- D. ATBCB PROWAG - Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way; 2011.
- E. FED-STD-595C - Colors Used in Government Procurement (Fan Deck); 2008 (Chg Notice 1).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's product data, standard details, details specific to this project; written installation and maintenance instructions.
- C. Samples: For each product specified provide two samples, 8 inches (203 mm) square, minimum; show actual product, color, and patterns.
- D. Warranty: Submit manufacturer warranty; complete forms in Owner's name and register with manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver to project site in manufacturer's protective wrapping and in manufacturer's unopened packaging.
- B. Store covered and elevated above grade and in manufacturer's unopened packaging until ready for installation. Maintain at ambient temperature between 40 and 90 degrees F (4 and 32 degrees C).

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Plastic Tiles: Provide manufacturer's standard five year warranty against manufacturing defects, breakage or deformation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Plastic Tactile and Detectable Warning Surface Tiles:
 - 1. Access Tile, a brand of Access Products, Inc: www.accesstile.com.
 - 2. ADA Solutions, Inc: www.adatale.com.
 - 3. Armor-Tile, a brand of Engineered Plastics, Inc: www.armortiletransit.com.

4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 TACTILE AND DETECTABLE WARNING TILES

- A. Plastic Tactile and Detectable Warning Tiles: Comply with 2013 CBC (11B-247), glass fiber and carbon fiber reinforced, exterior grade, matte finish polyester sheet with truncated dome pattern, solid color throughout, internal reinforcing of sheet and of truncated domes, integral radius cut lines on back face of tile; with factory applied removable protective sheeting.
 1. Installation Method: Cast in place.
 2. Shape: Rectangular.
 3. Dimensions: 24 inches by 48 inches (610 mm by 1220 mm).
 4. Pattern: In-line pattern of truncated domes complying with 2013 CBC (11B-247).
 5. Edge: Square.
 6. Joint: Butt.
 7. Color: FED-STD 595C, Table IV, Federal Yellow No. 33538.

2.03 ACCESSORIES

- A. Fasteners: ASTM A666, Type 304 stainless steel
 1. Type: Countersunk, color matched composite sleeve anchors
 2. Size: 1/4 inch (6.35 mm) diameter and 1-1/2 inches (38 mm) long.
- B. Adhesive: Type recommended and approved by surfacing tile manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. When installation location is near site boundary or property line, verify required location using property survey.
- B. Verify that work area is ready to receive work:
 1. If existing conditions are not as required to properly complete the work of this section, notify Architect.
 2. Do not proceed with installation until deficiencies in existing conditions have been corrected.
- C. Verify that dimensions, tolerances, and attachment methods for work in this section are properly coordinated with other work on site.

3.02 INSTALLATION, GENERAL

- A. Install in accordance with manufacturer's written instructions.
 1. Do not install damaged, warped, bowed, dented, abraded, or otherwise defective units.
 2. Do not install when ambient or substrate temperature has been below 40 degrees F (4 degrees C) during the preceding 8 daylight hours.
- B. Field Adjustment:
 1. Cut units to size and configuration shown on drawings.
 2. Do not cut plastic tiles to less than 9 inches (228 mm) wide in any direction.
 3. Locate relative to curb line in compliance with PROWAG, Sections 304 and 305.
 4. Orient so dome pattern is aligned with the direction of ramp.
 5. Align truncated dome pattern between adjacent units.
- C. Install units fully seated to substrate, square to straight edges and flat to required slope.
- D. Align units so that tops of adjacent units are flush and joints between units are uniform in width.

3.03 INSTALLATION, CAST IN PLACE PLASTIC TILES

- A. Concrete:
 1. See Section 03 3000 - Cast-in-Place Concrete.
 2. Slump: 4 to 7 percent.
- B. When installing multiple adjacent units, leave a 3/16 inch (5 mm) gap between units to allow for expansion.
- C. Tamp and vibrate units as recommended by manufacturer.

- D. Place and position weights on units while concrete cures as recommended by manufacturer. Ensure no voids or air pockets exist between top surface of concrete and underside of units.

3.04 CLEANING PLASTIC UNITS

- A. Remove protective plastic sheeting within 24 hours of installation.
- B. Remove excess sealant or adhesive from joints and edges.
- C. Clean 4 days prior to date of scheduled inspection.

3.05 PROTECTION

- A. Protect installed units from traffic, subsequent construction operations or other imposed loads until concrete is fully cured.
- B. Touch-up, repair or replace damaged products prior to Substantial Completion.

END OF SECTION

Section 32 5000
RESTORATION OF SURFACES

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes but is not limited to:
 - 1. General surface restoration.
 - 2. Asphalt concrete surface restoration.
 - 3. Concrete surface restoration.
 - 4. Pavement Marking
 - 5. Landscape/Planting restoration.

- B. Related Sections:
 - 1. Section 31 2333 - TRENCHING, BACKFILLING AND COMPACTING.
 - 2. Section 32 1233 - PAVING AND SURFACING.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Refer to Section 31 2333 - TRENCHING, BACKFILLING AND COMPACTING.
Refer to Section 32 1233 - PAVING AND SURFACING.

PART 3 – EXECUTION

3.1 GENERAL

- A. Surface restoration shall be in kind or better.

3.2 ASPHALT CONCRETE SURFACE RESTORATION

- A. The base course for permanent asphalt concrete surface restoration shall be Class II Aggregate Base, equal in depth to the existing pavement structural section, but not less than 8 inches in depth.

- B. The wearing surface for permanent surface restoration on improved streets shall be asphalt concrete equal in thickness to the existing pavement, but not less than 3 inches in depth. The asphalt concrete shall be Type B Asphalt Concrete, in accordance with Section 32 1233 - PAVING AND SURFACING.

3.3 CONCRETE SURFACE RESTORATION

- A. The base for permanent concrete surface restoration shall be Class II Aggregate base, equal in depth to the existing section, but not less than 6 inches in depth.

- B. The weaving surface for permanent concrete surface restoration shall be concrete equal in thickness to the existing concrete section, but not less than 4 inches in depth for Pedestrian Areas and not less than 6 inches in depth for Vehicular areas. The concrete shall be 6-sack concrete, in accordance with Section 32 1233 – PAVING AND SURFACING.

3.4 PAVEMENT MARKING RESTORATION

- A. Replace pavement marking disturbed by construction operations/activity to the satisfaction of the Project Manager in kind in accordance with Section 32 1233 – PAVING AND SURFACING.

3.5 LANDSCAPE RESTORATION

- A. Replace landscaping, planting, trees, shrubs, ground cover, irrigations systems disturbed by construction operations/activity to the satisfaction of the Project Manager in kind or better.
- B. Disturbed lawn areas shall be replaced with Sod in kind or better to the satisfaction of the Project Manager.

END OF DOCUMENT

**SECTION 32 8400
PLANTING IRRIGATION**

RELATED DOCUMENTS

DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 01 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

SUMMARY

3.01 SECTION INCLUDES:

- A. Backfill
- B. Pipes and fittings
- C. Pipe sleeves
- D. Valves
- E. Remote control valves
- F. Miscellaneous piping specialties
- G. Sprinklers and bubblers
- H. Quick couplers
- I. Drip irrigation
- J. Controllers and enclosure
- K. Electrical conduit, wiring, and water proof wire connectors
- L. Boxes for valves and wiring
- M. Marking and identification products
- N. Maintenance period
- O. Irrigation audit
 - 1. DESCRIPTION OF WORK
 - a. Furnish all labor, materials, supplies, equipment, tools, and transportation, and perform all operations in connection with and reasonably incidental to the complete installation of the irrigation system, and guarantee/ warranty.
 - b. Connect electrical power supply and data lines to irrigation controller.
 - c. Testing of the irrigation system to assure proper operation. Programming of controller and set-up and testing of sensors.
 - d. All necessary parts that are required to complete, modify, repair, and restore either existing and/ or new irrigation system shall be furnished and installed. All new and existing systems shall meet industry standards and be in operating order at the completion of maintenance period.
 - e. Maintain and repair irrigation system as needed during maintenance period.
 - f. Related Sections:
 - 1) Division 01 - Section "Tree and Plant Protection"
 - 2) Division 31 - Section "Earthwork and Grading"
 - 3) Division 32 - Section "Concrete Paving"
 - 4) Division 32 - Section "Planting"
 - 2. SUBMITTALS
 - a. Materials list:
 - 1) Contractor shall submit to Landscape Architect complete list of all irrigation system materials and processes proposed to be furnished and installed as part of contract. List shall be provided and approved by Landscape Architect before ordering irrigation system materials.
 - 2) Submittals shall have the following information:

- (a) The catalog cut sheets shall identify product from the most recent manufacturer's catalog or from manufacturer's web-site.
 - (b) The catalog cut sheets shall clearly indicate the manufacturer's name and item model number. The model number, specified options and specified size shall be clearly indicated on catalog cut sheets.
 - (c) Submittal format requirements:
 - (1) Title Sheet with job name, contractor's name, contractor address and telephone number, submittal date, and submittal number.
 - (2) Submittals shall be provided as one complete package for the project
 - (3) Submittal package shall be stapled or bound in such a way as to allow for disassembly for review processing. Submittal maybe sent as a single .pdf file and electronically transmitted.
 - (4) Submittal package shall have all pages numbered in the lower right hand corner.
 - (d) The Landscape Architect will allow no substitution without prior written acceptance.
 - (e) The Landscape Architect will not review the submittal package unless provided in the format described above.
3. DELIVERY, STORAGE, AND HANDLING
- a. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
 - b. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.
4. PROJECT CONDITIONS
- a. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then, only after arranging to provide temporary water service according to requirements indicated:
 - 1) Notify Owner no fewer than 7 days in advance of proposed interruption of water service.
 - 2) Do not proceed with interruption of water service without Owner's written permission.
5. TESTS AND INSPECTIONS
- a. The Contractor is responsible for notifying the Landscape Architect for site visits to review work as follows. Provide Landscape Architect 48 hours minimum notice to schedule these visits.
 - 1) Pre-construction conference with general contractor, grading contractor, landscape contractor, and landscape architect.
 - 2) Staking
 - (a) Set stakes to identify locations of proposed point of connection, backflow preventer, master valve and flow sensor assembly, controller, quick coupler, remote control valves, isolation valves, and mainline pipe.
 - 3) Mainline Pressure/ Leak Test: After installation of mainline pipe, valves, and remote control valves.
 - (a) Perform test after welded plastic pipe joints have cured at least 24 hours, or longer if manufacturer of solvent cement requires.
 - (b) Leak Test procedures:
 - (1) Charge system slowly to avoid water hammer.
 - (2) Bleed system to remove air from pipes.
 - (3) Maintain pressure in mainline pipe for 24 hour duration
 - (4) Pressurize system to 125% of design pressure for one hour using hydraulic pump or other safe method.
 - (5) Visually inspect all parts of irrigation system while the system is pressurized.

- (6) Repair any leaks found in mainline irrigation system.
 - 4) Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
 - (a) If operation test presents problems contractor shall contact a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
 - 5) Coverage Test: After completion of irrigation system a coverage test shall be performed to determine uniform and complete coverage of landscape area.
 - (a) 24 hours before test, run irrigation system at least once in all landscape planters.
 - (b) Landscape Architect shall review and approve all planters before plant material, bark mulch, gravel, or decomposed granite is installed.
 - 6) Test and adjust controller and irrigation equipment. Replace damaged and malfunctioning irrigation components and equipment.
 - 7) Irrigation Audit: Irrigation system is designed in accordance with the MWEL. Landscape and irrigation installation shall meet or exceed the MWEL, and shall pass an irrigation water audit.
6. PROJECT WARRANTY
- a. Contractor to furnish and install all work free of defects in materials and workmanship for period of 1-year from start of Maintenance Period per Div. 32- Section "Planting". Contractor to warranty all work furnished in accordance to the drawings and specifications. Ordinary wear and tear, neglect from maintenance, abuse, and vandalism are exempt from the contractor warranty. Repair and replacement of defective work and material will be done by the contractor at no cost to the owner. Repairs and replacement shall be conducted within 48 hours of notification to contractor.

3.02 PRODUCTS

A. QUALITY ASSURANCE

1. Materials used in the system shall be new and free of flaws and defects of any type.
2. BACKFILL MATERIAL
 - a. Backfill shall be either screened on-site material or imported.
 - b. Backfill material shall be free of organic materials, large clods of earth or rocks larger than one (1) inch diameter, trash, construction debris, asphalt, or concrete.
 - c. Imported material shall be a clean loam soil.
3. PIPE AND FITTINGS
 - a. Comply with requirements in the drawing for applications of pipe and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.
 - b. Use a dielectric union wherever a copper-based metal (copper, brass, bronze) is joined to an iron-based metal (iron, galvanized steel, stainless steel).
 - c. Assemblies calling for threaded pipe connections shall utilize PVC Schedule 80 nipples and PVC Schedule 80 threaded fittings.
 - d. Joint sealant: Use only Teflon-type tape pipe joint sealant on plastic threads. Use non-hardening, nontoxic pipe joint sealant formulated for use on water-carrying pipes on metal threaded connections.
 - e. PVC Pipe: ASTM D 1785, PVC 1120 compound, Class 315, schedule 40, schedule 80, with integral belled end.
 - 1) PVC Socket Fittings: ASTM D 2466, Schedule 80.
 - 2) PVC Threaded Fittings: ASTM D 2464, Schedule 80.
 - 3) Use Schedule 40 and SCH 80, Type 1, PVC solvent weld fittings conforming to ASTM Standards D2466 and D1784. Use primer approved by the pipe manufacturer. Solvent cement to conform to ASTM Standard D2564.
 - f. PVC Threaded Nipples: PVC Schedule 80 nipples shall be extruded. PVC Schedule 80 nipples shall be made from NSF approved PVC compound conforming to ASTM D1784, Cell Classification 12454B.

- g. Mainline detection tape:
 - 1) Manufacturer: TChristy. Model# TA.DT.2.BI. 5 mil (.005") thick tape with aluminum foil core and polyethylene backing, 2" width, and shall say "Caution Irrigation Line Buried Below".
- 4. IRRIGATION PIPE SLEEVE
 - a. Corrugated HDPE with dual wall construction for irrigation sleeves eight (8) inches and larger.
 - b. PVC schedule 40 for irrigation sleeves six (6) inches and smaller.
- 5. REMOTE CONTROL VALVES
 - a. Manufacturers: Refer to drawings for manufacturer, model, and size of remote control valves.
 - b. Remote control valve to be in normally closed position.
 - c. Remote control drip zone shall have forty (25) psi pressure regulator and a filter cartridge with a minimum of 120 mesh. Size valve, pressure regulator and filter for drip zone flow rate.
- 6. QUICK COUPLERS
 - a. Manufacturers: Refer to drawings for manufacturer, model, and size of quick coupler.
 - b. Description: Factory-fabricated, bronze or brass, two-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, locking rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key.
- 7. SPRINKLERS AND BUBBLERS
 - a. General Requirements: Designed for uniform coverage over entire spray area indicated at available water pressure.
 - b. Plastic, Pop-up Spray Sprinklers:
 - 1) Refer to drawings for manufacturer, model, and size of pop-up spray sprinklers and bubblers.
- 8. DRIP IRRIGATION SYSTEM
 - a. Manufacturers <<http://www.specagent.com/LookUp/?ulid=5320&mf=04&src=wd>>: Refer to drawings for manufacturer, model, and size of drip irrigation system and associated components.
 - b. Drip Tubes with Inline Emitters:
 - 1) Tubing: Flexible Polyethylene tubing.
 - 2) Emitter spacing: 12", 18", or 24" on center as specified on drawings.
 - 3) Emitters: Check valve and pressure compensation.
 - c. Fittings: Drip tubing fittings shall be per manufacturer's specifications.
 - d. Filter Units: Plastic housing, with corrosion-resistant internal parts; of size and capacity required for devices downstream from unit.
 - e. Air Relief Valves: Plastic housing, with corrosion-resistant internal parts.
 - f. Vacuum Relief Valves: Plastic housing, with corrosion-resistant internal parts.
- 9. IDENTIFICATION PRODUCTS
 - a. Remote control valve tags:
 - 1) Manufacturer: TChristy. Model# ID.STD.Y1. Plastic tag attached by nylon tie to valve, hot stamped lettering, tag color: yellow. Tag to identify valve based on drawings controller letter and valve numbering.
 - b. Backflow History Tag
 - 1) Manufacturer: TChristy. Model# ID.BFHT.1. Plastic tag attached directly and permanently to backflow.
- 10. AUTOMATIC IRRIGATION CONTROLLERS
 - a. Manufacturer: Refer to drawings for manufacturer and model of automatic irrigation controller.
 - b. ET Sensor Manufacturer: Refer to drawings for manufacturer and model of ET sensor.
 - c. Remote control. Refer to drawings for manufacturer and model of hand held remote control.

- d. Enclosure Manufacturer: Strong Box Model# SB-18SSW.
 - 1) Stainless steel locking enclosure, 18" wide x 36" high x 12" deep.
 - 2) Waterproof enclosure, with locking cover and matching keys; refer to drawings and manufacturer's grounding requirements.
- e. Two Wire Cable
 - 1) Controller to decoder wire use 14 gauge solid copper insulated wire, twisted together, loose tube-high density polyethylene jacket. Paige Electric Co., model P7354D.
 - 2) Decoder to Solenoid wire use 14 gauge solid copper insulated wire, parallel wire held by webbing, in various color. Paige Electric Co., model ICD.
 - 3) Where spliced wires are required, splices shall be housed in a grey plastic electric pull box.
 - 4) Waterproof wire connector manufacturer: 3M Direct Bury Splice Kit. Model# DBR/Y-6.
- 11. CONDUIT
 - a. All conduit and fittings to be PVC schedule 40, color: grey.
 - b. Pull tape manufacturer: Fibertek, Inc. Model# WP1250.
 - 1) Electrical pull tape to be 1/2" woven polyester tape with a minimum of 1250 pounds tensile strength and less than 0.10 coefficient of friction.
 - 2) All pull tape to be continuous with out slicing or knots.
 - 3) Provide couplers or bushings on cut pipe end to prevent damage to wires.
- 12. GROUNDING
 - a. Earth grounding for irrigation equipment shall meet or exceed article 250 of National Electrical Code (NEC) and be UL listed.
 - b. Grounding rod shall be minimum copper clad 5/8" diameter by 10 feet long.
 - c. OR Grounding plate
 - d. Bare Copper Wire shall be minimum 6 gauge soft-annealed uncoated wire.
 - e. Grounding rod connection to be exothermic weld or clamp.
 - 1) Grounding rod clamp shall be brass and must securely attach grounding rod and wire.
 - f. Grounding to have a resistance of 25 ohms or less.
 - g. Back fill shall be highly conductive material. Where needed use electrical grounding backfill products like Powerfill by Loresco.
- 13. BOXES VALVES AND ELECTRICAL PULL
 - a. Electrical Pull Box:
 - 1) Manufacturer: Carson. Body model# 910-10 and lid model# 910-4B. Bolt down kit, T-cover lid, body and lid color: grey.
 - 2) Or equal
 - b. Remote Control Valve:
 - 1) Manufacturer: Carson. Body model# 1220-12 and lid model# 1220-4B. Bolt down kit, T-cover lid, body and lid color: green.
 - c. Quick coupler:
 - 1) Manufacturer: Rainbird. Body model# VB-STD. Bolt down kit, T-cover lid, body color: black and lid color: green.
 - d. Isolation Valve:
 - 1) Manufacturer: Rainbird. Body model# VB-10RND. Bolt down kit, T-cover lid, body color: black and lid color: green.
 - e. Flush Valve:
 - 1) Manufacturer: Rainbird. Body model# VB-10RND. Bolt down kit, T-cover lid, body color: black and lid color: green.
 - f. Air/ Vacuum Relief Valve:
 - 1) Manufacturer: Rainbird. Body model# VB-7RND. T-cover lid, body color: black and lid color: green.
 - g. Subterranean Drip Emitter Box:

- 1) Manufacturer: Rainbird. Body model# SEB 7XB. T-cover lid, body color black and lid color: green.
- h. Drain rock shall be 3/4" washed crushed rock.
- i. Hardware cloth shall be galvanized 16 gauge 1/4" mesh.
- j. Use valve box extension where needed to install boxes at proper height.
 - 1) 1.

3.03 EXECUTION

A. GENERAL

1. Irrigation system shall meet all federal, state, and local codes, regulations and ordinances.
2. Verify all underground utilities by contacting Common Ground Alliance (C.G.A.) at 811 a minimum of 2 working days before any excavation work begins on site.
3. If contractor finds utilities on site that are not shown on plans, contractor shall contact Landscape Architect. Found utilities that cross irrigation lines shall be shown on Record Drawings.
4. Verify water pressure and available flow prior to construction. Notify Landscape Architect if water pressure or flow will prevent the irrigation system from functioning properly.
5. EARTHWORK
 - a. Excavating, trenching, and backfilling are specified in Division 31 - Section "Earth Moving."
 - b. Install warning tape directly above pressure piping, 12" below finished grades and above irrigation pipe.
6. PREPARATION
 - a. Set stakes to identify locations of proposed point of connection, backflow preventer, master valve and flow sensor assembly, controller, quick coupler, remote control valves, isolation valves, and mainline pipe. Contact Landscape Architect within 48 hours for approval before excavation.
7. WATER, ELECTRICAL, & COMMUNICATION CONNECTIONS
 - a. Water Supply
 - 1) Contact the Owner a minimum of five (5) working days before beginning any work that will disrupt existing irrigation system.
 - b. Electrical Supply
 - 1) Contractor is responsible for coordination of electrical supply connection to controller enclosure.
 - 2) Electrical work shall be performed by licensed electrical contractor. Material and workmanship for electrical service shall meet all federal, state, and local codes, regulations and ordinances.
 - c. Communication
 - 1) Contractor is responsible for coordination of data line connection to controller enclosure.
8. PIPING INSTALLATION
 - a. Install piping free of sags and bends. Lay piping on solid sub-base, uniformly sloped without humps or depressions.
 - b. Install groups of pipes parallel to each other and with a minimum of 4" of separation. Pipes shall not lie on top of another pipe.
 - c. Install fittings for changes in direction and branch connections.
 - d. Install PVC piping in dry weather when temperature is above 40 deg F. Allow joints to cure at least 24 hours at temperatures above 40 deg F before testing.
 - e. Install piping in sleeves under parking lots, roadways, and sidewalks.
 - f. Remove all rough edges and burrs from PVC pipe by reaming cut ends. All irrigation pipe cuts shall be square. Remove all debris from pipe before installing.
 - g. PVC pipe shall not lie on top of another pipe. All pipe should have 4" separation between pipes.
 - h. Cap all pipe ends during construction to prevent debris from entering pipe.

- i. Snake pipe in trench one (1) foot per every one hundred (100) feet for thermal expansion.
 - j. Mainline changes in depth and direction shall be done with 45 degree fittings.
9. JOINT CONSTRUCTION
- a. Ream ends of pipes and tubes and remove burrs.
 - b. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Join pipe fittings and valves as follows:
 - 1) Apply appropriate PTFE/ Teflon tape or thread compound to external pipe threads. Provide three wraps around male thread.
 - 2) Tighten joints to hand tight, plus one turn with a strap wrench
 - 3) Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
 - c. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1) Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - 2) PVC P Piping: Join schedule number, ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672
 - 3) Allow 30 minute cure time for handling and 24 hours of cure time before allowing water in the pipe..
10. CONDUIT
- a. Remove all rough edges or burrs from conduit pipe by reaming cut ends. All conduit cuts shall be square.
 - b. Install coupler or bushing on cut pipe ends.
 - c. All 2-wire cable shall be in PVC conduit.
11. SLEEVES
- a. Install sleeve in all locations where irrigation pipe and controller wire cross beneath pavement or other hardscape elements.
 - b. Irrigation controller wire shall not share sleeve with 120 volt and higher voltage wire.
 - c. Contractor shall coordinate the installation of sleeves with other trades.
 - d. Sleeves shall have minimum of 25% void space. Contractor is responsible for sizing sleeve based on field conditions. Size sleeve based on conduit and irrigation pipe size.
12. BACKFILLING
- a. Backfill shall be of approved screen material.
 - b. With the exception of center loading, irrigation trenches shall not be backfilled until completion and passing of tests.
 - c. Trench should be cleaned of debris before backfilling.
 - d. Backfill shall be compacted in 6" lifts using vibrating plate. Compaction of backfill shall be equal to adjacent undisturbed soil.
 - e. Contractor shall correct any settling with more backfill and compaction.
13. REMOTE CONTROL VALVES
- a. Flush mainline before installing remote control valves
 - b. Install valves in landscape planter. Do not install valves in roadways or paved areas.
 - c. Group remote control valves and other valves whenever possible.
 - d. Install per drawings and manufacturer's specifications.
 - e. Install valve in valve box to provide proper operation and maintenance of valve.
 - f. First downstream fitting past valve shall be located min. 18" from valve.
14. SPRINKLER INSTALLATION
- a. Install sprinklers after hydrostatic testing is completed.
 - b. Flush lateral pipe before installing sprinklers.
 - c. Set sprinklers perpendicular to finish grade.
 - d. Install sprinklers at manufacturer's recommended heights.

- e. Locate part-circle sprinklers to maintain a minimum distance of 4 inches from walls and 2 inches from other boundaries unless otherwise indicated.
 - f. Adjust the radius and throw of each sprinkler for best performance. Minimum of 70% low quarter distribution uniformity (DULQ) of spray irrigation. Post-installation irrigation audit may be conducted to confirm (DULQ) of spray irrigation.
 - g. Install per drawings and manufacturer's specifications.
15. DRIP IRRIGATION
- a. Flush lateral before installing drip tubing.
 - b. Install drip tubing on uniformly prepared bed. Drip tubing emitters should be offset to create a triangular spacing.
 - c. Install fitting for all 90 degree changes of direction in line.
 - d. Use 6" wire staples every three (3) feet to secure drip tubing.
 - e. Install air relief and vacuum relief valves in valve boxes, at highest point of landscape planter.
 - f. Install automatic flush and ball valves at drip exhaust header. Refer to drawings for location of flush valves.
 - g. The pressure at the end of the drip tubing should have a maximum of 20% drop in pressure from the beginning of the drip line.
 - h. Install per drawings and manufacturer's specifications.
16. AUTOMATIC IRRIGATION CONTROLLER
- a. Equipment Pedestal Mounting: Install on 6" thick concrete pad. Refer to drawings for location.
 - 1) Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2) Install anchor bolts for proper attachment to supported equipment.
 - 3) Orient enclosure to provide access to controller.
 - b. Provide connection to electrical power supply and data line as required by controller.
 - c. All remote control valves, master valves, and flow sensors to be connected to controller.
 - d. Install all ET sensor, weather stations, and rain/ freeze sensor equipment. Contractor to program and fine tune controller to operate with sensor equipment during maintenance period. Fine tuning of schedule and ET sensor should be completed at the end of maintenance period.
 - e. Irrigation schedule shall not exceed water budget established for project. Water budget and irrigation schedule shown on plans.
 - f. Install per drawings and manufacturer's specifications.
17. FIELD QUALITY CONTROL
- a. Contractor to make adjustments to irrigation components to provide optimum performance of system. Adjust irrigation components to prevent excessive watering onto paved surfaces, windows, and building walls.
 - b. Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with, or not more than 1/2" above, finish grade or compacted mulch.
 - c. Any irrigation product will be considered defective if it does not pass tests and inspections.
 - d. Improperly installed equipment shall be reinstalled or replaced to meet Construction Documents.
18. CLEANING
- a. Flush dirt and debris from piping before installing sprinklers and other devices.
 - b. Upon completion of work, remove all site machinery, tools, construction material, and any rubbish.
19. MAINTENANCE
- a. Provide maintenance as per Division 32 - Section "Planting"
20. RECORD DRAWINGS

- a. Prior to Pre-Maintenance Review, obtain from the Owner's Authorized Representative a reproducible copy of the Drawings. Using computer aided drafting, duplicate information contained on the Record Drawings maintained on site.
 - b. Label each sheet "Record Drawing".
 - c. Record pipe and wiring network alterations. Record work which is installed differently than shown on the construction drawings. Record accurate reference dimensions, measured from at least two permanent reference points, of each irrigation system valve, each backflow prevention device, each controller or control unit, each sleeve end, and other irrigation components enclosed within a valve box.
21. ITEMS FURNISHED TO OWNER
- a. The following items to be furnished to the Owner by the contractor at the completion of the project:
 - 1) Two (2) keys to the control and enclosure
 - 2) Two (2) quick coupler keys and hose swivels
 - 3) One (1) isolation valve opening key
 - 4) One (1) hand held remote control for controller, if specified.
 - 5) One (1) of each specialized tool used to adjust irrigation equipment
 - 6) All manuals for irrigation equipment
 - 7) One (1) copy of irrigation schedule
 - 8) One (1) copy of the approved irrigation submittal.
22. CONTROLLER CHARTS
- a. Prior to completion of the maintenance period, prepare a reduced copy of the as-built plans, with valve numbering/zones clearly highlighted at the reduced scale. The reduced plan shall be sized to fit flat within the controller, laminated in plastic, and placed in the controller.

3.04 IRRIGATION WATER AUDIT:

3.05 AN IRRIGATION AUDIT IS REQUIRED, PER AB 1881. IRRIGATION AUDIT SHALL BE CONDUCTED BY A CERTIFIED LANDSCAPE IRRIGATION AUDITOR.

3.06 IRRIGATION DESIGN

- A. As designed, the irrigation system is compliant with AB1881. The installation and tuning of the irrigation system shall also meet the requirements for a compliant irrigation audit.

3.07 B. AUDIT ATTENDEES

- A. At a minimum the following people shall be in attendance at the time of the Irrigation Audit: A certified landscape irrigation auditor, an Owner's representative, a landscape contractor who is knowledgeable of the irrigation design and installation, and who has access to the irrigation controller, and tune or repair the irrigation system if necessary during the audit.

3.08 C. AUDIT PROCEDURE

- A. Audit may only be performed after the completion of irrigation and landscape irrigation. No other irrigation water may be in use at time of irrigation audit. A project with spray irrigation cannot be audited when winds exceed 5 mph.
- B. Inspection- Prior to start of audit, inspect and confirm installation meets design intent of irrigation drawings. Inspect irrigation controller installation and programmed schedule, and ET sensor.
- C. Measurement- Measure static and dynamic pressure at irrigation point of connection.
- D. Sample areas- Audit shall include a representative sample of each type of irrigation (spray, drip) on each type of hydrozone. Linking of irrigation stations is allowed.
- E. Spray irrigation- Auditing of spray irrigation valves shall measure:
 1. Pressure at first and last spray head
 2. Flow rate of station
 3. Distribution uniformity
- F. Drip irrigation- Auditing of drip irrigation valves shall measure:

1. Pressure in dripline at supply and exhaust
2. Flow rate of station.

END OF SECTION

SECTION 32 9000

PLANTING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Provide all labor, material, equipment and services necessary to provide all landscape planting, complete in place, as shown and specified.
- B. Section Includes:
 - 1. Planting and landscape areas.
 - 2. Sodding.
 - 3. Landscape fabric.
 - 4. Landscape edgings.
 - 5. Tree stabilization.
 - 6. Decomposed granite.
- C. Subgrade Elevations
 - 1. Excavation filling and grading required to establish elevations is shown on drawings. Coordinate all work with grading contractor in order to arrive at rough grades that will allow tolerance for topsoil in planting areas, soil amendments and ornamental mulch as required in other sections of this specification. Contractor to assume tolerance of rough grades established at +/- .1 feet (1 tenth of a foot).
- D. Related Sections:
 - 1. Division 01 Section "Tree and Plant Protection" for protection of existing trees and plant materials.
 - 2. Division 31 Section "Site Preparation" for topsoil stripping and stockpiling.
 - 3. Division 31 Section "Earthwork and Grading" for excavation, filling and backfilling, and rough grading.
 - 4. Division 32 Section "Planting Irrigation" for irrigation.
 - 5. Division 33 Utilities for drainage.

1.03 SUBMITTALS

- A. Informational submittals shall include but not be limited to the following:
 - 1. Pesticides and herbicides: Include product label and manufacturer's application instructions specific to this Project.
 - 2. Soil Fertility and Agricultural (Horticultural) Suitability Analysis.
 - a. After completion of rough grading and prior to soil preparation, the Contractor shall obtain agronomic soils tests for planting areas. A minimum of two (2) samples of planting areas shall be required. Tests shall be performed by an approved agronomic soils testing laboratory and shall include a complete soil suitability analysis with written recommendations for soil amendment, fertilizer and chemical conditioner, application rates for soil preparation, and post-maintenance fertilizer program.
 - b. The soils report recommendations shall take precedence over the minimum soil amendment and fertilizer application rates, as specified, when they exceed the specified minimums.
 - c. The Soil Analysis report shall be submitted to the Landscape Architect in a timely manner to make necessary adjustments to the project documents.
 - d. The Soil Analysis report shall be submitted to the Landscape Architect as part of the Certificate of Completion requirements. The Landscape Architect shall submit documentation verifying implementation of the soil analysis report recommendation to the local agency with the Certificate of Completion.

- e. Fertilizer: Chemical and percentage composition, and manufacturers or vendor's certified analysis.
 - f. Plant materials: Include botanical and common name, quantities, sizes, quality, and sources for all plant materials.
 - g. Seed mixtures for sod and hydroseed: Botanical and common name, percentage by weight, percentages of purity, germination and weed seed for each grass seed species.
 - h. Landscape fabric.
 - i. Landscape edgings (except concrete): Type, size, manufacturer, required stakes (if any).
 - j. Tree staking.
 - k. Decomposed granite.
 - l. Stabilizer for decomposed granite.
 - m. Submit other data substantiating that materials comply with specified requirements. Such certificates may be tags, labels, and/or manufacturers literature. All submittals shall be reviewed and accepted by Landscape Architect before contractor begins work.
 - n. Planting schedule: Submit proposed planting schedule at least two weeks prior to planting any materials, indicating dates for each type of landscape work during normal seasons for such work in areas of the site. Correlate with specified maintenance periods to provide maintenance from date of substantial completion. If dates need to be revised after acceptance of planting schedule, document reasons for delays and submit for acceptance.
- B. Material submittals shall include but not be limited to the following:
- 1. Soil amendments: Type, size, composition, and manufacturers or vendor's certified analysis. 1-pint in sealed labeled plastic bag.
 - 2. Mulch: 1-pint in sealed labeled plastic bag.
 - 3. Landscape fabric: 8"x8" square

1.04 SITE VISITS

- A. The Contractor is responsible for notifying the Landscape Architect for site visits to review work as follows. Provide Landscape Architect 48 hours minimum notice to schedule these visits, unless otherwise indicated.
- 1. Pre-construction conference with general contractor, grading contractor, landscape contractor, and landscape architect, at project site. 7 days minimum notice. The purpose of this conference will include:
 - a. Review of Contractor's questions regarding project.
 - b. Review of administrative and inspection procedures that will occur during construction.
 - c. Review of Contractor's work schedule for project.
 - d. Tour, inspect, and discuss site conditions (if necessary).
 - e. Review of soil sampling.
 - f. Review of planting stock at nursery, or upon arrival on site.
 - g. Review of all landscape areas in preparation for planting.
 - 1) All landscape areas have been cleaned of all construction debris, including gravel, concrete, concrete washout, cement plaster, paint, asphalt, etc.
 - 2) Fine grading- allow for inclusion of all amendments, settling, etc.
 - 3) Irrigation coverage.
 - 4) Review of base preparation and edging for synthetic turf.
 - h. Review of plant material locations.
 - 1) The Landscape Architect may adjust locations of any plant materials prior to installation.
 - i. Punch list at substantial completion (prior to installation of bark mulch). 7 days minimum notice.

- j. Final completion. Final review of entire project, including grading, irrigation, planting and completion of all punch list items (to begin Maintenance Period). 7 days minimum notice.
- k. Final acceptance of project (at end of Maintenance Period). 7 days minimum notice.
 - 1) Final application shall have been made to all landscape areas with slow-release maintenance fertilizer.

1.05 QUALITY ASSURANCE

- A. Subcontract: Subcontract landscape work to a single firm specializing in commercial landscape installation.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.
 - 1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
 - 2. The Landscape Architect shall oversee soil sampling, with depth, location, and number of samples to be taken. A minimum of two representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
 - 3. Report suitability of tested soil for plant growth.
 - a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
 - b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.
- D. Source Quality Control:
 - 1. General: Comply with regulations applicable to shipping of landscape materials.
 - 2. Analysis and Standards: All materials shall be of standard, approved and first-grade quality and shall be in prime condition when installed and accepted. Any commercially processed or packaged material shall be delivered to the site in the original unopened container bearing the manufacturer's guaranteed analysis. The Contractor shall supply the Landscape Architect with analytical data from an approved laboratory source illustrating compliance of bearing the manufacturer's guaranteed analysis of all supplied materials.
- E. Topsoil: Obtain topsoil only from naturally, well-drained sites where topsoil occurs in a depth of not less than 4"; do not obtain from bogs or marshes. The Landscape Architect reserves right to have topsoil tested and analyzed by an independent laboratory before delivery to site.
- F. Trees, Shrubs and Plants: Provide trees, shrubs and plants of quantity, size, genus, species and variety shown and scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1-1980 "American Standard for Nursery Stock". Provide healthy, vigorous stock, grown in recognized nurseries in accordance with good horticultural practice and free of disease, insects, insect eggs, larvae and defects such as knots, sun-scald, injuries, abrasions, overlapping surface roots, or disfigurement. Central leaders of all trees shall be intact, undamaged, with evenly spaced lateral branches.
- G. The contractor is responsible for ordering and reserving plant materials immediately upon bid award to insure plant materials meet size and quality requirements as specified herein. Plant material of substandard size will be rejected.

- H. Label at least one tree and one shrub of each variety in each grouping with a securely attached waterproof tag bearing legible designation of botanical and common name. Where formal arrangements and consecutive order of trees is shown, select stock for uniform height/spread, and label with number to assure symmetry in planting.
- I. Stock review: The Landscape Architect will review all plant materials either at place of growth or at site before planting for compliance with requirements for genus, species, variety, size and quality. Landscape Architect retains right to further review trees and shrubs for size and condition of balls and root systems, insects, injuries and latent defects, and to reject unsatisfactory or defective material at any time during progress of the work. Remove rejected vegetation immediately from project site. Contractor shall request review of such stock by Landscape Architect by delivering notice in writing 48 hours in advance.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable. Protect materials from deterioration during delivery, and while stored on site.
- B. Sod: Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.
- C. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - 3. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.
- D. Trees and Shrubs: Do not prune prior to delivery. Do not bend or bind trees or shrubs in such manner as to damage bark, break branches or destroy natural shape. Provide protective covering during delivery, and provide protection on site from traffic, pedestrians, and deleterious effects of climate while planting operations are in progress. Dropped or damaged stock will not be accepted.
- E. Deliver trees and shrubs after preparations for planting have been completed and plant immediately after approval of plant materials locations. If planting is delayed more than 6 hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage, and keep roots moist by covering with mulch, burlap or other acceptable means of retaining moisture. Do not remove container grown stock from containers until planting time.
- F. Plant material shall not be stored on the jobsite for more than 48 hours before planting. Contractor shall schedule nursery deliveries in sub-groups as necessary to comply with this requirement. Plant materials that have been damaged in any way will be discarded and if installed, shall be replaced with undamaged materials at the Contractor's expense.

1.07 PROJECT CONDITIONS

- A. Proceed with and complete landscape work as rapidly as portions of site become available, working within seasonal limitations for each kind of landscape work required.
- B. Contractor shall verify locations of all existing utilities, whether shown on plans or not. The Contractor shall call 811 two (2) working days in advance of performing any excavation work.
- C. After determining location of underground utilities, perform work in a manner which will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.
- D. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Landscape Architect before planting.

- E. No landscape materials may be planted before an irrigation operation and coverage test is completed and approved by the Landscape Architect.
- F. No landscape materials may be planted before finish grade is inspected and approved by the Landscape Architect.
- G. Planting Time: Plant or install materials during normal planting seasons for each type of landscape work required.
- H. Coordination with Lawns: Plant trees and shrubs after final grades are established, after irrigation system is operable, and prior to planting of lawns, unless otherwise acceptable to Landscape Architect. If planting of trees and shrubs occurs after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.
- I. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.08 SPECIAL PROJECT WARRANTY

- A. Warranty all plant materials and other materials installed under the Contract for a period of one year (from beginning of maintenance period) against defects including death and unsatisfactory growth, or faulty performance, inferior materials and/or workmanship or improper maintenance resulting from neglect, abuse or damage by others, as determined by the Landscape Architect. Materials shall be replaced at the Contractor's expense.
- B. Replacement: Any materials found to be dead, missing, or not in a satisfactory or healthy condition during the maintenance period shall be replaced immediately. The Landscape Architect shall be sole judge as to the condition of material. Material to be replaced within the guarantee period shall be replaced by the Contractor within five (5) days of written notification by the Landscape Architect. All replacement materials and installations shall comply to the Plans and Specifications. Any plant missing due to suspected theft shall be replaced by the Contractor. If the Contractor suspects that theft may be a problem, the Contractor shall provide written documentation to the Landscape Architect that security on this site needs to be intensified. The Contractor may relieve himself of theft responsibility if after the security notice, with no result, a written notice to the Landscape Architect shall be given that plant material will not be replaced for theft or vandalism due to lack of site security being maintained. This procedure may take place only during the Landscape Maintenance Period.

1.09 MAINTENANCE SERVICE

- A. General: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3.
- B. Continuously maintain entire project area during the progress of the work and during the ninety (90) calendar day maintenance period until final acceptance of the project by the Landscape Architect.
- C. Maintenance period shall not start until Final Completion, when all elements of construction, planting and irrigation for the entire project are in accordance with Plans and Specifications. A prime requirement is that all turf grass and landscape areas shall be planted, and that all turf grass areas shall show an even, healthy stand of grass seedlings and which shall have been mown twice. If such criteria are met to the satisfaction of the Landscape Architect, a written notification shall be issued to the Owner establishing the effective beginning date of maintenance period.
- D. Any day of improper maintenance, as determined by the Landscape Architect, shall not be credited as an acceptable maintenance period day. The maintenance period shall be extended on a daily basis if the work is not in accordance to the Plans and Specifications. Project shall not be segmented into maintenance areas or phases, unless authorization of the Landscape Architect is obtained.

- E. Maintenance shall continue beyond the ninety (90) day maintenance period, as required, until final acceptance is given by the Landscape Architect.
- F. Contractor shall provide protection to the project site during the maintenance period.

PART 2 PRODUCTS

2.01 GENERAL

- A. The following organic amendments and fertilizers are to be used for bid price basis only. Specific amendments and fertilizers specification shall be made after rough grading operations are complete and soil samples are tested by the Contractor and approved by the Landscape Architect. The amounts listed in the Preparation section are considered minimum amounts for the project unless directed otherwise by the Landscape Architect.

2.02 ORGANIC SOIL AMENDMENTS

- A. Organic amendment shall be nitrogen stabilized wood residual containing 0.56 to 0.84% N based on dry weight.
- B. Particle Size:
 - 1. 95-100% passing 6.35 mm standard sieve
 - 2. 80-100% passing 2.33 mm standard sieve
- C. Salinity: The saturation extract conductivity shall not exceed 3.5 milliohms/centimeter at 25 degrees centigrade as determined by the saturation extract method.
- D. Iron content: Minimum 0.08% dilute acid soluble Fe on dry weight basis.
- E. Ash: 0-6.0% (dry weight).
- F. As available from:
 - 1. Redi-Grow Corporation
 - 2. 8909 Elder Creek Road
 - a. Sacramento, CA 95828
 - b. (916) 381-6063
 - c. (800) 654-4358
 - d. OR
 - e. Cascade Rock, Inc.
 - 1) 8585 Kiefer Boulevard
 - 2) Sacramento, CA 95826-3990
 - 3) (916) 383-1300

2.03 SOIL AMENDMENTS

- A. Soil Sulfur: Agricultural grade sulfur containing a minimum of 99% sulfur (expressed as elemental).
- B. Iron Sulfate: 20% Iron (expressed as metallic iron), derived from ferric and ferrous sulphate, 10% sulfur (expressed as elemental).
- C. Calcium Carbonate: 95% lime as derived from oyster shells.
- D. Gypsum: Agricultural grade product containing 98% minimum calcium sulphate.

2.04 FERTILIZERS

- A. Retain 1 bag of each type fertilizer on-site for inspection by Landscape Architect prior to disposal.
- B. Planting Fertilizer: Pelleted or granular form shall consist of the following percentages by weight and shall be mixed by commercial fertilizer supplier:
 - 1. 16% nitrogen, 6% phosphoric acid, 8% potash
- C. Planting Tablets:
 - 1. Shall be slow-release type with potential acidity of not more than 5% by weight containing the following percentages of nutrients by weight:
 - 2. 16% nitrogen

- a. 6% phosphoric acid
 - b. 8% potash
 - c. 2.6% combined calcium
 - d. 1.6% combined sulfur
 - e. 0.35% iron (elemental) from ferrous sulfate
 - f. Planting tablets shall be one of the following:
 - 1) 21 gram tablets as manufactured by Agriform or Best Tabs
 - 2) 7 gram tablets as manufactured by GroPower
 - 3) Or equal
 - g. Planting tablets shall be applied per manufacturer's instructions.
- D. Sulphate of Potash: 0-0-50.
- E. Single Super phosphate: Commercial product containing 18-20% available Phosphoric Pentoxide, or equal.
- F. Urea Formaldehyde: 38-0-0.
- G. Slow-release maintenance landscape fertilizer shall be "GroPower Controlled Release Nitrogen 12-8-8" 6-8 month formulation:
 1. 12% nitrogen, 8% phosphoric acid, 8% potash
- H. Turf maintenance fertilizer shall be "Best Turf Supreme 16-6-8"
 1. 16% nitrogen, 6% phosphoric acid, 8% potash

2.05 SOIL

- A. Topsoil: Site to be rough graded to elevations shown on Civil Drawings. Top soil is required behind curb areas. Top soil is required in all planting areas to a minimum depth of 9". Provide on-site, import, or non-processed topsoil in planting areas as needed to complete rough grading which is fertile, friable and natural. Topsoil shall be from agricultural sources, surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter, and free of roots, stumps, stones larger than 1" in any dimension, and other extraneous or toxic matter harmful to plant growth.
- B. All topsoil to be used for planting, regardless of whether import or on-site in origin, shall be tested as described in this Section.
- C. Import Topsoil: ASTM D 5268 topsoil, with pH range of 5.5 to 7.5, a minimum of 4 percent organic material content. Mix topsoil with the following soil amendments in the following quantities to produce planting soil:
 1. Coarse Sand:
 - a. Particle Size Range: 0.5-2.0 mm
 - b. Max. % weight: 15
 - c. Min. % weight: 0
 - d. Silt Plus Clay
 - 1) Particle Size Range: <0.05 mm
 - 2) Max. % weight: 50
 - 3) Min. % weight: 25
 - e. Silt
 - 1) Particle Size Range: 002-0.05 mm
 - 2) Max. % weight: 30
 - 3) Min. % weight: 10
 - f. Clay
 - 1) Particle Size Range: 0-.002 mm
 - 2) Max. % weight: 25
 - 3) Min. % weight: 10
 - g. Gravel
 - 1) Particle Size Range: 2-13 mm
 - 2) Max. % weight: 15
 - 3) Min. % weight: 0

- h. Rock
 - 1) Particle Size Range: >1/2 inch
 - 2) Max. % weight: 10% by volume; None > 1 inch
 - 3) Min. % weight: 0
- i. Organic Matter
 - 1) Particle Size Range: n/a
 - 2) Max. % weight: 15
 - 3) Min. % weight: 0

2.06 MULCH

- A. Mulch shall be walk-on shredded fir bark mulch.
- B. Physical properties:
 - 1. Percent Passing
 - 2. 90-100
 - 3. 80-100
 - 4. 1/4"
- C. Chemistry:
 - 1. Acid in reaction, max. pH 5.0
 - 2. Maximum ash Chemistry: 7% based on dry weight.
 - 3. Minimum moisture 35% at time of delivery based on fresh weight.
- D. As available from:
 - 1. Redi-Grow Corporation
 - a. 8909 Elder Creek Road
 - b. Sacramento, CA 95828
 - c. OR
 - d. Cascade Rock, Inc.
 - 1) 8585 Kiefer Boulevard
 - 2) Sacramento, CA 95826-3990
 - 3) (916) 383-1300

2.07 HERBICIDES

- A. General: Herbicide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for project conditions and application. Do not use restricted herbicides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.
 - 1. Roundup (Glyphosate)
 - 2. Approved Equal

2.08 PLANT MATERIAL

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features shown Drawings and complying with ANSI Z60.1 and in accordance with California State Department of Agricultural regulations for nursery inspections, rules and ratings; and with healthy root systems. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
 - 1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots will be rejected.

2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
 3. Plants of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.
- B. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.
 - C. If formal arrangements or consecutive order of plants is shown on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.
 - D. The minimum acceptable planted height of 15 gallon trees is 6'-6".
 - E. Provide single stem trees except where special forms are shown or listed.

2.09 SOD

- A. Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.
- B. Turf Grass Sod
 1. 95% Tall Fescue
 2. 5% Kentucky Bluegrass
 - a. As available from:
 - 1) Delta Bluegrass Company, P.O. Box 307, Stockton, CA 95201, (800) 637-8873
 - 2) Pacific Sod, 2006 Loquat Avenue, Patterson, CA 95363 (800) 692-8690

2.10 LANDSCAPE FABRIC

- A. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3.5oz./sq. yd. minimum, composed of fibers formed into a stable network so that fibers retain their relative position. Fabric shall be inert to biological degradation and resist naturally-encountered chemicals, alkalis, and acids.

2.11 LANDSCAPE EDGINGS

- A. Metal Edging: Standard commercial edging, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.
 1. Manufacturers: Provide products by one of the following:
 - a. Border Concepts, Inc.
 - b. Collier Metal Specialties, Inc.
 - c. Russell, J. D. Company (The).
 - d. Sure-Loc Edging Corporation.
 - e. Edging Size: 1/8 inch wide by 6 inches deep.
 - f. Stakes: Tapered steel, a minimum of 15 inches long.
 - g. Accessories: Standard tapered ends, corners, and splicers.
 - h. Finish: Standard paint.
 - i. Paint Color: Black.
- B. Concrete edger: Standard gray concrete.

2.12 TREE STABILIZATION

- A. Tree stakes

2.13 DECOMPOSED GRANITE

- A. Decomposed granite with stabilizer soil additive.

2.14 SAND

- A. Washed silica sand.

PART 3 EXECUTION

3.01 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - 1. Protect adjacent and adjoining areas from hydroseeding overspray.
 - 2. Protect grade stakes set by others until directed to remove them.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Soil Preparation
 - 1. All planting areas shall have a minimum of nine inches of clean topsoil. Soil shall be cleared of all stones, stumps, debris, etc. larger than 1 inch in diameter, that are brought to the surface as a result of cultivation.
 - a. Cultivation shall be by rototilling or ripping equipment.
 - b. After approximate finished grades have been established, soil shall be conditioned and fertilized in the following manner:
 - 1) Amendments shall be uniformly spread and cultivated thoroughly by means of mechanical tiller into the top six inches of soil.
 - 2) The following organic soil amendments and fertilizer rates, and quantities are minimums and are to be used for bid basis only. Specific rates and quantities will be made after rough grading operations are complete and soil samples are tested by the Contractor and approved by the Landscape Architect.
 - 3) Application rates: (Per 1,000 square feet)
 - (a) Organic amendment- six cubic yards for groundcover and shrub areas; three cubic yards for lawn areas.
 - (b) Fertilizer- 15 lbs.
 - (c) Gypsum- 200 lbs.
 - (d) Soil sulphur- 20 lbs.
 - (e) Iron- 2 lbs.
 - (f) Calcium carbonate- 2 lbs.
- D. Loosen subgrade of planting areas to a minimum depth of 9 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them offsite.
- E. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that will be planted within 24 hours.
- F. Parking Lot Planters:
 - 1. All aggregate base rock, and other non-organic materials shall be removed from all parking lot planter areas down to the level of native soil. Backfill planters to specified finish grade with native or approved topsoil, and amend as specified.
- G. Final Grades:
 - 1. The following areas shall be graded so that the final grades shall be established below adjacent paved areas, sidewalks, valve boxes, headers, clean outs, drains, manholes, etc. as follows:
 - a. Shrub/groundcover areas: 2-1/2 inches.
 - b. Sod areas: 1-1/2 inches.
 - c. Hydroseed areas: 1 inch
 - d. Surface drainage shall be away from all building foundations, 2% minimum.
 - e. Legally dispose of excess or unacceptable soil from the site at no expense to the Owner.
- H. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.02 PRE-PLANT WEED CONTROL

- A. Irrigate all areas to be planted for 7 days to achieve weed germination.
- B. Spray all weeds with a non-selective systemic contact herbicide, as recommended and applied by and approved licensed landscape pest control advisor and applicator. Leaved sprayed plants intact for at least fourteen days. Continue to irrigate during this period, after the initial 48 hours. Clear and remove these existing weeds by grubbing off all plant parts at least a 1/4 inch below the soil surface in the entire area to be planted.
- C. Apply a second application of herbicide to remaining weeds.
- D. Planting may begin 24 hours after the second application has been completed.

3.03 EXCAVATION FOR TREES AND SHRUBS

- A. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Landscape Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.
- B. Planting Pits and Trenches: Excavate circular planting pits. Create a roughened edge along the inside walls of the planting pit. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling.
 - 1. Excavate approximately three times as wide as ball diameter.
 - 2. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
 - 3. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
- C. Subsoil and topsoil removed from excavations may be used as planting soil, provided they meet the requirements of planting soil noted above.
- D. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
- E. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.
- F. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.04 PLANTING

- A. Set plant plumb and in center of planting pit or trench with root flare 1-inch above adjacent finish grades shrubs, vines and groundcover; 2- inches at trees.
 - 1. Use planting soil for backfill.
 - 2. Carefully remove root ball from container without damaging root ball or plant.
 - 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 - 4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
 - 5. Continue backfilling process. Water again after placing and tamping final layer of soil.
- B. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.
- C. After installation and before Substantial Completion, remove all nursery tags, tie tape, labels, wire, and other debris from plant material, planting areas, and project site.

3.05 TREE STABILIZATION

- A. Staking
 - 1. Retain one of first two subparagraphs below or revise to suit Project.

2. Stake trees of 2- through 5-inch caliper. Use stake of required length to penetrate at least 18 inches below bottom of backfilled excavation. Set stake to avoid penetrating root balls or root masses.
3. Support trees with strap-bar OR tree straps. Allow enough slack to avoid rigid restraint of tree.

3.06 LANDSCAPE FABRIC

- A. Place fabric below cobble/rock mulch or as indicated on drawings. Overlap all seams 12" minimum and pin down every 36".

3.07 MULCH ALL PLANTING AREAS (EXCEPT TURF) TO DEPTH OF 3".

- A. Do not place mulch within 3 inches of trunks or stems.

3.08 EDGING INSTALLATION

- A. Metal Edging: Install metal edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced approximately 30 inches apart, driven below top elevation of edging.
- B. Concrete Edging: End of concrete edging shall meet flush and at 90° angle to abutting material, unless shown otherwise on plans. Height of edging shall not vary more than 1/2" over finish grade.

3.09 HERBICIDE APPLICATION

- A. Apply herbicide and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.
 1. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.10 TURF AREA PREPARATION

- A. Limit turf subgrade preparation to areas to be planted.
- B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 1. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
 - a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
 - b. Mix lime with dry soil before mixing fertilizer.
 - c. Spread planting soil to a depth of 6 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
 - 1) Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.
 - 2) Reduce elevation of planting soil to allow for soil thickness of sod (1 1/2" below finish grade).
- C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted within 24 hours.
 1. Sodded areas shall be compacted with a water filled roller. Final compaction shall range from 95% for flat areas and up to 90% for 3:1 slopes.

- D. Moisten prepared area before planting if soil is dry. Water thoroughly to a depth of 4" and allow surface to dry before planting. Do not create muddy soil.
- E. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.11 TURF

- A. Sodding:
 - 1. Lay sod within 24 hours of harvesting.
 - 2. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll with 200 pound roller to ensure contact with subgrade, eliminate air pockets, and form a smooth surface.
 - a. Lay sod across angle of slopes exceeding 1:3.
 - b. Anchor sod on slopes exceeding 1:6 with wood pegs spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.
 - c. At irregular areas, sod shall be laid in the direction of the longest straight line that can be drawn through the area.
 - d. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 6 inches below sod.
- B. Remove turf from around each tree to create a 3'-0" diameter.

3.12 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Landscape Architect:
 - 1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
 - 2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
- B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.13 MAINTENANCE

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.
- B. Thoroughly water to insure vigorous and healthy growth until work is accepted. Water in a manner to prevent erosion due to application of excessive quantities of water.
- C. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- D. Weeding
 - 1. Keep plant basins and areas between plants free of weeds. Control weeds with pre-emergent herbicides. If weeds develop, use legally approved herbicides. Avoid frequent soil cultivation that destroys shallow roots. Weeding also shall be included in all paved areas including public or private sidewalks.
 - 2. Apply a final application of pre-emergent herbicide at the end of the Maintenance Period, just prior to final acceptance.
 - 3. Pruning
 - 4. Trees: Prune trees to select and develop permanent scaffold branches; to eliminate narrow V-shaped branch forks that lack strength; to reduce toppling and wind damage by thinning out crowns; to maintain a natural appearance and to balance crown with roots. All trees shall be maintained and pruned in accordance with the accepted practices of the

- International Society of Arboriculture (ISA). Prune only as directed by the Landscape Architect.
5. Shrubs: Same objectives as for trees. Shrubs shall not be clipped into balled or boxed forms unless such is required by the landscape plans. All pruning cuts shall be made to lateral branches, buds or flush with the trunk. Stubbing and heading shall not be permitted.
 6. Only skilled workers shall perform pruning work in accordance with standard horticultural pruning practices. Remove from the project all pruned branches and material. Remove and replace any plant material excessively pruned or malformed resulting from improper pruning practices at no additional costs to the owner.
- E. Staking: Stakes shall remain in place through the guarantee period and shall be inspected and adjusted to prevent rubbing that causes bark wounds. Remove nursery stakes from all trees just prior to end of Maintenance Period, unless otherwise noted.
1. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.
- F. Fertilization: Fertilize all planting areas, just prior to end of maintenance period with slow release maintenance fertilizer at manufacturer's recommended rate.
- G. Turf Maintenance
1. Mowing and Edging
 - a. Excess grass clippings shall be picked up and removed from the site and premises.
 - b. Let turf areas dry out enough so that mower wheels do not skid, tear or mark the lawn.
 - c. Edges shall be trimmed at 90 degrees to pavement, at least twice monthly or as needed for neat appearance. Clippings shall be removed from paved and planting areas and disposed of from the site.
 - d. Fertilization:
 - 1) During maintenance period an application of turf maintenance fertilizer, as specified, shall be made at thirty (30) day intervals from the date of maintenance period start at a rate of five (5) pounds per 1,000 square feet, or as per manufacturer's recommendations.
 - 2) Final application (just prior to final acceptance) shall be made with the slow-release maintenance fertilizer at the manufacturer's recommended application rate.
 - e. Watering: Lawns shall be watered at such frequency as weather conditions require to replenish soil moisture below root zone and to establish healthy strands of grass.
 - f. Disease control: Control turf diseases throughout the maintenance period with legally approved fungicides and herbicides.
 - g. Weed Control
 - 1) Control broad leaf weeds with selective, legally approved herbicides throughout maintenance period.
 - 2) A final application of selective herbicide shall be applied at the end of the landscape maintenance period, just prior to final acceptance.
- H. IRRIGATION SYSTEM
1. System Observation: The Contractor shall check all systems for proper operation. Lateral lines shall be flushed out after removing the last sprinkler head or two at each end of the lateral. All heads are to be adjusted as necessary for unimpeded head to head coverage.
 2. Controllers: Set and program automatic controllers for seasonal water requirements. Give the Owner's Representative instructions on how to turn off system in case of emergency.
 3. Repairs: Repair all damages to irrigation system at the Contractor's expense. Repairs shall be made within twenty-four (24) hours.

3.14 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris from paved and vertical surfaces. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
 - 1. Erect temporary fencing, barricades and/or warning signs as required protecting newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established. Treat, repair, or replace damaged plantings.
 - 2. Remove non-degradable erosion-control measures after grass establishment period.
 - 3. During planting, keep adjacent paving and construction clean and work area in an orderly condition.
 - 4. Trash: Remove trash weekly in all planted areas, pedestrian walkways and parking areas.

3.15 FINAL ACCEPTANCE

- A. Work under this section will be accepted by the Landscape Architect upon satisfactory completion of all work (including maintenance). Upon final acceptance, and written notification, the Owner will assume responsibility for maintenance of the work.

END OF SECTION

Section 33 1000
WATER SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

- A. This section describes general requirements, products, and methods of execution relating to on-site domestic water and fire water systems serving all buildings and appurtenances. Unless otherwise noted, this section does not apply to irrigation water systems and water systems inside and within 5 feet of buildings. This section applies to:
 - 1. Domestic water distribution and services.
 - 2. Fire water distribution and services.
 - 3. Water storage tanks.
 - 4. Booster pumps.

- B. Contractor shall provide all labor, equipment, materials, and testing services unless otherwise noted.

- C. Related Sections:
 - 1. Section 31 2333 – TRENCHING, BACKFILLING AND COMPACTING.

1.2 SUBMITTALS

- A. Comply with requirements of Section 01330 – SUBMITTALS.

- B. Product Data: Manufacturer's literature and data, including, where applicable, sizes, pressure rating, rated capacity, listing/approval stamps, labels, or other marking on equipment made to the specified standards for materials, and settings of selected models, for the following:
 - 1. Piping and fittings.
 - 2. Gaskets, couplings, sleeves, and assembly bolts and nuts.
 - 3. Gate valves and ball valves.
 - 4. Blow-off valves, air release and vacuum valves, and combination air valves.
 - 5. Check valves.
 - 6. Pressure reducing valves.
 - 7. Backflow preventers.
 - 8. Post indicators.
 - 9. Fire department connections and wet stand pipes.
 - 10. Fire hydrants.
 - 11. Thrust block concrete mix and/or restrained joints and fittings.
 - 12. Tapping sleeves and tapping valves.
 - 13. Service saddles and corporation stops.
 - 14. Identification materials and devices.

- C. Shop Plans and Calculations: Where an on-site fire water system is required, Contractor shall provide shop plans for Program Manager and agency approval prior to construction. Coordinate with the Construction Documents and identify any proposed modifications or deviations. Shop Plans and Calculations shall be stamped and signed by a registered Fire Protection Engineer licensed by the State of California as required.
 - 1. Include the following information:

- a. Design assumptions.
 - b. Thrust block sizing and calculations.
 - c. Materials to be used.
 - d. Available water pressure.
 - e. Required water pressure.
2. The review of fire system components constitutes only a portion of the review and approval required. A copy of the fire system component submittal package shall be forwarded to the local fire marshal for further review and approval.

D. Test Reports:

1. Water Pressure Report: At the conclusion of work, the Contractor shall engage a qualified testing service to conduct a flow test of the existing campus main (providing flow test data for all mains and at least six (6) hydrants). Provide date and location of test, type and method of test performed, static pressure and residual pressure in psig, observed flow in gpm, and orifice size.

E. Samples: None specified. Provide as necessary.

1.3 QUALITY ASSURANCE

A. Comply with the latest edition of the following Standards and Regulations:

1. American Water Works Association (AWWA) and American National Standards Institute (ANSI):
 - a. C104/A21.4 ANSI Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
 - b. C105/A21.5 ANSI Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
 - c. C110/A21.10 ANSI Standard for Ductile-Iron and Gray-Iron Fittings, 3 inch - 48 inch for Water.
 - d. C111/A21.11 ANSI Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - e. C115/A21.15 ANSI Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
 - f. C116/A21.16 ANSI Standard for Protective Fusion-Bonded Epoxy Coatings Interior & Exterior Surfaces for Ductile-Iron and Gray-Iron Fittings.
 - g. C150/A21.50 ANSI Standard for Thickness Design of Ductile-Iron Pipe.
 - h. C151/A21.51 ANSI Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
 - i. C153/A21.53 ANSI Standard for Ductile-Iron Compact Fittings for Water Service.
 - j. C500 Metal-Seated Gate Valves for Water Supply Service.
 - k. C502 Dry-Barrel Fire Hydrants.
 - l. C503 Wet-Barrel Fire Hydrants.
 - m. C504 Rubber-Seated Butterfly Valves.
 - n. C507 Ball Valves, 6 inches - 48 inches.
 - o. C508 Swing-Check Valves for Waterworks Service, 2 inches - 24 inches NPS.
 - p. C509 Resilient-Seated Gate Valves for Water Supply Service.
 - q. C510 Double Check Valve Backflow Prevention Assembly.
 - r. C511 Reduced-Pressure Principle Backflow Prevention Assembly.
 - s. C512 Air Release, Air/Vacuum, and Combination Air Valves for Waterworks Service.
 - t. C550 Protective Epoxy Interior Coating for valves and Hydrants.
 - u. C600 Installation of Ductile-Iron Water Mains and their Appurtenances.
 - v. C602 Cement-Mortar Lining of water Pipelines in place – 4 inches and larger.
 - w. C605 Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.

- x. C651 Disinfecting Water Mains
 - y. C652 Disinfection of Water-Storage Facilities
 - z. C800 Underground Service Line Valves and Fittings for 1/2 inches - 2 inches.
 - aa. C900 Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 inches - 12 inches, for Water Distribution.
 - bb. C901 Polyethylene (PE) Pressure Pipe and Tubing, 1/2 inches through 3 inches, for Water Service.
 - cc. C905 Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 inches - 48 inches.
 - dd. C906 Polyethylene (PE) Pressure Pipe and Fittings, 4 inches - 63 inches, for Water Distribution and Transmission.
 - ee. C907 Polyvinyl Chloride (PVC) Pressure Fittings for Water, 4 inches - 8 inches.
 - ff. C908 PVC Self-Tapping Saddle Tees for Use on PVC Pipe.
 - gg. D103 Factory-Coated Bolted steel Tanks for water Storage.
2. National Fire Protection Association (NFPA):
- a. NFPA 13 Standard for the Installation of Sprinkler Systems.
 - b. NFPA 14 Standard for the Installation of Standpipe, Private Hydrants, and Hose Systems.
 - c. NFPA 20 Standard for the Installation of Stationary Pumps for Fire Protection.
 - d. NFPA 22 Standard for Water Tanks for Private Fire Protection.
 - e. NFPA 24 Private Service Mains and their Appurtenances.
 - f. NFPA 25 Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.
3. Uni-Bell Plastic Pipe Association (UNI).
- a. PUB 3 PVC Pipe – Technology Serving the Water Industry.
 - b. PUB 7 External Corrosion of Underground Water Distribution Piping Systems.
 - c. PUB 8 Tapping Guide for AWWA C900 Pressure Pipe.
 - d. PUB 9 Installation Guide for PVC Pressure Pipe.
 - e. B-8 Recommended Practice for the Direct Tapping of Polyvinyl Chloride (PVC) Pressure Water Pipe (Nominal Diameters 6-12 inch).
4. American Society of Testing and Materials (ASTM).
- a. ASTM A536 Standard Specification for Ductile Iron Castings.
 - b. ASTM A674 Standard Practice for Polyethylene Encasement for Ductile Iron Pipe for Water or Other Liquids.
 - c. ASTM D1785 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
 - d. ASTM D2241 Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe.
 - e. ASTM D2466 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
 - f. ASTM D2564 Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
 - g. ASTM D2683 Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
 - h. ASTM D3139 Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
 - i. ASTM D3261 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
 - j. ASTM D3350 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
 - k. ASTM F477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
 - l. ASTM F1055 Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.

- m. ASTM F1056 Standard Specification for Socket Fusion Tools for Use in Socket Fusion Joining Polyethylene Pipe or Tubing and Fittings.
- n. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- o. ASTM A795 Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.
- p. ASTM A865 Standard Specification for Threaded Couplings, Steel, Black or Zinc-Coated (Galvanized) Welded or Seamless, for Use in Steel Pipe Joints.
- q. ASTM B88 Standard Specification for Seamless Copper Water Tube.
- 5. American Society of Mechanical Engineers (ASME).
 - a. ASME B16 series for valves, fittings, flanges, and gaskets applicable for use in water systems.
 - b. ASME B1.20.1 American Standard Tapered Pipe Threads for factory-threaded pipe and pipe fittings.
- 6. National Sanitation Foundation (NSF).
 - a. NSF/ANSI 14 Plastics Piping System Components and Related Materials.
 - b. NSF/ANSI 61 Standard for Drinking Water Systems Components – Health Effects.
- 7. Underwriters Laboratories, Inc. (UL).
 - a. UL 157 Standard for Safety for Gaskets and Seals.
 - b. UL 194 Standard for Safety for Gasketed Joints for Ductile-Iron Pipe and Fittings for Fire Protection Service.
 - c. UL 213 Rubber Gasketed Fittings for Fire-Protection Service.
 - d. UL 246 Standard for Safety for Hydrants for Fire-Protection Service.
 - e. UL 262 Standard for Safety for Gate Valves for Fire-Protection Service.
 - f. UL 312 Standard for Safety for Check Valves for Fire-Protection Service.
 - g. UL 405 Standard for Safety for Fire Department Connections.
 - h. UL 448 Standard for Safety for Pumps for Fire-Protection Service.
 - i. UL 789 Standard for Safety for Indicator Posts for Fire-Protection Service.
 - j. UL 860 Pipe Unions for Flammable and Combustible Fluids and Fire-Protection Service.
 - k. UL 1091 Standard for Safety for Butterfly Valves for Fire-Protection Service.
 - l. UL 1285 Pipe and Couplings, Polyvinyl Chloride (PVC), for Underground Fire Service.
 - m. UL 1468 Direct Acting Pressure Reducing and Pressure Restricting Valves.
 - n. UL 1478 Standard for Safety for Fire Pump Relief Valves.
- 8. FM Global (FM).
 - a. FM 1020 Automatic Water Control Valves.
 - b. FM 1045 Waterflow Detector Check Valves.
 - c. FM 1110 Indicator Posts.
 - d. FM 1111 Post-Indicator-Valve-Assembly.
 - e. FM 1112 Indicating Butterfly Valves.
 - f. FM 1120 and FM 1130 Fire Service Water Control Valves (OS&Y and NRS Type Gate Valves).
 - g. FM 1210 Swing Check Valves.
 - h. FM 1221 Backflow Preventers (Reduced Pressure Principle and Double Check Valve Types).
 - i. FM 1311 Centrifugal Fire Pumps (Horizontal, Split-Case Type).
 - j. FM 1312 Centrifugal Fire Pumps (Vertical-Shaft, Turbine Type).
 - k. FM 1319 Centrifugal Fire Pumps (Horizontal, End Suction Type).
 - l. FM 1361 Water Pressure Relief Valve.
 - m. FM 1362 Pressure Reducing Valves.
 - n. FM 1371 Centrifugal Fire Pumps (In-Line Type).
 - o. FM 1510 Fire Hydrants (Dry Barrel Type) for Private Fire Service.
 - p. FM 1511 Fire Hydrants (Wet Barrel Type) for Private Fire Service.
 - q. FM 1530 Fire Department Connections.

- r. FM 1610 Plastic Pipe & Fittings for Underground Fire Protection Service.
 - s. FM 1620 Pipe Joints & Anchor Fittings for Underground Fire Service Mains.
 9. Plastics Pipe Institute (PPI).
 - a. Underground Installation of Polyethylene Pipe.
 - b. Polyethylene Joining Procedures.
 - c. Inspections, Test and Safety Considerations.
 10. American Association of State Highway and Transportation Officials (AASHTO) for H2O Loading.
 11. American Concrete Institute (ACI).
 - a. ACI 348 - Meter Pit Construction.
 12. Local Water District Standard Specifications and Details.
 13. Local Office of the Fire Marshal Regulations.
 14. Other authorities having jurisdiction.
- B. System Description: Grades and elevations are to be established with benchmarks referenced on Plans.
- C. Comply with authorities having jurisdiction for the installation and testing of potable water piping and fire protection systems.
- D. All testing of systems specified in this section shall be witnessed by representatives of the local water department or local authority. Provide at least 7 days notice.
- E. The Contractor shall prepare shop plans and calculations, and obtain all required approvals for the fire water system of the proposed project. Contractor shall have shop plans and calculations stamped and signed by a Fire Protection Engineer, licensed by the State of California, as required by the local jurisdiction.

PART 2 – PRODUCTS

2.1 PIPING

- A. Water Distribution Main (pipe size 4 inches and larger).
1. Ductile Iron Pipe (DIP): Pressure Class 350 pipe conforming to AWWA/ANSI C151/A21.5, cement-mortar lining conforming to AWWA/ANSI C104/A21.4, with standard thickness per AWWA/ANSI C150/A21.50. U.S. Pipe, American Cast Iron Pipe Company (ACIPCO), or approved equivalent.
 - a. Flanged ends shall conform to AWWA/ANSI C115/A21.15.
 - b. Rubber-gasket joints shall conform to AWWA/ANSI C111/A21.11.
 2. Polyvinyl Chloride Pipe (PVC): Pressure Class 200, DR 14, spigot and gasket bell end, conforming to AWWA C900 or AWWA C905, with equivalent cast-iron pipe outer diameter (O.D.). J-M Manufacturing, PW Pipe, North American Pipe Company, or approved equivalent.
- B. Water Service Line (pipe size 3 inches and smaller)
1. Copper (Cu): Provide Type K soft or hard copper pipe conforming to ASTM B88.
 2. For pipe size 1 inches and smaller High Density Polyethylene Pipe (HDPE): PE3408, Pressure Class 200, DR 9 conforming to AWWA C901. PWPIPE or approved equivalent.

2.2 FITTINGS, GASKETS, COUPLINGS, SLEEVES, AND ASSEMBLY BOLTS AND NUTS

- A. For DIP: Provide fittings with pressure rating greater than or equal to that of the pipe. Provide flanged joints, mechanical joints, push-on joints, and insulating joints where indicated. Fittings with push-on joint ends shall conform to the same requirements as fittings with mechanical-joint ends. Provide mechanically coupled type joints using a sleeve-type mechanical coupling where indicated. Provide ends of pipe and fittings suitable for the specified joints. Fittings shall have cement-mortar lining conforming to AWWA/ANSI C104/A21.4.
1. Flanged Joints: Provide bolts, nuts, and gaskets in conformance with AWWA/ANSI C115/A21.15. Flanged fittings shall conform to AWWA/ANSI C110/A21.10 or C153/A21.53.
 - a. Provide flange for setscrewed flanges of ductile iron, ASTM A536, Grade 65-45-12, and conform to the applicable requirements of ASME B16.1, Class 250.
 - b. Provide setscrews for setscrewed flanges of 190,000 psi tensile strength, heat treated and zinc-coated steel.
 - c. Gaskets for setscrewed flanges shall conform to the applicable requirements for mechanical-joint gaskets specified in AWWA/ANSI C111/A21.11.
 - d. Design of setscrewed gaskets shall provide for confinement and compression of gasket when joint to adjoining flange is made.
 - e. Unless otherwise required, above ground flange assembly bolts shall be standard hex-head, cadmium plated machine bolts with American Standard Heavy, hot-pressed, cadmium plated hexagonal nuts. Buried flange nuts and bolts shall be as above except they shall be of Type 304 stainless steel.
 2. Mechanical Joints: Dimensional and material requirements for pipe ends, glands, bolts and nuts, and gaskets shall conform to AWWA/ANSI C111/A21.11.
 3. Push-on Joints: Provide shape of pipe ends and fitting ends, gaskets, and lubricant for joint assembly conforming to AWWA/ANSI C111/A21.11. Modify bell design fittings, as approved.
 4. Insulating Joints: Provide a rubber-gasketed or other suitable approved type of insulating joint or dielectric coupling which will effectively prevent metal-to-metal contact at the joint between adjacent sections of dissimilar metals.
 - a. Provide joint of the flanged type with insulating gasket, insulating bolt sleeves, and insulating washers.
 - b. Provide gasket of the dielectric type, full face, as recommended in AWWA/ANSI C115/A21.15.
 - c. Provide bolts and nuts as recommended in AWWA/ANSI C115/A21.15.
- B. For PVC: Fittings shall be DIP.
1. DIP fittings: Provide gray-iron or ductile-iron conforming to AWWA/ANSI C110/A21.10, with cement-mortar lining conforming to AWWA/ANSI C104/A21.4, and standard thickness, with equivalent cast-iron pipe O.D.
 - a. Fittings with push-on joint ends shall conform to the same requirements as fittings with mechanical-joint ends, except the bell design shall be modified, as approved, for push-on joint suitable for use with PVC plastic pipe.
 - b. Provide push-on joints, compression joints and mechanical joints where indicated between pipe and fittings, valves, and other accessories.
 - c. Mechanical joints, glands, bolts and nuts, and gaskets shall conform to AWWA/ANSI C111/A21.11.
 - d. All fittings shall be epoxy-coated, 10-mil thickness conforming to AWWA C550.
- C. For Cu:
1. Cast copper alloy solder-joint pressure fittings shall conform to ASME B16.18.
 2. Wrought copper solder-joint pressure fittings or wrought copper alloy unions shall conform to ASME B16.22
 3. Cast copper alloy flare fittings shall conform to ASME B16.26.

4. Wrought copper alloy body, hexagonal stock, metal-to-metal seating surfaces, and solder-joint threaded ends shall conform to ASME B1.20.1.
5. Compression connections shall be Mueller 110, Ford or approved equivalent.

D. For PE:

1. Cast Copper Fittings shall conform to ASME B16.18.
2. Cast Copper Compression Fittings and connections shall be Mueller 110 Ford or approved equivalent.

2.3 GATE VALVES AND BALL VALVES

- A. Gate Valves: Valves shall open by counterclockwise rotation of the valve stem. Provide valves with ends as appropriate for the adjoining pipe.
1. Stuffing boxes shall have O-ring stem seals. Provide stuffing boxes bolted and constructed so as to permit easy removal of parts for repair.
 2. Valves (2-1/2 inches and larger):
 - a. Provide valves conforming to AWWA C500 or AWWA C509 and of one manufacturer. Valves shall have a non-rising stem, a 2-inch square nut, and double-disc gates. Valves shall be rated for 250 psi maximum working pressure. Mueller 2360 series, ACIPCO, or approved equivalent.
 - b. For the domestic water system, valves shall also conform to ANSI/NSF 61.
 - c. For the fire water system, valves 2 inches through 16 inches in size shall also conform to UL 262 and FM 1120 or FM 1130 to a working pressure of 200 psi.
 3. Where a post indicator is shown, provide valve with an indicator post flange.
- B. Ball Valves: Valves shall open by counterclockwise rotation of the valve stem. Provide valves with ends as appropriate for the adjoining pipe.
1. Valves (2-inches and smaller):
 - a. Provide valves conforming to AWWA C800 and of one manufacturer. Mueller 300 Series, Ford, or approved equivalent.
 2. Provide valve with lockable operating nut or handle as shown on the Construction Documents.

2.4 BLOW-OFF VALVES, AIR RELEASE AND VACUUM VALVES, AND COMBINATION AIR VALVES

- A. Blow-off valves: Provide valve and service size as shown in the Construction Documents. Provide 2-inch valves at low points of the piping system, and 4-inch valves at dead-ends of the piping system, unless otherwise directed by the Program Manager.
1. 2-inch blow-off shall have a 2-inch vertical female iron pipe (FIP) inlet and a 2-inch normal pressure and temperature (NPT) nozzle outlet with cap. Valve shall open by counterclockwise rotation of a top-mounted 9/16-inch square operating nut. All working parts shall be serviceable without excavation. Kupferle/Truflo Model TF550, or approved equivalent.
 2. 4-inch blow-off shall have a 4-inch vertical FIP inlet and a 4-inch male iron pipe (MIP) outlet with cap. Valve shall open by counterclockwise rotation of a top-mounted 9/16-inch square operating nut. All working parts shall be serviceable without excavation. Kupferle/Truflo Model TF800, or approved equivalent.
- B. Air release and vacuum valves: Provide valve and service size as shown on the Construction Documents, and where there is an increase in the downward slope or a decrease in the upward slope of the piping system. Valve shall have cast-iron single valve body, and shall conform to AWWA C512. A compound lever system shall have a maximum operating pressure of 300psi.

Provide a protective cap for the outlet of the valve. Provide universal air-vacuum type valves, Crispin Model UL, Apco, or approved equivalent.

- C. Combination air valves: Provide valve and service size as shown on the Construction Documents, and at high points and sharp changes in gradient of the pipe system. Valve shall have cast-iron single valve or double valve body, and shall conform to AWWA C512. A simple or compound lever system shall have a maximum operating pressure of 300psi. Provide a protective cap for the outlet of the valve. Crispin Model C, Apco, or approved equivalent.

2.5 CHECK VALVES

- A. Check Valves: Valves shall have clear port opening and a cast-iron body. Provide spring-loaded or weight-loaded valves where indicated on the Construction Documents.
 - 1. For the domestic water system, provide swing-check type valves conforming to AWWA C508. Provide valves of one manufacturer. Mueller, Apco, or approved equivalent.
 - 2. For the fire water system, provide swing-check type valves conforming to FM 1210 and UL 312. Mueller, Watts, or approved equivalent.

2.6 PRESSURE REDUCING VALVES

- A. Pressure Reducing Valves: Valves shall have a cast-iron body, conforming to ASTM A536, with epoxy interior coating conforming to AWWA, and rated to pressure class 300. Cla-Val Model 90-01, Singer, or approved equivalent.
 - 1. Valves shall have flanged ends.
 - 2. Valves sized 3-inches or smaller may have screwed ends.

2.7 POST INDICATORS

- A. Posts Indicators shall withstand up to 900 ft-lbs of operating torque, be free-standing, and tamper-proof.
- B. Post Indicators shall conform to UL 789 and FM 1110. Mueller, ACIPCO, or approved equivalent.

2.8 VALVE BOXES, METER BOXES, FRAMES AND COVERS

- A. Water Valve Box: Provide pre-cast concrete valve box for each buried valve. Provide box with steel or cast iron traffic cover marked "WATER". Christy Model G5 with G5C cover or approved equivalent.
- B. Valve or Meter Boxes: Contractor shall verify box size required for water system appurtenances as shown in the Construction Documents. Provide a precast concrete utility box for each buried appurtenance. Provide a traffic-rated lid for H2O loading. A non-traffic rated lid may be used for boxes located in landscape areas. Christy, or approved equivalent.

2.9 BACKFLOW PREVENTERS

- A. Provide backflow preventers as shown on the Construction Documents. Subject to District's approval. Backflow preventers on the fire water system shall be subject to approval by the local office of the fire marshal.

- B. Reduced Pressure Principle Assemblies (RPPA): Provide a cast-iron body RPPA consisting of two independently operating check valves with a pressure differential relief valve located between the two check valves, two shut-off valves and four test cocks. RPPA shall be tamper-proof and conform to AWWA C511. Febco 860, Watts, or approved equivalent.
- C. Double Check Detector Assemblies (DCDA): Provide a cast-iron body DCDA consisting of mainline double check assemblies in parallel with a bypass double check and meter assembly, two shut-off valves and four test cocks. DCDA shall be tamper-proof and conform to AWWA C510. Febco 806, Watts, or approved equivalent.

2.10 FIRE DEPARTMENT CONNECTIONS AND WET STAND PIPES

- A. Fire Department Connections (FDC): Provide FDC's with 2-1/2 inch female hose connections, sidewalk or free-standing type. Number of inlets shall be as shown on the Construction Documents. Clapper and spring check inlets shall each have a minimum capacity of 250 gpm, and be furnished with a cap and chain. Outlet shall be sized for simultaneous use of all inlets. Connection shall be branded "Building XX".
 - 1. 2-Way FDC: Connection shall conform to UL 405 or FM 1530. Elkhart, Croker, or approved equivalent.
 - 2. 3-Way FDC: Connection shall be subject to approval by the local water department or fire marshal. Elkhart, Croker, Potter-Roemer or approved equivalent.
 - 3. 4-Way FDC: Connection shall conform to UL 405. Potter-Roemer, Croker, or approved equivalent.
 - 4. 6-Way FDC: Connection shall be subject to approval by the local water department or fire marshal. Croker, Potter-Roemer or approved equivalent.

2.11 FIRE HYDRANTS

- A. Provide two 2-1/2 inch and one 4-1/2 inch outlets, with a 6-inch nominal inside diameter inlet and break-away type bolts. Hydrant shall have a working pressure of 250 psi and shall conform to AWWA C502 or C503, and be UL listed and FM approved. Provide hydrants of one manufacturer. Clow model 960 series or approved equivalent, subject to approval of the District and fire marshal.

2.12 THRUST BLOCKS AND PIPE RESTRAINTS

- A. Thrust Blocks: Provide thrust blocks in accordance with NFPA 24 Standards. Use concrete conforming to ASTM C94 having a minimum compressive strength of 2,500 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2-1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength.
- B. Pipe Restraints: Provide thrust restraint systems for fittings and joints as indicated on the Plans. Restrained lengths for onsite fire system will be as indicated on the Plans.
 - 1. For mechanical joint fittings and joints: Pipe restraints shall be "Mega-Lug" pipe restraint system by EBBA Iron, Inc., or approved equivalent.
 - 2. For push-on joint fittings and joints: Pipe restraints shall be "Field-Lok" gaskets by U.S. Pipe, or approved equivalent.
- C. Thrust blocks or mechanical pipe restraints may be used at Contractor's option, unless otherwise indicated on the Plans.
- D. Provide thrust blocks or mechanical pipe restraints at all fittings and changes in angle, alignment or elevation.

- E. Where depth or location of existing structures prohibit the use of standard thrust blocks, gravity blocks may be used. Conform to NFPA 24 Standards.

2.13 TAPPING SLEEVES AND TAPPING VALVES

- A. Tapping sleeves shall be epoxy coated and furnished with stainless steel washers, nuts and bolts. Mueller H-615 and H-619, Ford, or approved equivalent.

2.14 SERVICE SADDLES AND CORPORATION STOPS

- A. Service Saddles: Saddles shall conform to AWWA C800 and NSF 61.
 - 1. For DIP: Provide bronze or stainless steel body, double strap type with a 200 psi maximum working pressure. Mueller BR2 Series, Ford, or approved equivalent.
 - 2. For PVC: Provide bronze body, wide strap type. Mueller H-13000 Series, Ford, or approved equivalent.
 - 3. For PE: Per manufacturer's recommendations.
- B. Corporation Stops: Provide ground key type; bronze conforming to ASTM B61 or ASTM B62, for a working pressure of 100 psi. and suitable for the working pressure of the system.
 - 1. Ends shall be suitable for adjoining pipe and connections, solder-joint, or flared tube compression type joint.
 - 2. Threaded ends shall conform to AWWA C800.
 - 3. Coupling nut for connection to flared copper tubing shall conform to ASME B16.26.
 - 4. Mueller H_15000 Series with "CC" threads and a copper flare straight connection outlet, Ford, or approved equivalent.

2.15 IDENTIFICATION MATERIALS AND DEVICES

- A. Marker Tape: Provide marker tape consisting of metallic foil bonded to plastic film not less than 2-inches wide. Film shall be inert polyethylene plastic. Film and foil shall each not be less than 1-mil. thick. The tape shall be identified with lettering, not less than 3/4-inch high, "CAUTION: WATER MAIN BELOW", repeated at approximately 24-inch intervals.
- B. Tracer Wire for Nonmetallic Piping: Provide 12 gage, coated copper or aluminum wire not less than 0.10 inch in diameter in sufficient length to be continuous over each separate run of nonmetallic pipe. Wire shall be tied in at all valves.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine surfaces and areas for suitable conditions where water service is being installed.
- B. Do not begin installation until unsatisfactory conditions have been corrected.

3.2 LOCATION OF WATER LINES

- A. Where the location of the water line is not clearly defined by dimensions on the Plans, do not lay water line closer than 10 feet horizontally from any sewer line.

- B. Where water lines cross under gravity sewer lines, encase sewer line in concrete for a distance of at least 10 feet on each side of the crossing, unless sewer line is made of pressure pipe with rubber-gasketed joints and no joint is located within 3 feet horizontally of the crossing.
- C. Where water lines cross sewer force mains and inverted siphons, install water line at least 2 feet above these sewer lines.
- D. When joints in the sewer line are closer than 3 feet horizontally from the water line, encase sewer line joints in concrete.
- E. Do not lay water lines in the same trench with other utilities.
- F. Install water lines at 3'-0" minimum depth or as detailed on Plans.

3.3 INSTALLATION OF PIPING

- A. Inspection:
 - 1. Before placing in position, inspect pipe for noticeable defects. Clean the inside and outside of the pipe, fittings, valves, and accessories, and maintain in a clean condition.
 - 2. Remove fins and burrs from pipe and fittings.
- B. Pipe laying and jointing:
 - 1. Provide proper facilities for lowering sections of pipe into trenches.
 - 2. Do not drop or dump pipe, fittings, valves, or any other water line material into trenches.
 - 3. Cut pipe accurately to length established at the site and work into place without springing or forcing. Replace any pipe or fitting that does not allow sufficient space for proper installation of jointing material.
 - 4. Blocking or wedging between bells and spigots will not be permitted. Lay bell-and-spigot pipe with the bell end pointing in the direction of laying.
 - 5. Grade the pipeline in straight lines; avoid the formation of dips and low points.
 - 6. Support pipe at proper elevation and grade.
 - 7. Provide secure firm, uniform support. Wood support blocking will not be permitted.
 - 8. Lay pipe so that the full length of each section of pipe and each fitting rests solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings.
 - 9. Provide anchors and supports where indicated and where necessary for fastening work into place.
 - 10. Make proper provision for expansion and contraction of pipelines.
 - 11. Keep trenches free of water until joints have been properly made.
 - 12. Do not lay pipe when conditions of trench or weather prevent proper installation.
 - 13. All fittings shall be blocked with appropriately sized thrust blocks as shown in the Construction Documents.
- C. Installation of Tracer Wire:
 - 1. Install a continuous length of tracer wire for the full length of each run of nonmetallic pipe.
 - 2. Attach wire to top of pipe in such manner that it will not be displaced during construction operations.
- D. Connections to Existing Lines:
 - 1. Make connections to existing water lines after approval is obtained and with a minimum interruption of service on the existing line.
 - 2. Make connections to existing lines under pressure in accordance with the recommended procedures of a manufacturer of pipe of which the line being tapped is made.

- E. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads to keep out debris and contamination.

3.4 INSTALLATION OF DUCTILE-IRON PIPING

- A. Install pipe and fittings in accordance with requirements of AWWA C600 for pipe installation, joint assembly, valve-and-fitting installation, and thrust restraint.
- B. Jointing:
 - 1. Provide push-on joints with the gaskets and lubricant specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly.
 - 2. Provide mechanical joints with the gaskets, glands, bolts, and nuts specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly and with the recommendations of AWWA C111.
 - 3. Provide flanged joints with the gaskets, bolts, and nuts specified for this type joint.
 - a. Install flanged joints up tight; avoid undue strain on flanges, fittings, valves, and other equipment and accessories.
 - b. Align bolt holes for each flanged joint.
 - c. Use full size bolts for the bolt holes; use of undersized bolts to make up for misalignment of bolt holes or for any other purpose will not be permitted.
 - d. Do not allow adjoining flange faces to be out of parallel to such degree that the flanged joint cannot be made watertight without over straining the flange.
 - e. Where flanged pipe and fitting have dimensions that do not allow the installation of a proper flanged joint as specified, replace it by one of proper dimensions.
 - f. Use setscrewed flanges to make flanged joints where conditions prevent the use of full-length flanged pipe. Assemble in accordance with the recommendations of the setscrewed flange manufacturer.
 - 4. Provide insulating joints with the gaskets, sleeves, washers, bolts, and nuts previously specified for this type joint. Assemble insulating joints as specified for flanged joints. Bolts for insulating sleeves shall be full size for the bolt holes.
 - 5. Ensure that there is no metal-to-metal contact between dissimilar metals after the joint has been assembled.
- C. Exterior Protection: Completely encase buried ductile iron pipelines and underground appurtenances with polyethylene wrap. Install 8-mil linear low-density polyethylene (LLD) film or 4-mil high-density cross-laminated (HDCL) film per manufacturer's recommendations and in accordance with AWWA/ANSI C105/A21.5 and ASTM A674.
- D. Pipe Anchorage:
 - 1. Provide concrete thrust blocks or restrained joints for pipe anchorage, except where metal harness is indicated on the Construction Documents.
 - 2. Pipe anchorage shall be in accordance with NFPA 24 Standards.

3.5 INSTALLATION OF POLYVINYL CHLORIDE PIPING

- A. Install pipe and fittings in accordance with the requirements of UNI B-3 for the following:
 - 1. The laying of pipe, joining PVC pipe to fittings and accessories.
 - 2. The setting of hydrants, valves, and fittings.
- B. Comply with the recommendations for pipe joint assembly and appurtenance installation in AWWA Manual M23, Chapter 7, "Installation".

- C. Comply with the applicable requirements of AWWA C600 for joint assembly, and with the recommendations of Appendix A to AWWA C111.

- D. Jointing:
 - 1. Provide push-on joints with the elastomeric gaskets specified for this type joint, using either elastomeric-gasket bell-end pipe or elastomeric-gasket couplings.
 - 2. For pipe-to-pipe push-on joint connections, use only pipe with push-on joint ends having factory-made bevel.
 - 3. For push-on joint connections to metal fittings, valves, and other accessories, cut spigot end of pipe off square and re-bevel pipe end to a bevel approximately the same as that on ductile-iron pipe used for the same type of joint.
 - 4. Use an approved lubricant recommended by the pipe manufacturer for push-on joints.
 - 5. Assemble push-on joints for connection to fittings, valves, and other accessories in accordance with the requirements of UNI B_3 for joining PVC pipe to fittings and accessories and with the applicable requirements of AWWA C600 for joint assembly.
 - 6. Make compression-type joints/mechanical-joints with the gaskets, glands, bolts, nuts, and internal stiffeners previously specified for this type joint. Cut off spigot end of pipe for compression-type joint or mechanical-joint connections and do not re-bevel.
 - 7. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer using internal stiffeners as previously specified for compression-type joints.

- E. Pipe Anchorage:
 - 1. Provide concrete thrust blocks or restrained joints for pipe anchorage, except where metal harness is indicated on the Construction Documents.
 - 2. Anchorage shall be in accordance with the requirements of UNI B-3 and in accordance with NFPA 24 Standards for reaction or thrust blocking and plugging of dead ends, except that size and positioning of thrust blocks shall be as indicated on the Construction Documents.

3.6 INSTALLATION OF POLYETHYLENE PIPING

- A. Install pipe, fittings, and appurtenances in accordance with PPI and Manufacturer's Recommendations.

- B. Jointing:
 - 1. Provide mechanical joints, compression fittings, or flanges as recommended by the manufacturer.
 - 2. Jointing shall be performed using proper equipment and machinery by trained and certified personnel.
 - 3. Joints, fittings and tools shall be clean and free of burrs, oil, and dirt.
 - 4. Butt fusion:
 - a. Pipe ends shall be faced to establish clean, parallel mating surfaces.
 - b. Align and securely fasten the components to be joined squarely between the jaws of the joining machine.
 - c. Heat the ends of the pipe to the pipe manufacturer's recommended temperature interface pressure and time duration. A pyrometer or other surface temperature measuring device should be used to insure proper temperature of the heating tool. Temperature indicating crayons shall not be used on a surface which will come into contact with the pipe or fitting.
 - d. Prevent molten plastic from sticking to the heater faces. Molten plastic on the heater faces shall be removed immediately according to the tool manufacturer's instructions.

- e. Bring the molten ends together with sufficient pressure to properly mix the pipe materials and form a homogeneous joint. Hold the molten joint under pressure until cooled adequately to develop strength. Refer to the Manufacturer's recommendations for temperature, pressure, holding, and cooling times.
- f. Remove the inside bead from the fusion process using Manufacturer's recommended procedure.
- 5. Socket fusion:
 - a. Mixing manufacturers' heating tools and depth gages will not be allowed unless the tools conform to ASTM F1056.
 - b. Pipe ends shall be faced square to establish clean, parallel mating surfaces.
 - c. Clamp the cold ring on the pipe at the proper position using a depth gauge.
 - d. Heat the tool to the pipe manufacturer's recommended temperature. A pyrometer or other surface temperature measuring device should be used to insure proper temperature. Temperature indicating crayons shall not be used on a surface which will come into contact with the pipe or fitting.
 - e. Follow manufacturer's recommendations for bringing the hot tool faces into contact with the outside surface of the end of the pipe and the inside surface of the socket fitting.
 - f. Simultaneously remove the pipe and fitting from the tool.
 - g. Inspect the melt pattern for uniformity and immediately insert the pipe squarely and fully into the socket of the fitting until the fitting contacts the cold ring. Do not twist the pipe or fitting during or after the insertion.
 - h. Hold or block the pipe in place during cooling.
- 6. Electrofusion:
 - a. Unless the operation is for a saddletype electrofusion joint, pipe ends shall be faced square to establish clean, parallel mating surfaces.
 - b. Clamp the pipe and fitting at the proper position in the fixture.
 - c. Connect the electrofusion control box to the fitting and to the power source. Apply the electric current using manufacturer's instructions.
 - d. Allow the joint to cool before removing the clamping fixtures.

3.7 INSTALLATION OF VALVES

- A. Install gate valves conforming to AWWA C500 and UL 262 in accordance with the requirements of AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix (Installation, operation, and Maintenance of Gate Valves) to AWWA C509.
- B. Install gate valves conforming to AWWA C509 in accordance with the requirements of AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix (Installation, Operation, and Maintenance of Gate Valves) to AWWA C509.
- C. Install gate valves on PVC water mains in addition in accordance with the recommendations for appurtenance installation in AWWA Manual M23, Chapter 7, "Installation."
- D. Install check valves in accordance with the applicable requirements of AWWA C600 for valve-and-fitting installation, except as otherwise indicated.
- E. Provide and assemble joints to gate valves and check valves as specified for making and assembling the same type joints between pipe and fittings.

3.8 INSTALLATION OF VALVE AND METER BOXES

- A. Boxes shall be centered over the appurtenance so as not to transmit shock or stress. Covers shall be set flush with the surface of the finished pavement, or as shown in the Construction

Documents. Backfill shall be placed around the boxes and compacted to the specified level in a manner that will not damage or displace the box from proper alignment or grade. Misaligned boxes shall be excavated, plumbed, and backfilled at no additional cost to the District.

3.9 INSTALLATION OF HYDRANTS

- A. Install hydrants, except for metal harness, plumbed vertical, in accordance with AWWA C600 for hydrant installation and as indicated.
- B. Provide and assemble joints as specified for making and assembling the same type joints between pipe and fittings. Hydrants shall be set so that mounting bolts clear the top of finished grade by three inches so bolts may be easily replaced if needed.
- C. Provide metal harness as specified under pipe anchorage requirements for the respective pipeline material to which hydrant is attached.

3.10 SERVICE LINE CONNECTIONS TO WATER MAINS

- A. Connect service lines of size shown on plans to the main with a rigid connection or a corporation stop and gooseneck. Install a gate valve on the service line.
- B. Connect service lines to ductile-iron water mains in accordance with AWWA C600 for service taps.
- C. Connect service lines to PVC plastic water mains in accordance with UNI-B-8 and the recommendations of AWWA Manual M231, Chapter 9, "Service Connections."

3.11 INSTALLATION OF BACKFLOW PREVENTERS

- A. Backflow devices shall be installed horizontal and level, with three feet minimum clearances from obstructions.

3.12 HYDROSTATIC PIPELINE TESTING

- A. Requirements:
 - 1. After the pipe has been laid and backfilled, perform hydrostatic pressure tests.
 - 2. Do not conduct tests until at least 12 hours have elapsed since pipe laying and at least 5 days have elapsed since placing of concrete thrust blocks.
 - 3. Fill the pipe with water which shall remain without external application of pressure for 24 hours before tests are conducted.
 - 4. Prior to hydrostatic testing, flush pipe system with fresh water until piping is free of dirt and foreign matter.
 - 5. Apply pressure by a pump and measured by a test gage. All necessary apparatus and labor for conducting the pressure and leakage tests shall be furnished by the Contractor.
 - 6. Ensure the release of air from the line during filling, and prevent collapse due to vacuum when dewatering the line.
 - 7. For pressure test, use a hydrostatic pressure not less than 200 psi. The duration of the test shall not be less than 4 hours with the variation in pressure of not more than 5 psi for the duration of the test.
- B. Leakage Tests:
 - 1. Perform tests at the same time as pressure tests.

2. Leakage rate shall be measured for at least 4 hours with a certified water meter, or other approved method. If requested, meter certification shall be submitted to the District for approval prior to testing.
3. Leakage shall not be measured by a drop in pressure in a test section over a period of time.
4. Leakage at mechanical couplings and joints, tapping sleeves, saddles, flanged joints, and copper piping will not be accepted. Correct any visible leaks.
5. Push-on joints: Test ductile iron pipe for leakage in accordance with AWWA C600 as shown in the following table:

TABLE 1

Allowable Leakage per 1000 feet of DIP Pipeline (Gal/Hr)

Average Test Pressure (psi)	Nominal Pipe Diameter - Inches									
	3	4	6	8	10	12	14	16	18	20
300	0.39	0.52	0.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60
275	0.37	0.50	0.75	1.00	1.24	1.49	1.74	1.99	2.24	2.49
250	0.36	0.47	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37
225	0.34	0.45	0.68	0.90	1.13	1.35	1.58	1.80	2.03	2.25
200	0.32	0.43	0.64	0.85	1.06	1.28	1.48	1.7	1.91	2.12

6. When the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.
7. Test polyvinyl chloride pipe for leakage in accordance with the recommendations of the Uni-Bell Plastic Pipe Association (UNI) as shown in the following table:

TABLE 2

Allowable Leakage per 1000 feet or 50 joints of PVC Pipeline (Gal/Hr)

Nominal Pipe Size (inches)	Average Test pressure in Line (psi.)	
	200	250
4	0.38	0.43
6	0.57	0.64
8	0.76	0.85
10	0.96	1.07
12	1.15	1.28
14	1.34	1.50
16	1.53	1.71
18	1.72	1.92
20	1.91	2.14

8. Should any section of new pipe fail to pass either test, locate and repair the defective pipe and repeat the test.

3.13 STERILIZATION AND FLUSHING

A. General:

1. Disinfect domestic water lines, mains, and branches by chlorination in accordance with AWWA C601 and as herein specified.

B. Sterilization Methods:

1. Liquid Chlorine Solution Method:

- a. Flush all foreign matter from mains, branch runs, hydrant runs, and installed services.
- b. Introduce liquid chlorine solution at appropriate locations to assure uniform distribution through the facilities at the proper concentration.
- c. Do not use installed copper service lines to convey the concentrated chlorine solution to the mains.
- d. The sanitizing solution shall be retained in the facilities for a period of 24 hours after which each service, hydrant run, branch run and dead end shall be flushed until:
 - i. Residual chlorine is less than 1 part per million.
 - ii. Residual chlorine is no greater than the concentration of chlorine in the water supplied for flushing.
- e. Chlorine shall be a 1 percent solution (containing 10,000 parts per million available chlorine) or shall be obtained by use of dry chlorine in tablet form firmly attached to inside tope of the pipe.
- f. The required concentration of chlorine in the pipe is 50 parts per million. This concentration may be attained by adding 5 gallons of the chlorine solution to 1,000 gallons of water.
- g. The weight of chlorine or chlorine compound required to make a 1 percent chlorine solution is as follows:

TABLE 3

One-Percent Chlorine Solution Mix

AMOUNT OF PRODUCT COMPOUND		QUANTITY OF WATER (in gallons)
High-Test Calcium Hypochlorite (65-70% C1)	1 pound	7.50
Chlorinated Lime (32-35% C1)	2 pounds	7.50
Liquid Laundry Bleach (5.25 % C1)	1 gallon	4.25
Liquid Chlorine (100% available chlorine)	0.62 pounds	7.50

2. HTH Tablet Method:

- a. The required concentration of chlorine in the mains may be obtained by the use of HTH tablets as produced by Olin Mathieson in the following quantities or approved equivalent:

TABLE 4

HTH Tablet (70%) Dosage
 Number of Tablets Per Length of Pipe

Length Of Section	DIAMETER OF PIPE				
	4 inches	6 inches	8 inches	10 inches	12 inches
13 feet or less	1	2	3	4	6
18 feet	1	2	3	5	6
20 feet	1	2	3	5	7
30 feet	2	3	5	7	10
36 feet	2	3	5	8	12
40 feet	2	4	6	9	14
100 feet	4	9	15	23	30

- b. Tablets are to be fastened to the inside top surface of each length of pipe using "Permatex No. 1" no earlier than the day pipe is laid.
- c. Tablets shall not be installed in the pipe and left overnight before laying and shall not be accessible at any time for casual pilferage by the general public or by children. Tablets shall be stored in a hermetically sealed container.
- d. The new water lines are to be slowly filled with water. Air is to be exhausted from each dead end, branch run, hydrant run, and installed service.
- e. Water shall be retained for a period of 24 hours, after which each service, hydrant run, branch run and dead end shall be thoroughly flushed to clear foreign matter and until:
 - i. Residual chlorine concentration is less than 1 part per million
 - ii. Residual chlorine is no greater than the concentration of chlorine in the water supplied for flushing.

B. Bacteriological Testing:

1. Samples shall be gathered and tests conducted at the expense of the Contractor by a laboratory approved by the District.
2. Samples are to be taken at representative points not less than one test per every 500 feet of pipe, plus one test at each end of the pipe; or as required by the District and inspector having jurisdiction.
3. The new water lines shall remain isolated and out of service until satisfactory test results have been obtained that:
 - a. All samples shall be tested and show the absence of Coliform Organisms, the presence of free chlorine residual (and shall equal to that of source water). Turbidity, PH and Heterotrophic Plate Count shall also match that of the source water.
 - b. District has accepted the results as indicative of the bacteriological condition of the facilities.
 - c. If unsatisfactory or doubtful results are obtained from the initial sampling, repeat the chlorination process until acceptable test results are reported.
 - d. Source water shall be that of the campus.

END OF DOCUMENT

Section 33 3000
SANITARY SEWER

PART 1 – GENERAL

1.1 SUMMARY

- A. This section describes general requirements, products, and methods of execution relating to on-site sanitary sewerage excluding portions within five feet of buildings unless otherwise noted. Any work within the public right-of-way shall be constructed to the standards of the local sanitation district, which would include one of the following: City of Fairfield; City of Vacaville; Vallejo Sanitation and Flood Control Department; and the State of California Department of Transportation.
 - 1. Sanitary Sewer System, including piping and structures.
- B. Contractor shall provide all labor, equipment, and materials, unless otherwise noted.
- C. Related Sections:
 - 1. Section 31 2333 – TRENCHING, BACKFILLING AND COMPACTING.

1.2 SUBMITTALS

- A. Comply with the requirements of Section 01 3300 - SUBMITTALS.
- B. Product Data: Manufacturer's literature and data, including, where applicable, pressure rating, capacity, labels, or other markings on equipment made to the specified standards for materials, for the following:
 - 1. Piping and fittings.
 - 2. Jointing material.
 - 3. Gaskets, couplings, and sleeves.
 - 4. Precast concrete structures, including manholes.
 - 5. Concrete mix design for sanitary structures.
 - 6. Manhole lids and frames.
 - 7. Steps.
 - 8. Pipe to Structure Connection Seal
 - 9. Clean-out boxes.
 - 10. Lift Station Vault.
 - 11. Pump Data.

1.3 QUALITY ASSURANCE

- A. Comply with the latest editions of the following Standards and Regulations:
 - 1. American Concrete Pipe Association (ACPA).
 - a. ACPA 01-102 (1988) Concrete Pipe Handbook.
 - b. ACPA 01-103 (1995) Concrete Pipe Installation Manual.
 - 2. American National Standards Institute (ANSI).
 - a. ANSI B18.5.2.1M (1981; R 1995) Metric Round Head Short Square Neck Bolts.
 - 3. American Railway Engineering & Maintenance-of-Way Association (AREMA).
 - a. AREMA 1-5 (2001) Pipelines.
 - 4. American Society for Testing and Materials (ASTM).
 - a. A 123/A 123M (2001a) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

- b. A 307 (2000) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
- c. A 47 (1999) Ferritic Malleable Iron Castings.
- d. A 47M (1990; R 1996) Ferritic Malleable Iron Castings (Metric).
- e. A 48 (1994ae1) Gray Iron Castings.
- f. A 48M (1994e1) Gray Iron Castings (Metric).
- g. A 536 (1984; R 1999e1) Ductile Iron Castings.
- h. A 563 (2000) Carbon and Alloy Steel Nuts.
- i. A 563M (2001) Carbon and Alloy Steel Nuts (Metric).
- j. A 74 (1998) Cast Iron Soil Pipe and Fittings.
- k. A 746 (1999) Ductile Iron Gravity Sewer Pipe.
- l. C 12 (2002) Installing Vitrified Clay Pipe Lines.
- m. C 14 (1999) Concrete Sewer, Storm Drain, and Culvert Pipe.
- n. C 14M (1999) Concrete Sewer, Storm Drain, and Culvert Pipe (Metric).
- o. C 150 (2002) Portland Cement.
- p. C 260 (2001) Air-Entraining Admixtures for Concrete.
- p. C 270 (2001a) Mortar for Unit Masonry.
- q. C 301 (1998) Vitrified Clay Pipe.
- r. C 33 (2001a) Concrete Aggregates.
- s. C 361 (1999) Reinforced Concrete Low-Head Pressure Pipe.
- t. C 361M (1999) Reinforced Concrete Low-Head Pressure (Metric).
- u. C 425 (2002) Compression Joints for Vitrified Clay Pipe and Fittings.
- v. C 443 (2001) Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
- w. C 443M (2001) Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets (Metric).
- x. C 478 (1997) Precast Reinforced Concrete Manhole Sections.
- y. C 478M (1997) Precast Reinforced Concrete Manhole Sections (Metric).
- z. C 494 Chemical Admixtures for Concrete.
- aa. C 564 (1997) Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- ab. C 700 (2002) Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
- ac. C 76 (2000) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
- ad. C 76M (2000) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric).
- ae. C 828 (2001) Low-Pressure Air Test of Vitrified Clay Pipe Lines.
- af. C 920 (2002) Elastomeric Joint Sealants.
- ag. C 923 (2000) Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.
- ah. C 923M (1998) Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals (Metric).
- ai. C 924 (1989; R 1997) Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method.
- aj. C 924M (1989; R 1998) Testing Concrete Pipe Sewer Liner by Low-Pressure Air Test Method (Metric).
- ak. C 94 (1994) Ready-Mixed Concrete.
- al. C 94/C 94M (2000e2) Ready-Mixed Concrete.
- am. C 969 (2000) Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
- an. C 969M (2000) Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines (Metric).
- ao. C 972 (2000) Compression-Recovery of Tape Sealant.
- ap. C 990 (2001a) Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealers.
- aq. C 990M (2001a) Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants (Metric).

- ar. D 1784 (1999a) Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
 - as. D 1785 (1999) Poly(Vinyl Chloride)(PVC) Plastic Pipe, Schedules 40, 80, and 120.
 - at. D 2235 (2001) Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
 - au. D 2241 (2000) Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
 - av. D 2321 (2000) Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
 - aw. D 2412 (1996a) Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
 - ax. D 2464 (1999) Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
 - ay. D 2466 (2001) Poly(Vinyl Chloride)(PVC) Plastic Pipe Fittings, Schedule 40.
 - az. D 2467 (2001) Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
 - ba. D 2680 (2001) Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping.
 - bb. D 2751 (1996a) Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.
 - bc. D 2996 (2001) Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
 - bd. D 2997 (2001) Centrifugally Cast "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
 - be. D 3034 (2000) Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - bf. D 3139 (1998) Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
 - bg. D 3212 (1996a) Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
 - bh. D 3262 (2002) "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe.
 - bi. D 3350 (2002) Polyethylene Plastics Pipe and Fittings Materials.
 - bj. D 3753 (1999) Glass-Fiber-Reinforced Manholes.
 - bk. D 3840 (2001) "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Fittings for Non-pressure Applications.
 - bl. D 4101 (2002) Propylene Injection and Extrusion Materials.
 - bm. D 412 (1998a) Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers – Tension.
 - bn. D 4161 (2001) "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals.
 - bo. D 624 (2000) Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
 - bp. F 1336 (2002) Poly(Vinyl Chloride) (PVC) Gasketed Sewer Fittings.
 - bq. F 402 (1993; R 1999) Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings.
 - br. F 405 (1997) Corrugated Polyethylene (PE) Tubing and Fittings.
 - bs. F 477 (1999) Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
 - bt. F 714 (2001) Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
 - bu. F 758 (1995; R 2000) Smooth-Wall Poly(Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage.
 - bv. F 794 (1999) Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.
 - bw. F 894 (1998a) Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe.
 - bx. F 949 (2001a) Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings.
5. ASME International (ASME).
- a. B1.20.1 (1983; R 2001) Pipe Threads, General Purpose, Inch.
 - b. B16.1 (1998) Cast Iron Pipe Flanges and Flanged Fittings.

- c. B18.2.2 (1987; R 1999) Square and Hex Nuts.
 - d. B18.5.2.2M (1982; R 2000) Metric Round Head Square Neck Bolts.
 6. American Water Works Association (AWWA).
 - a. C104 (1995) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
 - b. C105 (1999) Polyethylene Encasement for Ductile-Iron Pipe Systems.
 - c. C110 (1998) Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. (76 mm through 1219 mm), for Water.
 - d. C111 (2000) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - e. C115 (1999) Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges.
 - f. C151 (1996) Ductile-Iron Pipe, Centrifugally Cast, for Water.
 - g. C153 (2000) Ductile-Iron Compact Fittings for Water Service.
 - h. C302 (1995) Reinforced Concrete Pressure Pipe, Noncylinder Type.
 - i. C600 (1999) Installation of Ductile-Iron Water Mains and Their Appurtenances.
 - j. C606 (1997) Grooved and Shouldered Joints.
 - k. C900 (1997) Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Distribution.
 - l. M23 (1980) Manual: PVC Pipe _ Design and Installation.
 - m. M9 (1995) Manual: Concrete Pressure Pipe.
 7. California Department of Transportation (CDT): Standard Specifications:
 - a. Section 55: Steel Structures
 - b. Section 70: Miscellaneous Facilities
 - c. Section 75: Miscellaneous Metal
 8. Cast Iron Soil Pipe Institute (CISPI).
 - a. 301 (2000) Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
 - b. 310 (1997) Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
 9. Uni_Bell PVC Pipe Association (UBPPA).
 - a. UNI-B-3 (1992) Recommended Practice for the Installation of Polyvinyl Chloride (PVC) Pressure Pipe (Nominal Diameters 4-36 Inch).
 - b. UNI-B-6 (1990) Recommended Practice for the Low-Pressure Air Testing of Installed Sewer Pipe.
 10. City of Fairfield Standard Plans and Specifications.
 11. City of Vacaville Standard Plans and Specifications.
 12. Vallejo Sanitation and Flood Control District Standard Plans and Specifications.
 13. American Association of State Highway and Transportation Officials (AASHTO) for H20 Loading.
 14. American Concrete Institute (ACI).
 15. Other authorities having jurisdiction.
- B. System Description: Grades and elevations are to be established with reference to the benchmarks referenced on the Plans.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Storage
1. Piping: Inspect materials delivered to site for damage; store with minimum of handling. Store materials on site in enclosures or under protective coverings. Store plastic piping and jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.

2. Metal Items: Check upon arrival; identify and segregate as to types, functions, and sizes. Store off the ground in a manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials.
- B. Handling
1. Handle pipe, fittings, and other accessories in such manner as to ensure delivery to the trench in sound undamaged condition. When handling lined pipe, take special care not to damage linings of pipe and fittings; if lining is damaged, make satisfactory repairs. Carry, do not drag, pipe to trench.

PART 2 – PRODUCTS

2.1 PIPING

- A. Polyvinyl Chloride (PVC) Pipe: PVC pipe conforming to ASTM D3034, SDR 26 with bell-and-spigot type of rubber gasket joints. Bells shall be integral with pipe. Spigot end pipe with separate double hub couplings is not acceptable.
- B. Vitrified Clay Pipe (VCP): VCP and fitting shall conform to ASTM C700, Extra Strength.

2.2 MANHOLES

- A. Manholes shall be pre-cast concrete of the size and shape shown on the Plans and shall conform to Sections 70-1.02H of the CDT Standard Specifications and to ASTM C478. Equivalent poured-in-place structures may be used at the Contractor's option. Concrete shall consist of Caltrans Type I/II cement.
- B. Frames and covers shall be cast iron conforming to Section 55-2.03 and 75-1.02 of the CDT Standard Specifications. Manhole covers shall have the words "SANITARY SEWER" in letters not less than 2 inches cast into the cover. The clear opening for all manhole covers shall be 24 inches.
- C. All interior concrete surfaces shall be coated with "Xypex Crystalline" or approved equivalent. Use of a water-resistant admix is acceptable, at contractor option.
- D. Frames and lids for manholes shall be match-marked in pairs before delivery to the job site. The lids shall fit into their frames without rocking.
- E. Reinforcing Bars: Reinforcing bars shall be of intermediate grade billet steel conforming to ASTM A615 and shall be of the size shown on the Standard Details or in the Plans. Bars shall be of the round deformed type, free from injurious seams, flaws, or cracks, and shall be cleaned of all rust, dirt, grease and loose scales.
- F. Portland Cement Concrete: Concrete for manhole bases, inlets, and other concrete structures shall conform to the requirements of CDT Section 90 and as herein specified. The concrete shall be Class "A" containing six (6) sacks of Portland Cement per cubic yard of concrete. The grading of the combined aggregate shall conform with the CDT requirements of the three-quarter inch maximum. The consistency of the fresh aggregate shall be such that the slump does not exceed four inches, as determined by Test Method No. Calif. 520. The concrete shall have a minimum design compressive strength of 3,000 psi after 28 days.

2.3 CLEAN-OUTS

- A. Where cleanouts are located in landscaping, a box shall be provided for each clean-out. Boxes shall be pre-cast concrete with cast iron frame and cover marked "SAN SEWER"; Christy G5 with G5C lid or approved equivalent. Where cleanouts are in hardscape, minimize the aesthetic impact of the cleanout by eliminating the concrete box (cleanout cover flush with hardscape).

2.4 PIPE TO STRUCTURE CONNECTOR/SEAL

- A. A flexible pipe to manhole connector shall be used for all pipe penetrations to pre-cast and/or cast-in-place concrete structures.
1. The seal shall provide a flexible, positive, watertight connection between pipe and concrete wastewater structures. The connector shall assure that a seal is made between (1) the connector and the structure wall, and (2) between the connector and the pipe. The seal between the connector and the manhole wall shall be made by casting the connector integrally with the structure wall during the manufacturing process in such a manner that it will not pull out during coupling. The seal between connector and pipe will be made by way of a stainless steel take down band compressing the gasket against the outside diameter of the pipe.

The connector shall be molded from materials whose physical/chemical properties meet or exceed the physical/chemical resistant properties outlined in ASTM C-923. The connector and stainless steel hardware shall meet or exceed the performance requirements proscribed in ASTM C-923.

The connector shall be of size specifically designed for the pipe material being used and shall be installed in accordance with recommendations of the manufacturer.

2. Connectors shall be Z-LOK or G3 connectors manufactured by A-LOK Products Inc. or approved equivalent.

PART 3 – EXECUTION

3.1 PIPE INSTALLATION

- A. Pipe shall be installed in conformance with Section 31 2333 – TRENCHING, BACKFILLING AND COMPACTING, and manufacturer's recommendations.
- B. Pipe laying:
1. No pipe shall be laid until the Geotechnical Project Manager inspects and approves the conditions of the bottom of the trench.
 2. Pipe laying shall proceed "up grade" with the spigot section of the bell-and-spigot pipe pointing in the direction of the flow.
 3. Each section of pipe shall be laid true to line and grade and in such a manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets in the flow line.
 4. Pipe shall not be laid when the condition of the trench or the weather is unsuitable.
- C. Debris Control:
1. The interior of the sewer pipe shall be kept clean of dirt and debris at all times. When work is not in progress, open ends of pipe and fittings shall be plugged.
 2. Where clearing after laying is difficult because of small pipe size, a suitable swab or squeegee shall be kept in the pipe and bulled forward past every joint immediately after joining has been completed.

3.2 POURED-IN-PLACE CONCRETE

- A. Concrete shall be mixed in accordance with applicable provisions of Section 90 of the CDT Standard Specifications.

- B. Construction of concrete structures shall conform to applicable provisions of Section 51 of the CDT Standards Specifications. Unless otherwise noted herein or in the Plans, exposed surfaces of structures shall be Class 1 surface finish.
- C. Curing shall conform to applicable portions in Section 90 of CDT Standard Specifications. No pigment shall be used in curing compounds. All work shall be subject to inspection. No concrete shall be placed until the Project Manager has approved the forms and reinforcement.
- D. Concrete shall not be dropped freely where reinforcing bars will cause segregation, nor shall it be dropped freely more than six feet. Spouts, elephant trunks, or other approved means shall be used to prevent segregation.

3.3 PIPELINE AIR TESTING AND FLUSHING

- A. All new sections of sanitary sewer shall be tested using the following procedures:
 - 1. Test is conducted between two consecutive manholes, or as directed by the Project Manager.
 - 2. The test section of the sewer shall be plugged at each end. One of the plugs used at the manhole shall be tapped and equipped for the air inlet connection for filling the line from an air compressor.
 - 3. All service laterals, stubs, and fittings into the sewer test section shall be properly capped or plugged and carefully braced against the internal pressure to prevent air leakage by slippage and blowout.
 - 4. Connect air hose to tapped plug selected for the air inlet. Connect the other end of the air hose to the portable air control equipment, which consists of valves and pressure gauges used to control the air entry rate into the sewer test section, and to monitor the air pressure in the pipeline. More specifically, the air control equipment includes a shut-off valve, pressure regulating valve, pressure reduction valve, and a monitoring pressure gauge having a pressure range from 0-5 psi. The gauge shall have minimum divisions of 0.10 psi and an accuracy of 0.40 psi.
 - 5. Connect another air hose between the air compressor (or other source of compressed air) and the air control equipment. This completes the test equipment set-up. Test operations may commence.
 - 6. Supply air to the test section slowly, filling the pipeline until a constant pressure of 3.5 psig is maintained. The air pressure must be regulated to prevent the pressure inside the pipe from exceeding 5.0 psig.
 - 7. When constant pressure of 3.5 psig is reached, throttle the air supply to maintain the internal pressure above 3.0 psig for at least 5 minutes. This time permits the temperature of the entering air to equalize with the temperature of the pipe wall. During this stabilization period, it is advisable to check all capped and plugged fittings with a soap solution to detect any leakage at these connections. If leakage is detected at any cap plug, release the pressure in the line and tighten all leaky caps and plugs. Start the test operation again by supplying air. When it is necessary to bleed off the air to tighten or repair a faulty plug, a new 5-minute interval must be allowed after the pipeline has been refilled.
 - 8. After the stabilization period, adjust the air pressure to 3.5 psig and shut-off or disconnect the air supply. Observe the gauge until the air pressure reached 3.0 psig. At 3.0 psig, commence timing with a stopwatch until the pressure drops to 2.5 psig, at which time the stop watch is stopped. The time required, as shown on the stopwatch, for a pressure loss of 0.5 psig is used to compute the air loss.
 - 9. If the time, in minutes and seconds, for the air pressure drop from 3.0 to 2.5 psi is greater than that shown in the following table for the designated pipe size, the section undergoing test shall have passed and shall be presumed to be free of defects. The test may be discontinued at any time.

10. If the time, in minutes and seconds, for the 0.5 psig drop is less than that shown in the following table for the designated pipe size, the section of the pipe shall not have passed the test; therefore, adequate repairs must be made and the line retested.

Requirements for Air Testing

Pipe Size (in inches)	Time	
	Minutes	Seconds
4	2	32
6	3	50
8	5	6
10	6	22
12	7	39
14	8	56
15	9	35
16	10	12
18	11	34
20	12	30

(For larger diameter pipe use the following: Minimum time in seconds = 462 X pipe diameter in feet).

11. For 8 inch and smaller pipe, only: if, during the 5 minute saturation period, pressure drops less than 0.5 psig after the initial pressurization and air is not added, the pipe section undergoing test shall have passed.
12. Multi-pipe sizes: when the sewer line undergoing test is 8 inch or larger diameter pipe and includes 4 inch or 6 inch laterals, the figures in the table for uniform sewer main sizes will not give reliable or accurate criteria for the test. Where multi-pipe sizes are to undergo the air test, the Project Manager can compute the "average" size in inches which is then multiplied by 38.2 seconds. The results will give the minimum time in seconds acceptable for a pressure drop of 0.5 psig for the "averaged" diameter pipe.
13. Adjustment Required for Groundwater:
 - a. An air pressure correction is required when the ground water table is above the sewer line being tested. Under this condition, the air test pressure must be increased .433 psi for each foot the ground water level is above the invert of the pipe.
 - b. Where ground water is encountered or is anticipated to be above the sewer pipe before the air testing will be conducted, the following procedure shall be implemented at the time the sewer main and manholes are constructed.
 - i. Install a ½ inch diameter pipe nipple (threaded one or both ends, approximately 10 inch long) through the manhole wall directly on top of one of the sewer pipes entering the manhole with threaded end of nipple extending inside the manhole.
 - ii. Seal pipe nipple with a threaded ½ inch cap.
 - iii. Immediately before air testing, determine the ground water level by removing the threaded cap from the nipple, blowing air through the pipe nipple to remove any obstruction, and then connecting a clear plastic tube to the pipe nipple.
 - iv. Hold plastic tube vertically permitting water to rise in it to the groundwater level.
 - v. After water level has stabilized in plastic tube, measure vertical height of water, in feet, above invert of sewer pipe.
 - vi. Determine air pressure correction, which must be added to the 3.0 psig normal starting pressure of test, by dividing the vertical height in feet by 2.31. The result gives the air pressure correction in pounds per square inch to be added.

Example: if the vertical height of water from the sewer invert to the top of the water column measures 11.55 feet, the additional air pressure required would be:

$$\frac{(11.55)}{(2.31)} = 5.0 \text{ psig}$$

Therefore, the starting pressure of the test would be 3.0 plus 5 or 8.0 psig, and the ½ pound drop becomes 7.5 psig. There is no change in the allowable drop (0.5 psig) or in the time requirements established for the basic air test.

- B. After the line has passed the air test, it shall be balled and flushed with water to clean. A metal screen shall be used downstream at the point of connection to the existing system to collect and remove any rock or other debris that is flushed out during cleaning.

3.4 DEFLECTION TESTING

- A. Upon completion of work, perform a deflection test on entire length of installed plastic pipeline. Completed work includes superimposed loads adjacent to and over the pipeline, such as compacted backfill and earthwork, and does not include paving, concrete curbs and gutters, sidewalks, walkways, and landscaping.
- B. Under external loads, deflection of pipe in the installed pipeline shall not exceed 4.5 percent of the average inside diameter of pipe.
- C. Determine whether the allowable deflection has been exceeded by use of a pull-through device or a deflection-measuring device.
- D. Pull-Through Device:
 - 1. Provide a spherical, spheroidal, or elliptical ball, a cylinder, or circular sections fused to a common shaft.
 - a. Circular sections shall be so spaced on the shaft that distance from external faces of front and back sections will equal or exceed diameter of the circular section.
 - b. Pull-through device may also be of a design approved by the Uni-Bell Plastic Pipe Association, provided that the device meets the applicable requirements specified in this paragraph, including those for diameter of the device.
 - 2. Ball, cylinder, or circular sections shall conform to the following:
 - a. A diameter, or minor diameter as applicable, of 95 percent of the average inside diameter of the pipe; tolerance of plus 0.5 percent will be permitted.
 - b. A homogeneous material throughout, with a density greater than 1.0 as related to water at 39.2 degrees F, and a surface Brinell hardness of not less than 150.
 - c. Center bored and through bolted with a ¼ inch minimum diameter steel shaft having a yield strength of not less than 70,000 pounds per square inch, with eyes or loops at each end for attaching pulling cables.
 - d. Each eye or loop shall be suitably backed with a flange or heavy washer such that a pull exerted on opposite end of shaft will produce compression throughout remote end.
 - 3. Pull-Through Device:
 - a. Pass the pull-through device through each run of pipe, either by pulling it through or flushing it through with water.
 - b. If the device fails to pass freely through a pipe run, replace pipe which has the excessive deflection and completely retest in same manner and under same conditions as specified.
- E. Deflection measuring Device:
 - 1. Sensitive to 1.0 percent of the diameter of the pipe being tested and accurate to 1.0 percent of the indicated dimension.

2. Obtain approval of deflection measuring device prior to use.
- F. Deflection Measuring Device Procedure:
1. Measure deflections through each run of installed pipe.
 2. If deflection readings in excess of 4.5 percent of average inside diameter of pipe are obtained, retest pipe by a run from the opposite direction.
 3. If retest continues to show a deflection in excess of 4.5 percent of average inside diameter of pipe, remove pipe which has excessive deflections, replace with new pipe, and completely retest in same manner and under same conditions.
- G. Warranty Period Test: Pipe found to have a deflection of greater than 5 percent of average inside diameter when deflection test is performed just prior to end of 1 year warranty period shall be replaced with new pipe and tested as specified for leakage and deflection.

3.5 CLEANING

- A. Thoroughly clean storm drain lines, manholes, catch basins, field inlets, culverts, and similar structures, of dirt, debris, and obstructions of any kind.

3.6 TELEVISION INSPECTION

- A. After completion of the pipe installation, service connections, flushing and cleaning, and prior to placement of pavement, the sewer line shall be televised with a color closed-circuit television with tilt-head camera recorded in VHS format. The original videotape and log sheets shall be provided to the Project Manager for review.
1. The following observations from television inspections will be considered defects in the construction of sewer pipelines and will require correction prior to placement of pavement:
 - a. Low spot (1 inch or greater _ mainlines only).
 - b. Joint separations (3/4 inch or greater opening between pipe sections).
 - c. Cocked joints present in straight runs or on the wrong side of pipe curves.
 - d. Chips in pipe ends.
 - e. Cracked or damaged pipe.
 - f. Dropped joints.
 - g. Infiltration.
 - h. Debris or other foreign objects.
 - i. Other obvious deficiencies.
 - j. Irregular condition without logical explanation

END OF DOCUMENT

Section 33 4000
STORM DRAINAGE

PART 1 – GENERAL

1.1 SUMMARY

- A. This section describes general requirements, products, and methods of execution relating to on-site storm drainage excluding portions within five feet of buildings unless otherwise noted. Any work within the public right-of-way shall be constructed to the standards of the local Jurisdiction, which would include one of the following: City of Fairfield; City of Vacaville; City of Vallejo; and the State of California Department of Transportation.
- B. State of California Department of Transportation.
 - 1. Storm drain piping.
 - 2. Storm drain structures including curb inlets, catch basins, area drains, and manholes.
 - 3. Storm drain outfalls.
 - 4. Culverts and headwalls.
 - 5. Storm drain pump station.
- C. Contractor shall provide all labor, equipment, and materials, unless otherwise noted.
- D. Related Sections:
 - 1. Section 31 2333 – TRENCHING, BACKFILLING AND COMPACTING.

1.2 SUBMITTALS

- A. Comply with the requirements of Section 01 3300 – SUBMITTALS.
- B. Product Data: Manufacturer's literature and data, including, where applicable, pressure rating, capacity, labels, or other markings on equipment made to the specified standards for materials, for the following:
 - 1. Piping and fittings.
 - 2. Jointing material.
 - 3. Gaskets, couplings, and sleeves.
 - 4. Precast concrete structures, including manholes and drainage inlets.
 - 5. Concrete mix design for precast and cast-in-place structures.
 - 6. Manhole lids and frames.
 - 7. Manhole steps.
 - 8. Pipe to Structure Connection Seal
 - 9. Drainage inlet and area drain grates and frames.
 - 10. Pump station vaults.
 - 11. Pump data.

1.3 QUALITY ASSURANCE

- A. Comply with the latest editions of the following Standards and Regulations:
 - 1. American Society for Testing and Materials (ASTM).
 - a. A74: Cast Iron Soil Pipe and Fittings.

- b. A615: Deformed and Plain Billet-Steel Bars for Reinforcement.
 - c. B32: Solder Metal.
 - d. C76: Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - e. C150: Portland Cement.
 - f. C478: Precast Reinforced Concrete Manhole Sections.
 - g. C494: Chemical Admixtures for Concrete.
 - h. C920-02: Elastomeric Joint Sealants.
 - i. D2241-00: Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
 - j. D2680-01: Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.
 - k. D2729: Perforated PVC Drain Pipe.
 - l. D3034-00: Type PSM Polyvinyl Chloride (PVC) Sewer pipe and Fittings.
 - m. F1336-02: Poly(Vinyl Chloride) (PVC) Gasketed Sewer Fittings.
- 2. California Department of Transportation (CDT): Standard Specifications:
 - a. Section 51: Concrete Structures
 - b. Section 52: Reinforcement
 - c. Section 55: Steel Structures
 - d. Section 66: Corrugated Facilities
 - e. Section 70: Miscellaneous Metal
 - f. Section 72: Slope Protection
 - g. Section 75: Miscellaneous Metal
 - h. Section 90: Portland Cement Concrete
 - 3. City of Fairfield Standard Plans and Specifications.
 - 4. City of Vacaville Standard Plans and Specifications.
 - 5. City of Vallejo Standard Plans and Specifications.
 - 6. American Association of State Highway and Transportation Officials (AASHTO) for H20 Loading.
 - 7. American Concrete Institute (ACI).
 - 8. Other authorities having jurisdiction.

B. System Description: Grades and elevations

PART 2 – PRODUCTS

2.1 PIPING

- A. Polyvinyl Chloride (PVC) Pipe: PVC pipe conforming to ASTM D3034, SDR 35 with bell-and-spigot type of rubber gasket joints. Bells shall be integral with pipe. Spigot end pipe with separate double hub couplings is not acceptable.
- B. Reinforced Concrete Pipe (RCP): RCP shall conform to ASTM C76 with tongue-and-groove or bell-and-spigot joints. Unless indicated otherwise on the plans, all reinforced concrete pipe shall be Class III, 1350_D pipe.
- C. High-Density Polyethylene (HDPE) Pipe: HDPE pipe conforming to ASTM D3212, or ASTM 1417 for pipe sizes four inch-60 inch (ADS N-12 1B WT pipe or equivalent).

2.2 MANHOLES

- A. Manholes shall be pre-cast concrete of the size and shape shown on the Drawings and shall conform to Sections 70-1.02H of the CDT Standard Specifications and to ASTM C478.

Equivalent poured-in-place structures may be used at the Contractor's option. Concrete shall consist of Caltrans Type I/II cement.

- B. Frames and covers shall be cast iron conforming to Section 55-2.03 and 75-1.02 of the CDT Standard Specifications. Manhole covers shall have the words "STORM DRAIN" in letters not less than 2-inches cast into the cover. The clear opening for all manhole covers shall be 24 inches.
- C. All interior concrete surfaces shall be coated with "Xypex Crystalline" or equal. Use of a water-resistant admix is acceptable, at Contractor option.
- D. Frames and grates for manholes and catch basins shall be match-marked in pairs before delivery to the job site. The grates shall fit into their frames without rocking. Grates shall have a maximum opening of one-half inch between bars, unless otherwise noted in the Plans.
- E. Reinforcing Bars: Reinforcing bars shall be of intermediate grade billet steel conforming to ASTM A615 and shall be of the size shown on the Standard Details or in the Drawings. Bars shall be of the round deformed type, free from injurious seams, flaws, or cracks, and shall be cleaned of all rust, dirt, grease and loose scales.
- F. Portland Cement Concrete: Concrete for manhole bases, inlets, and other concrete structures shall conform to the requirements of CDT Section 90 and as herein specified. The concrete shall be Class "2" containing at least six (6) sacks of Portland Cement per cubic yard of concrete. The grading of the combined aggregate shall conform with the CDT requirements of the three-quarter inch maximum. The consistency of the fresh aggregate shall be such that the slump does not exceed four inches, as determined by Test Method No. Calif. 520. The concrete shall have a minimum design compressive strength of 3,000 psi after 28 days.

2.3 PIPE TO STRUCTURE CONNECTOR/SEAL

- A. A flexible pipe to manhole connector shall be used for all pipe penetrations and/or cast-in-place concrete structures.
 - 1. The seal shall provide a flexible, positive, watertight connection between pipe and concrete wastewater structures. The connector shall assure that a seal is made between (1) the connector and the structure wall, and (2) between the connector and the pipe. The seal between the connector and the manhole wall shall be made by casting the connector integrally with the structure wall during The manufacturing process in such a manner that it will not pull out during coupling. The seal between connector and pipe will be made by way of a stainless steel take down band compressing the gasket against the outside diameter of the pipe.
 - a. The connector shall be molded from materials whose physical/chemical properties meet or exceed the physical/chemical resistant properties outlined in ASTM C-923. The connector and stainless steel hardware shall meet or exceed the performance requirements proscribed in ASTM C-923.
 - b. The connector shall be of size specifically designed for the pipe material being used and shall be installed in accordance with recommendations of the manufacturer.
 - 2. Connectors shall be Z-LOK or G3 connectors manufactured by A-LOK Products Inc. or approved equivalent.

2.4 AREA DRAINS

- A. Grate and Riser: Area drain shall be ADS model 2718 AG or approved equal. Riser shall be constructed of 6-inch PVC SDR 35 piping per paragraph 2.1(A) of this section and connected to area drain by a gasket joint. Riser shall be vertical except as otherwise noted in the plans. Riser may include a reducer if necessary to make connection to the storm drain line.

- B. Elevation and Grading: Area Drain rim elevation shall be set and area around area drain shall be graded to drain away from any adjacent structures, walks, or roadways and towards area drain.

2.5 CLEAN-OUTS

- A. A valve box shall be provided for each clean-out. Boxes shall be pre-cast concrete with cast iron frame and cover marked "STORM DRAIN"; Christy G5 with G5C lid or approved equivalent.

2.6 CULVERT AND OUTFALL HEADWALLS

- A. All headwalls shall be constructed in conformance with CDT Standard Plans as indicated.

PART 3 – EXECUTION

3.1 PIPE INSTALLATION

- A. Pipe shall be installed in conformance with manufacturer's recommendations.
- B. Pipe laying:
 - 1. No pipe shall be laid until the Geotechnical Engineer inspects and approves the conditions of the bottom of the trench.
 - 2. Pipe laying shall proceed "up grade" with the spigot section of the bell-and-spigot pipe pointing in the direction of the flow.
 - 3. Each section of pipe shall be laid true to line and grade and in such a manner as to form an close concentric joint with the adjoining pipe and to prevent sudden offsets in the flow line.
 - 4. Pipe shall not be laid when the condition of the trench or the weather is unsuitable.
- C. Debris Control:
 - 1. The interior of the storm pipe shall be kept clean of dirt and debris at all times. When work is not in progress, open ends of pipe and fittings shall be plugged.
 - 2. Where clearing after laying is difficult because of small pipe size, a suitable swab or squeegee shall be kept in the pipe and pulled forward past every joint immediately after joining has been completed.

3.2 POURED-IN-PLACE CONCRETE

- A. Concrete shall be mixed in accordance with applicable provisions of Section 90 of the CDT Standard Specifications. Concrete shall consist of Type I/II cement.
- B. Construction of concrete structures shall conform to applicable provisions of Section 51 of the CDT Standards Specifications. Unless otherwise noted herein or in the Drawings, exposed surfaces of structures shall be Class 1 surface finish.
- C. Curing shall conform to applicable portions in Section 90 of CDT Standard Specifications. No pigment shall be used in curing compounds. All work shall be subject to inspection. No concrete shall be placed until the Project Manager has approved the forms and reinforcement.

- D. Concrete shall not be dropped freely where reinforcing bars will cause segregation, nor shall it be dropped freely more than six feet. Spouts, elephant trunks, or other approved means shall be used to prevent segregation.

3.3 PIPELINE FLUSHING

- A. Newly constructed storm drain pipes shall be flushed with water to clean. A metal screen shall be used to collect and remove any rock, silt and other debris that is flushed out during cleaning.

3.4 DEFLECTION TESTING

- A. Upon completion of work, perform a deflection test on entire length of installed plastic pipeline. Completed work includes superimposed loads adjacent to and over the pipeline, such as compacted backfill and earthwork, and does not include paving, concrete curbs and gutters, sidewalks, walkways, and landscaping.
- B. Under external loads, deflection of pipe in the installed pipeline shall not exceed 4.5 percent of the average inside diameter of pipe.
- C. Determine whether the allowable deflection has been exceeded by use of a pull-through device or a deflection-measuring device.
- D. Pull-Through Device:
 - 1. Provide a spherical, spheroidal, or elliptical ball, a cylinder, or circular sections fused to a common shaft.
 - a. Circular sections shall be so spaced on the shaft that distance from external faces of front and back sections will equal or exceed diameter of the circular section.
 - b. Pull-through device may also be of a design approved by the Uni-Bell Plastic Pipe Association, provided that the device meets the applicable requirements specified in this paragraph, including those for diameter of the device.
 - 2. Ball, cylinder, or circular sections shall conform to the following:
 - a. A diameter, or minor diameter as applicable, of 95 percent of the average inside diameter of the pipe; tolerance of plus 0.5 percent will be permitted.
 - b. A homogeneous material throughout, with a density greater than 1.0 as related to water at 39.2 degrees F, and a surface Brinell hardness of not less than 150.
 - c. Center bored and through bolted with a ¼ inch minimum diameter steel shaft having a yield strength of not less than 70,000 pounds per square inch, with eyes or loops at each end for attaching pulling cables.
 - d. Each eye or loop shall be suitably backed with a flange or heavy washer such that a pull exerted on opposite end of shaft will produce compression throughout remote end.
 - 3. Pull-Through Device:
 - a. Pass the pull-through device through each run of pipe, either by pulling it through or flushing it through with water.
 - b. If the device fails to pass freely through a pipe run, replace pipe which has the excessive deflection and completely retest in same manner and under same conditions as specified.
- E. Deflection measuring Device:
 - 1. Sensitive to 1.0 percent of the diameter of the pipe being tested and accurate to 1.0 percent of the indicated dimension.
 - 2. Obtain approval of deflection measuring device prior to use.

- F. Deflection Measuring Device Procedure:
 - 1. Measure deflections through each run of installed pipe.
 - 2. If deflection readings in excess of 4.5 percent of average inside diameter of pipe are obtained, retest pipe by a run from the opposite direction.
 - 3. If retest continues to show a deflection in excess of 4.5 percent of average inside diameter of pipe, remove pipe which has excessive deflections, replace with new pipe, and completely retest in same manner and under same conditions.

- G. Warranty Period Test: Pipe found to have a deflection of greater than 5 percent of average inside diameter when deflection test is performed just prior to end of 1 year warranty period shall be replaced with new pipe and tested as specified for leakage and deflection.

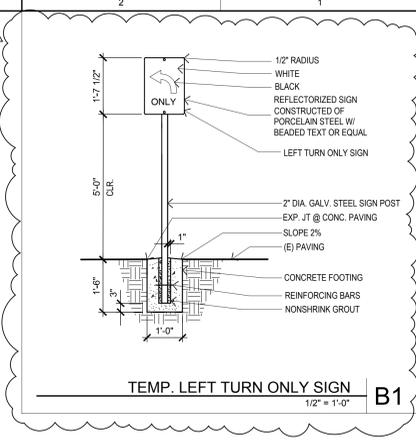
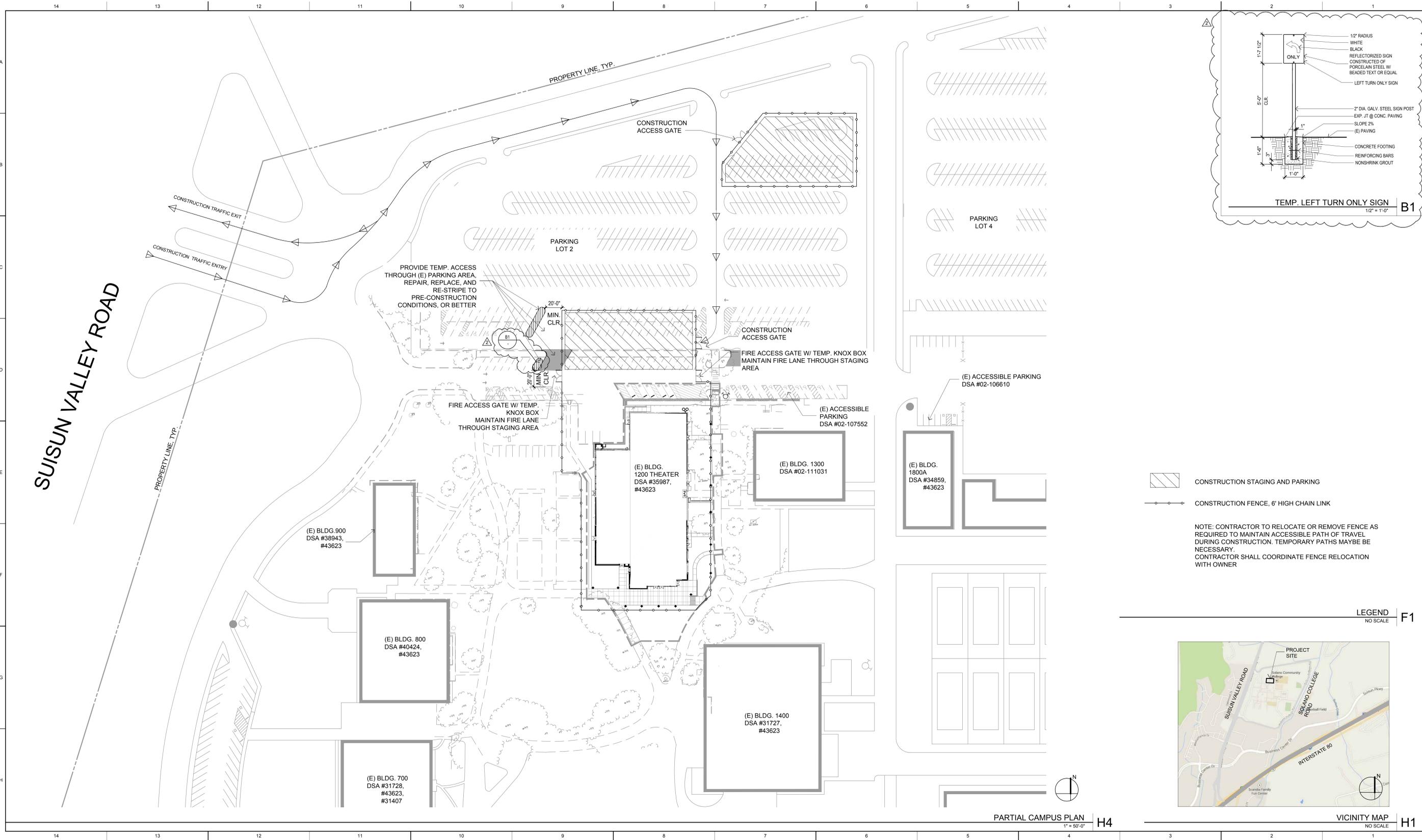
3.5 CLEANING

- A. Thoroughly clean storm drain lines, manholes, catch basins, field inlets, culverts, and similar structures, of dirt, debris, and obstructions of any kind.

3.6 TELEVISION INSPECTION

- A. After completion of the pipe installation, service connections, flushing and cleaning, and prior to placement of pavement, the storm drainage line shall be televised with a color closed-circuit television with tilt-head camera recorded in VHS format. The original videotape and log sheets shall be provided to the District.
 - 1. The following observations from television inspections will be considered defects in the construction of sewer pipelines and will require correction prior to placement of pavement:
 - a. Low spot (1 inch or greater - mainlines only).
 - b. Joint separations (3/4 inch or greater opening between pipe sections).
 - c. Cocked joints present in straight runs or on the wrong side of pipe curves.
 - d. Chips in pipe ends.
 - e. Cracked or damaged pipe.
 - f. Dropped joints.
 - g. Infiltration.
 - h. Debris or other foreign objects.
 - i. Other obvious deficiencies.
 - j. Irregular condition without logical explanation.

END OF DOCUMENT



(E) BLDG. 1800A
 DSA #34859,
 #43623

(E) BLDG. 1400
 DSA #31727,
 #43623

(E) BLDG. 800
 DSA #40424,
 #43623

(E) BLDG. 1200 THEATER
 DSA #35987,
 #43623

(E) BLDG. 1300
 DSA #02-111031

(E) BLDG. 900
 DSA #38943,
 #43623

(E) BLDG. 700
 DSA #31728,
 #43623,
 #31407

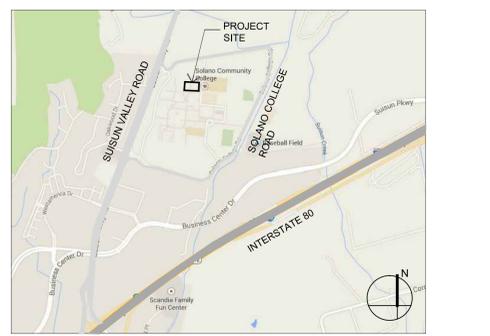
(E) ACCESSIBLE PARKING
 DSA #02-107552

(E) ACCESSIBLE PARKING
 DSA #02-106610

CONSTRUCTION STAGING AND PARKING

CONSTRUCTION FENCE, 6" HIGH CHAIN LINK

NOTE: CONTRACTOR TO RELOCATE OR REMOVE FENCE AS REQUIRED TO MAINTAIN ACCESSIBLE PATH OF TRAVEL DURING CONSTRUCTION. TEMPORARY PATHS MAY BE NECESSARY. CONTRACTOR SHALL COORDINATE FENCE RELOCATION WITH OWNER



LEGEND
 NO SCALE
F1

VICINITY MAP
 NO SCALE
H1

PARTIAL CAMPUS PLAN
 1" = 50'-0"
H4

NO.	ISSUE	DATE
2	ADDENDA 2	2015-06-26

SOLANO COMMUNITY COLLEGE
 BLDG 1200 - THEATER RENOVATION
 INCREMENT 2
 4000 SUISUN VALLEY ROAD
 FAIRFIELD, CA



ARCHITECT / CONSULTANT

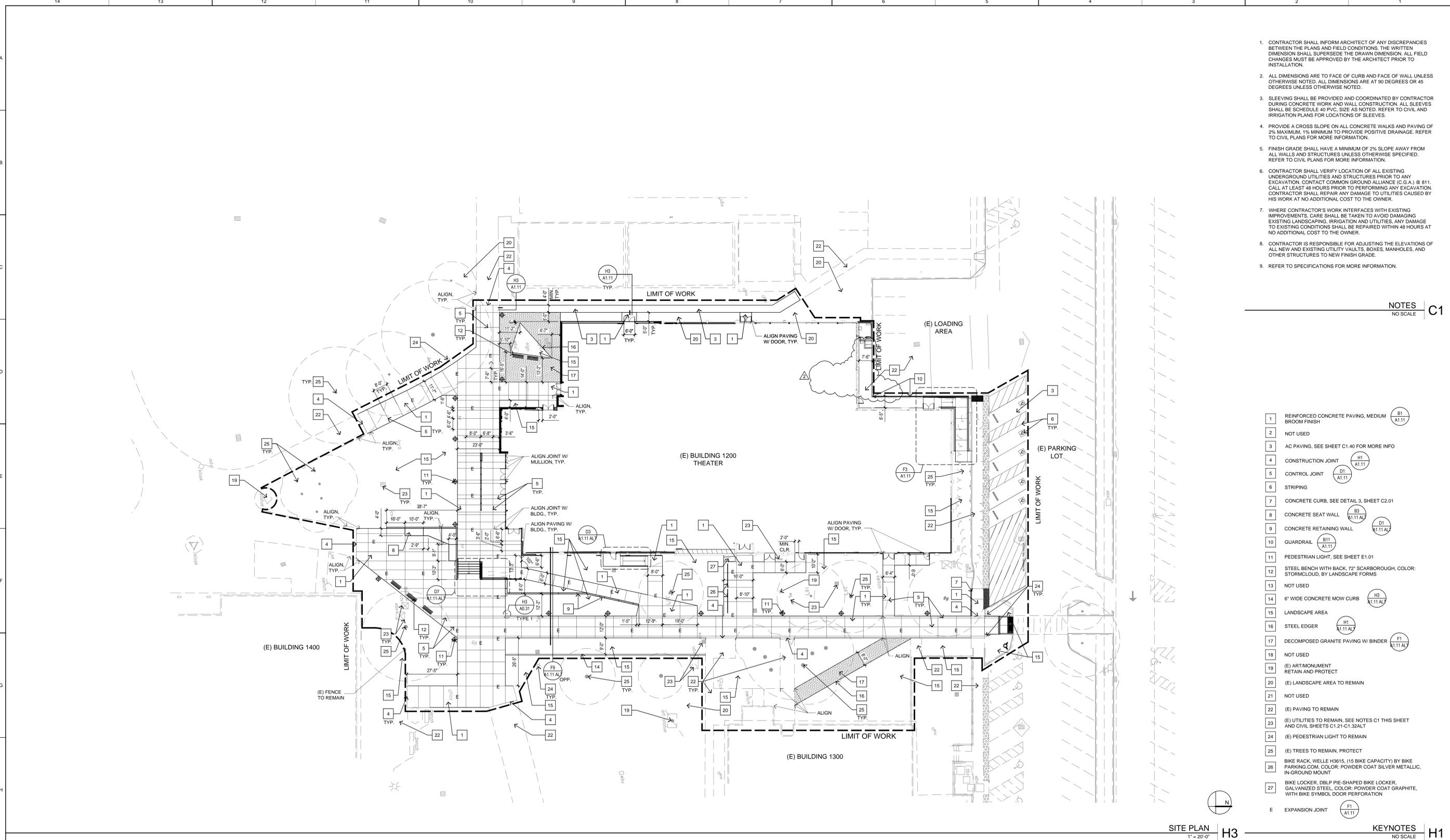
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 02-113590
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LPAS
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 916 443 0335 lpasdesign.com Architecture + Design

CONSTRUCTION ACCESS AND STAGING PLAN
 PROJECT NO: 764-0002
 DATE: 06.15.2015 Revised
 SHEET NO:
A0.20
 CONSTRUCTION SET



- CONTRACTOR SHALL INFORM ARCHITECT OF ANY DISCREPANCIES BETWEEN THE PLANS AND FIELD CONDITIONS. THE WRITTEN DIMENSION SHALL SUPERSEDE THE DRAWN DIMENSION. ALL FIELD CHANGES MUST BE APPROVED BY THE ARCHITECT PRIOR TO INSTALLATION.
- ALL DIMENSIONS ARE TO FACE OF CURB AND FACE OF WALL UNLESS OTHERWISE NOTED. ALL DIMENSIONS ARE AT 90 DEGREES OR 45 DEGREES UNLESS OTHERWISE NOTED.
- SLEEVING SHALL BE PROVIDED AND COORDINATED BY CONTRACTOR DURING CONCRETE WORK AND WALL CONSTRUCTION. ALL SLEEVES SHALL BE SCHEDULE 40 PVC, SIZE AS NOTED. REFER TO CIVIL AND IRRIGATION PLANS FOR LOCATIONS OF SLEEVES.
- PROVIDE A CROSS SLOPE ON ALL CONCRETE WALKS AND PAVING OF 2% MAXIMUM, 1% MINIMUM TO PROVIDE POSITIVE DRAINAGE. REFER TO CIVIL PLANS FOR MORE INFORMATION.
- FINISH GRADE SHALL HAVE A MINIMUM OF 2% SLOPE AWAY FROM ALL WALLS AND STRUCTURES UNLESS OTHERWISE SPECIFIED. REFER TO CIVIL PLANS FOR MORE INFORMATION.
- CONTRACTOR SHALL VERIFY LOCATION OF ALL EXISTING UNDERGROUND UTILITIES AND STRUCTURES PRIOR TO ANY EXCAVATION. CONTACT COMMON GROUND ALLIANCE (C.G.A.) @ 811. CALL AT LEAST 48 HOURS PRIOR TO PERFORMING ANY EXCAVATION. CONTRACTOR SHALL REPAIR ANY DAMAGE TO UTILITIES CAUSED BY HIS WORK AT NO ADDITIONAL COST TO THE OWNER.
- WHERE CONTRACTOR'S WORK INTERFACES WITH EXISTING IMPROVEMENTS, CARE SHALL BE TAKEN TO AVOID DAMAGING EXISTING LANDSCAPING, IRRIGATION AND UTILITIES. ANY DAMAGE TO EXISTING CONDITIONS SHALL BE REPAIRED WITHIN 48 HOURS AT NO ADDITIONAL COST TO THE OWNER.
- CONTRACTOR IS RESPONSIBLE FOR ADJUSTING THE ELEVATIONS OF ALL NEW AND EXISTING UTILITY VAULTS, BOXES, MANHOLES, AND OTHER STRUCTURES TO NEW FINISH GRADE.
- REFER TO SPECIFICATIONS FOR MORE INFORMATION.

NOTES C1
NO SCALE

- | | | | |
|----|--|-----|----------|
| 1 | REINFORCED CONCRETE PAVING, MEDIUM BROOM FINISH | B1 | A1.11 |
| 2 | NOT USED | | |
| 3 | AC PAVING, SEE SHEET C1.40 FOR MORE INFO | | |
| 4 | CONSTRUCTION JOINT | H1 | A1.11 |
| 5 | CONTROL JOINT | D1 | A1.11 |
| 6 | STRIPING | | |
| 7 | CONCRETE CURB, SEE DETAIL 3, SHEET C2.01 | | |
| 8 | CONCRETE SEAT WALL | B3 | A1.11 AL |
| 9 | CONCRETE RETAINING WALL | D1 | A1.11 AL |
| 10 | GUARDRAIL | B11 | A1.11 |
| 11 | PEDESTRIAN LIGHT, SEE SHEET E1.01 | | |
| 12 | STEEL BENCH WITH BACK, 72" SCARBOROUGH, COLOR: STORMCLOUD, BY LANDSCAPE FORMS | | |
| 13 | NOT USED | | |
| 14 | 6" WIDE CONCRETE MOW CURB | H3 | A1.11 AL |
| 15 | LANDSCAPE AREA | | |
| 16 | STEEL EDGER | H1 | A1.11 AL |
| 17 | DECOMPOSED GRANITE PAVING W/ BINDER | F1 | A1.11 AL |
| 18 | NOT USED | | |
| 19 | (E) ART/MONUMENT RETAIN AND PROTECT | | |
| 20 | (E) LANDSCAPE AREA TO REMAIN | | |
| 21 | NOT USED | | |
| 22 | (E) PAVING TO REMAIN | | |
| 23 | (E) UTILITIES TO REMAIN, SEE NOTES C1 THIS SHEET AND CIVIL SHEETS C1.21-C1.32AL | | |
| 24 | (E) PEDESTRIAN LIGHT TO REMAIN | | |
| 25 | (E) TREES TO REMAIN, PROTECT | | |
| 26 | BIKE RACK, WELLE H3615, (15 BIKE CAPACITY) BY BIKE PARKING.COM, COLOR: POWDER COAT SILVER METALLIC, IN-GROUND MOUNT | | |
| 27 | BIKE LOCKER, DBLP PIE-SHAPED BIKE LOCKER, GALVANIZED STEEL, COLOR: POWDER COAT GRAPHITE, WITH BIKE SYMBOL DOOR PERFORATION | | |
| E | EXPANSION JOINT | F1 | A1.11 |

SITE PLAN
1" = 20'-0"
H3

KEYNOTES
NO SCALE
H1

NO. ISSUE
△ ADDENDA 2
DATE
2015-06-26

SOLANO COMMUNITY COLLEGE
BLDG 1200 - THEATER RENOVATION
INCREMENT 2
4000 SUISUN VALLEY ROAD
FAIRFIELD, CA

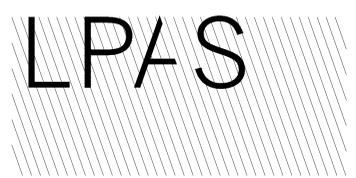


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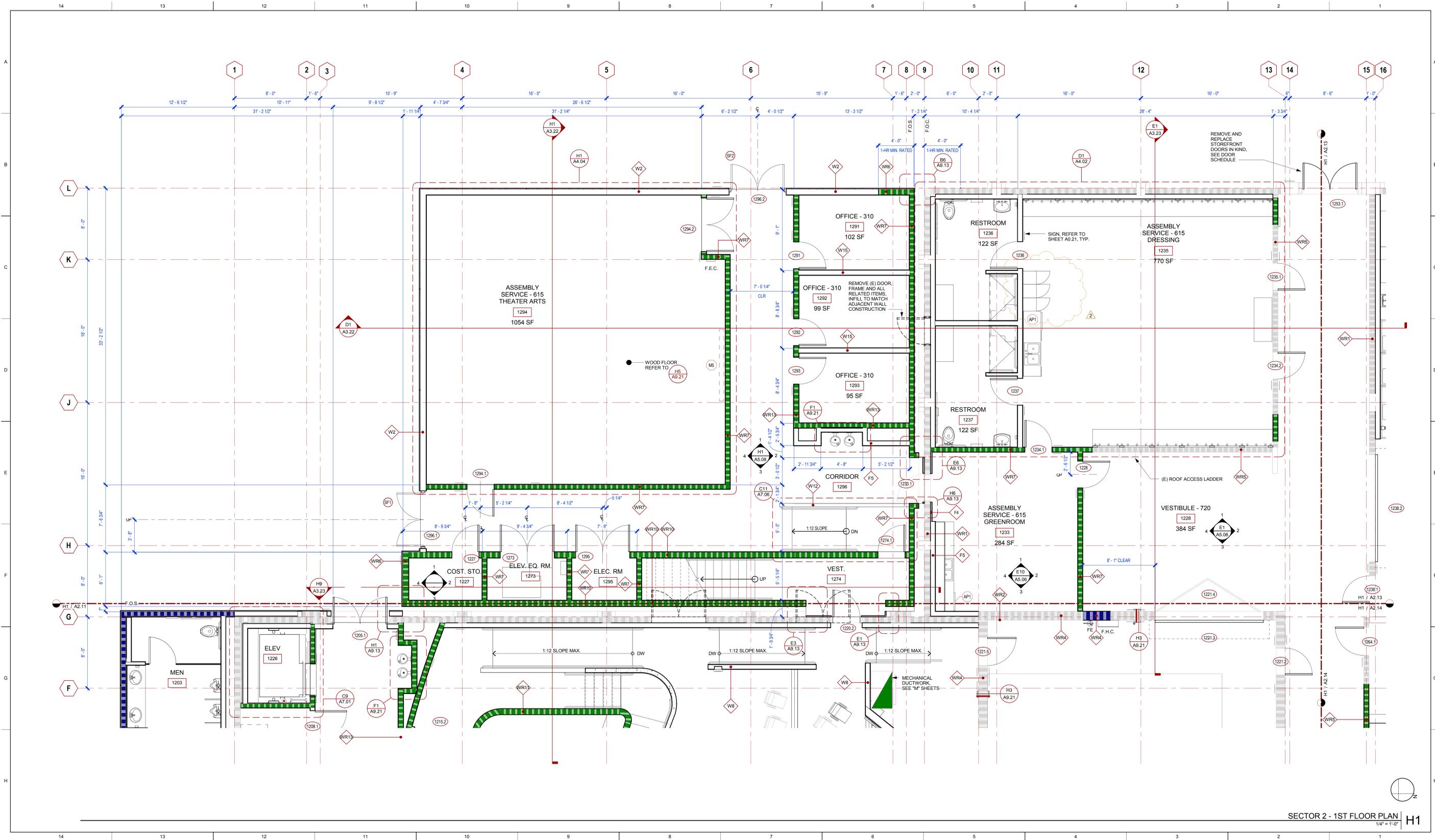
2484 Natomas Park Drive Suite 100 Sacramento CA 95833
916 443 0335 lpasdesign.com Architecture + Design

**SITE PLAN
ALTERNATE #4**

PROJECT NO: 764-0002
DATE: 06.15.2015 Revised

SHEET NO:

A1.00-ALT
CONSTRUCTION SET



SECTOR 2 - 1ST FLOOR PLAN
1/4" = 1'-0" H1

FLOOR PLAN LEGEND

- EXISTING
- NEW
- ▨ EXISTING 1-HR RATED
- ▨ NEW 1-HR RATED
- ▨ EXISTING 2-HR RATED
- ▨ NEW 2-HR RATED
- ▨ EXISTING 3-HR RATED
- ▨ NEW 3-HR RATED
- 101 DOOR NUMBER, SEE DOOR SCHEDULE SHEET A2.81
- 12 WINDOW/STOREFRONT NUMBER, SEE WINDOW SCHEDULE SHEET A2.82
- MATCHLINE
- WALL TYPE, SEE SHEETS A9.10 - A9.11

NO. ISSUE
2 ADDENDUM #2

DATE
06/26/2015

SOLANO COMMUNITY COLLEGE

BUILDING 1200 THEATER RENOVATION
INCREMENT 2
4000 SUISUN VALLEY ROAD, FAIRFIELD, CA

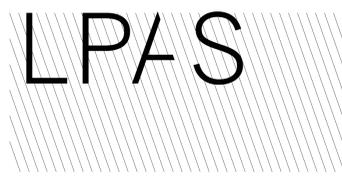


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DSA FILE NO: 48-C1



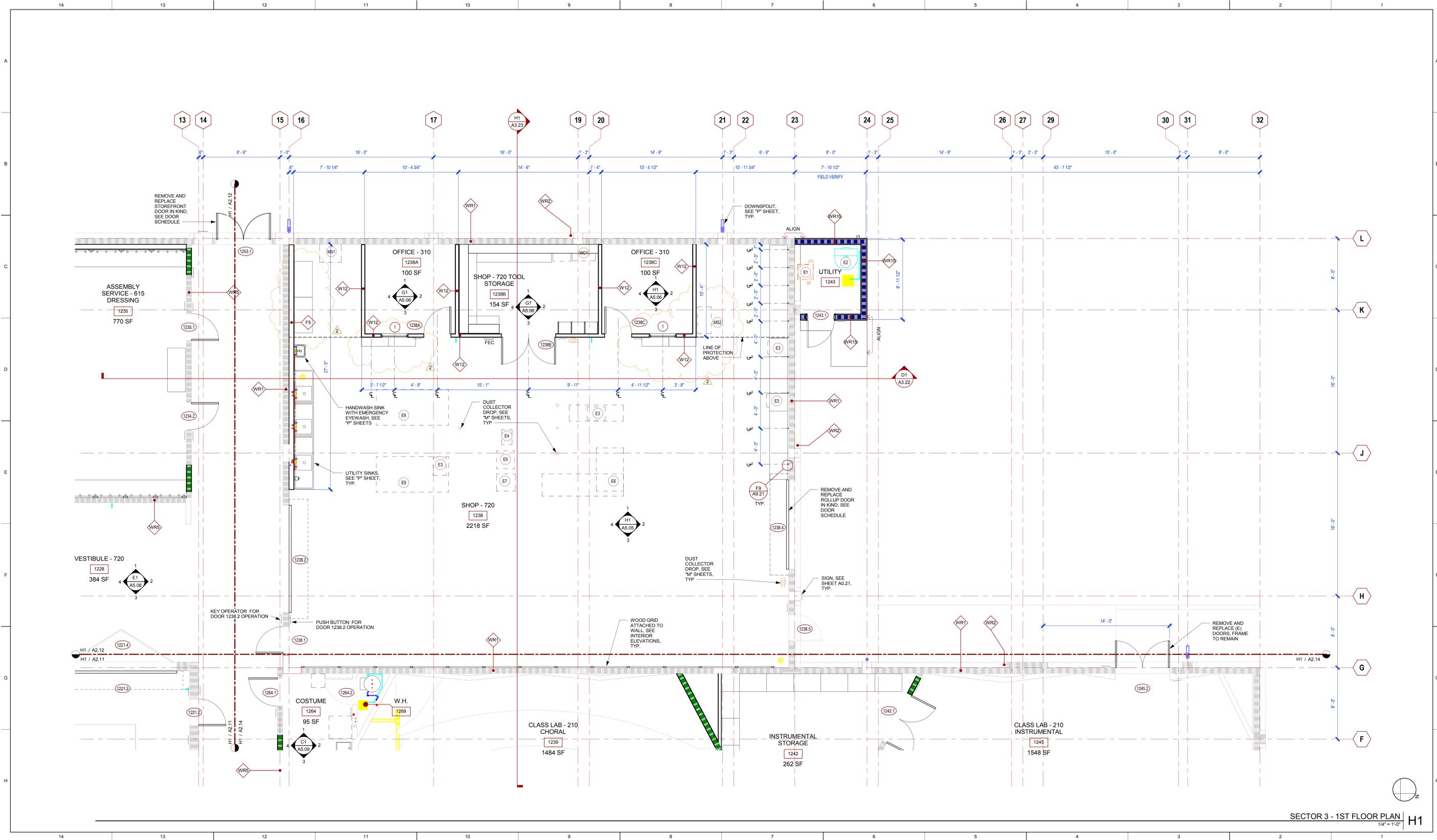
APPROVAL



SECTOR 2 - 1ST FLOOR PLAN

SCCD PROJECT NO: 14-014
LPAS PROJECT NO: 764-0002
DATE: 04-22-2015
SHEET NO:

A2.12



SECTOR 3 - 1ST FLOOR PLAN
1/4" = 1'-0" H1

FLOOR PLAN LEGEND

- EXISTING
- NEW
- ▨ EXISTING 1-HR RATED
- ▨ NEW 1-HR RATED
- ▨ EXISTING 2-HR RATED
- ▨ NEW 2-HR RATED
- ▨ EXISTING 3-HR RATED
- ▨ NEW 3-HR RATED

- 101 DOOR NUMBER, SEE DOOR SCHEDULE SHEET A2.81
- 12 WINDOW/STOREFRONT NUMBER, SEE WINDOW SCHEDULE SHEET A2.82
- MATCHLINE
- B WALL TYPE, SEE SHEETS A9.10 - A9.11

NO. ISSUE
2 ADDENDUM #2

DATE
06/26/2015

SOLANO COMMUNITY COLLEGE

BUILDING 1200 THEATER RENOVATION
INCREMENT 2
4000 SUISUN VALLEY ROAD, FAIRFIELD, CA

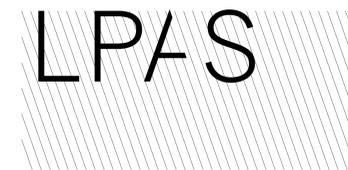


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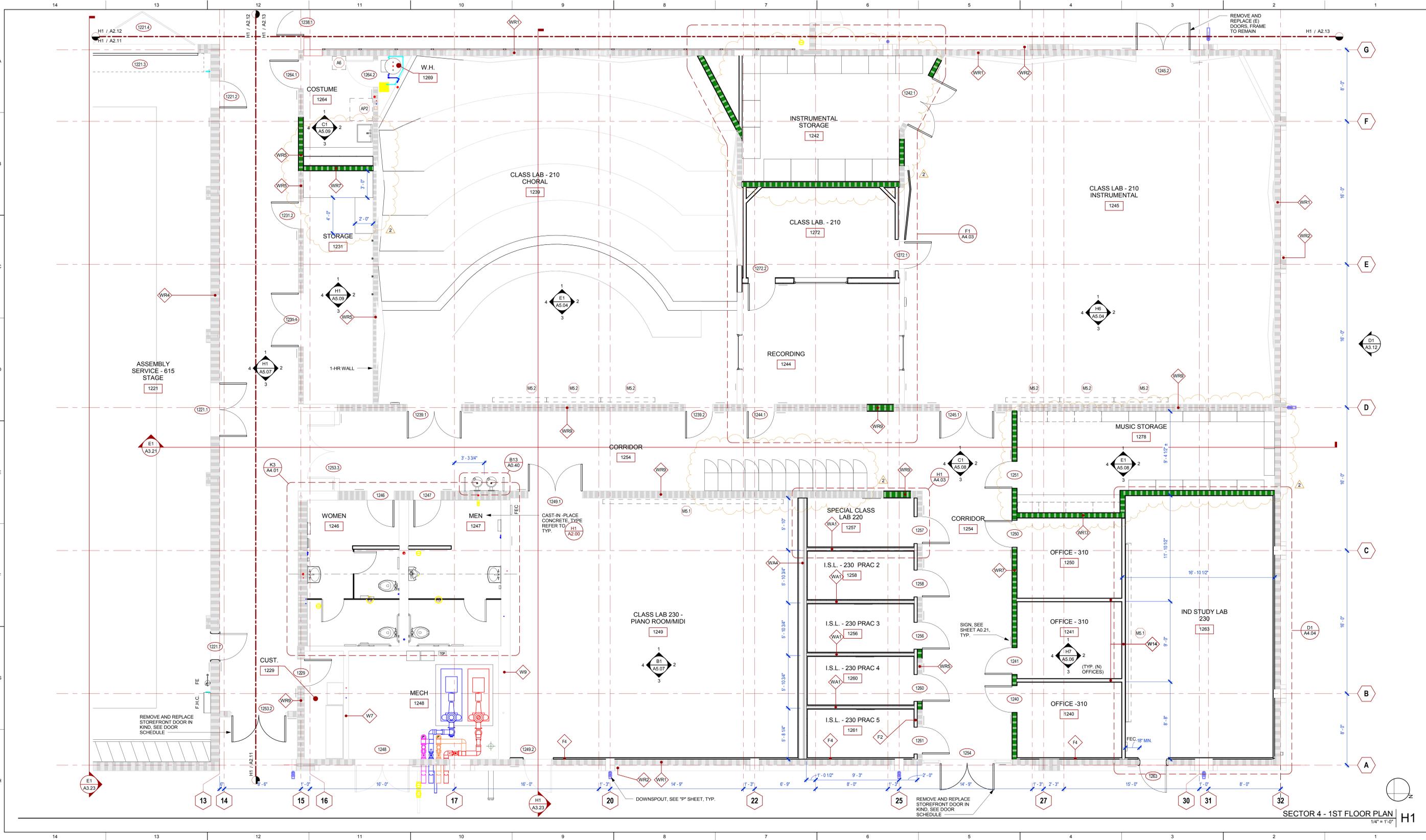
APPROVAL



SECTOR 3 - 1ST FLOOR PLAN

SCCD PROJECT NO: 14-014
LPAS PROJECT NO: 764-0002
DATE: 04-22-2015
SHEET NO:

A2.13



SECTOR 4 - 1ST FLOOR PLAN
1/4" = 1'-0" H1

FLOOR PLAN LEGEND

- EXISTING
- NEW
- ▨ EXISTING 1-HR RATED
- ▨ NEW 1-HR RATED
- ▨ EXISTING 2-HR RATED
- ▨ NEW 2-HR RATED
- ▨ EXISTING 3-HR RATED
- ▨ NEW 3-HR RATED
- 101 DOOR NUMBER, SEE DOOR SCHEDULE SHEET A2.81
- 12 WINDOW/STOREFRONT NUMBER, SEE WINDOW SCHEDULE SHEET A2.82
- MATCHLINE
- B WALL TYPE, SEE SHEETS A9.10 - A9.11

NO. ISSUE
2 ADDENDUM #2

DATE
06/26/2015

SOLANO COMMUNITY COLLEGE

BUILDING 1200 THEATER RENOVATION
INCREMENT 2
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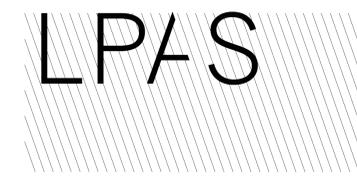


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SECTOR 4 - 1ST FLOOR PLAN

SCCD PROJECT NO: 14-014
LPAS PROJECT NO: 764-0002
DATE: 04-22-2015
SHEET NO:

A2.14

Furniture and Equipment Schedule						
Mark	Description	Provided By	Installed By	Requirements	Detail	Comments
A6	STEAMER	OWNER	Contractor	120V		WALL MOUNTED
AP1	REFRIGERATOR	OWNER	Contractor	120v		
AP2	STACKABLE LARGE CAPACITY WASHER AND DRYER	OWNER	Contractor	H/C WATER SS 120V		
AP4	REFRIGERATOR/FREEZER	OWNER	Contractor	120V		
AP5	REFRIGERATOR/FREEZER	OWNER	Contractor	120V		
E1	DUST COLLECTOR	OWNER	Contractor	230V		
E2	AIR COMPRESSOR	OWNER	Contractor	230V		
E3	MITER SAW	OWNER	Contractor	120V		
E4	DRILL PRESS	OWNER	Contractor	120V		
E5	BAND SAW	OWNER	Contractor	120V		
E6	TABLE SAW	OWNER	Contractor	230V		
E7	SHAPER	OWNER	Contractor	120V		
E9	WORK TABLE	OWNER	OWNER	NA		
M5	MARKER BOARD	Contractor	Contractor	PROVIDE BACKING PER H9/A9.81		4'X8'
M5.1	HORIZONTAL SLIDING MARKER BOARD	Contractor	Contractor	PROVIDE BACKING PER H9/A9.81		
M5.2	VERTICAL SLIDING MARKER BOARDS	Contractor	Contractor	PROVIDE BACKING PER H9/A9.81		
MS1	FLAMMABLE LIQUID SAFETY CABINET	Contractor	Contractor	PROVIDE BACKING PER H9/A9.81		115 Ga
MS2	STORAGE CABINET WITH BINS	Contractor	Contractor	PROVIDE BACKING PER H9/A9.81		156 BINS
S1	WOOD SHELVING	Contractor	Contractor	PROVIDE BACKING PER H9/A9.81		
TC1	Torch Cart	OWNER	OWNER	NA		EXISTING
TC2	TOOL STORAGE CABINET	OWNER	OWNER	NA		
TV1	FLAT SCREEN TV 50"	OWNER	OWNER	NA		
TVM	FLAT SCREEN TV MOUNT	Contractor	Contractor	NA		
WC1	Welder Cart	OWNER	OWNER	NA		

GENERAL FINISH NOTES

MATERIALS LEGEND - GENERAL NOTES

- REFER TO INTERIOR ELEVATIONS FOR MORE INFORMATION ON FINISHES AND MATERIAL TRANSITIONS.
- REFER TO CEILING PLANS FOR MORE INFORMATION ON CEILING MATERIALS AND TRANSITIONS.
- INSTALL CARPET USING A RANDOM ASHLAR PATTERN, U.O.N.
- GYP BOARD CEILINGS TO BE PAINTED P1, U.O.N.
- ALL EXPOSED SURFACES, MATERIALS, ELECTRICAL COMPONENTS, MECHANICAL AND STRUCTURAL ELEMENTS IN THE THEATER, TO BE PAINTED P9, U.O.N. OR NOT ALLOWED BY CODE.
- FLOORING MATERIALS TO TRANSITION AT THE CENTERLINE OF THE DOORWAY U.O.N. ON THE FINISH PLANS.
- PROVIDE FRP AT THE JANITOR'S CLOSETS BEHIND THE FLOOR SINK TO 48" AFF.
- CASEWORK: ALL CABINETS TO BE PLASTIC LAMINATE U.O.N. COUNTERTOPS ARE AS SPECIFIED ON THE FINISH PLANS AND INTERIOR ELEVATIONS.
- DOORS: SEE DOOR SCHEDULE FOR DOOR AND TRIM COLORS. UTILITY ROOMS TO HAVE PAINTED DOORS AND FRAMES TO MATCH ADJACENT WALL SURFACE.
- PROVIDE AN ANTI-GRAFFITI COATING AT ALL RESTROOM TILE WALLS.
- WALL TEXTURE TO BE MEDIUM ORANGE PEEL, U.O.N.
- SEE A3.11 FOR EXTERIOR FINISH INFORMATION.

MATERIALS LEGEND

ACOUSTIC CEILINGS

- AC1 NOT USED
- AC2 ARMSTRONG CEILING
PRODUCT: CALLA SQUARE LAY-IN
COLOR: BLACK
SIZE: 24 X 24 X 7/8"
GRID: PRELUDE 15/16" COLOR: BLACK (BK)
- AC3 ARMSTRONG CEILING
PRODUCT: OPTIMA SQ LAY-IN
COLOR: BLACK
SIZE: 24 X 48
GRID: PRELUDE 15/16"
- AC4 ARMSTRONG
PRODUCT: FINE FISSURED
TONGUE & GROOVE,
SIZE: 1' X 1'
INSTALLATION: DIRECT GLUE TO GYP BOARD
ADHESIVE PER MANUFACTURER'S RECOMMENDATION.

ACOUSTIC PANELS

- AP1 ACOUSTIC WALL PANELS
ECHO ELIMINATOR
THICKNESS: 2"
COLOR: BLACK
- AP2 ACOUSTIC WALL PANELS
PRODUCT: OWENS CORNING
CONWED DESIGNSCAPE
PRODUCT: RESPOND ULTIMATE 2000
THICKNESS: 1-1/8"
HEIGHT: 4' WIDTH: VARIES
FINISH: TEDLAR, COLOR: TBD (BLACK)
- AP3 ACOUSTIC WALL PANELS
PRODUCT: OWENS CORNING
CONWED DESIGNSCAPE
PRODUCT: RESPOND ULTIMATE 2000
THICKNESS: 2"
HEIGHT: 4' WIDTH: VARIES
FINISH: TEDLAR, COLOR: TBD (BLACK)
- AP4: ACOUSTIC PANELS - CEILING
CUSTOM NVR CEILING REFLECTORS
SIZE: 4' X 4'
FINISH: PLASTIC LAMINATE - PL2

BASE

- B1 JOHNSONITE
1" COVERED RUBBER BASE
COLOR: 63 BURNT UMBER B

CARPET

- C1 BROADLOOM CARPET
TANDUS POWERBOND PERFORMANCE BACKING
PATTERN: PLEXUS COLOUR III 02875
COLOR: BLACK BIRD 18512
12' W

CARPET TILE

- CT1 TANDUS CARPET
PATTERN: APPLAUSE III 02803
COLOR: MOSAIC 28502
TILE SIZE: 24 X 24 MODULAR
- CT2 TANDUS CARPET
PATTERN: AFTERMATH II 03026
COLOR: FLEECE 23508
TILE SIZE: 24 X 24 MODULAR

CONCRETE

- CN1 LM SCOFIELD
SEALED CONCRETE - FINISH TOPCOAT
COLOR: MEDIUM GRAY
- SC1 SEALED CONCRETE - TRANSPARENT SEALER FROM RUSTOLEUM

CORNER GUARDS

- CG1 KOROGUARD
PRODUCT: CS30 CORNER GUARDS
16 GA STAINLESS STEEL #4 SATIN
SIZE: WING 2"; HEIGHT: VARIES
- CG2 KOROGUARD
PRODUCT: R10 RECESS MOUNTED CORNER GUARD
COLOR: PORCELAIN
SIZE: 2" WING; HEIGHT: VARIES

FABRIC

- FB1 ROSE BRAND
DRAPERY FABRIC: ENCORE 22 OZ VELOUR
COLOR: (BLUE)
WIDTH: 64"
- FB2 ROSE BRAND
DRAPERY FABRIC: ENCORE 22 OZ VELOUR
COLOR: (BLACK)
WIDTH: 64"
- FB3 MAHARAM TEXTILES
PATTERN: MESSENGER 458640
COLOR: VOYAGE
WIDTH: 54"
- FB4 GUILFORD OF MAINE
PATTERN: FR701 2100
COLOR: BLACK 408
WIDTH: 66"
- FB5 GUILFORD OF MAINE
PATTERN: FR701 2100
COLOR: TBD
WIDTH: 66"

GROUT

- G1 CUSTOM BUILDING PRODUCTS
POLYBEND SANDED GROUT
COLOR: 183 CHATEAU
- G2 CUSTOM BUILDING PRODUCTS
POLYBEND SANDED GROUT
COLOR: 352 BONE
- G3 CUSTOM BUILDING PRODUCTS
PRISM SURECOLOR NON-SANDED GROUT
COLOR: 381 BRIGHT WHITE

METAL WALL PANEL

- MP1 OMEGA-LITE
METAL PANEL
FINISH: CLEAR ANNOXIDIZED ALUMINUM
CLIP AND CAULK SYSTEM

PAINTS AND COATINGS

- P1 SHERWIN WILLIAMS
COLOR: SW 6126 NAVAJO WHITE
- P2 SHERWIN WILLIAMS
COLOR: SW 0037 MORRIS ROOM GREY
- P3 SHERWIN WILLIAMS
COLOR: SW 6528 TRICORN BLACK
FINISH: FLAT (FOR ABOVE THEATER)
- P4 SHERWIN WILLIAMS
PRODUCT: EPOXY PAINT
COLOR: BLACK, FLAT
- P5 SHERWIN WILLIAMS
COLOR: SW 6230 RAINSTORM DARK BLUE (THEATER)
- P6 SHERWIN WILLIAMS
COLOR: SW 7075 WEB GRAY
- P7 SHERWIN WILLIAMS
COLOR: SW 6509 GEORGIAN BAY
- P8 IDEA PAINT PRO
PRODUCT: DRY ERASE PAINT
COLOR: WHITE
SUBSTRATE: GYPSUM BOARD WITH LEVEL 5 FINISH
WHERE THIS PAINT OCCURS.
- P9 SHERWIN WILLIAMS
COLOR: SW 7710 BRANDYWINE
- P10 SHERWIN WILLIAMS
COLOR: SW 6226 LANGUID BLUE
- P11 SHERWIN WILLIAMS
COLOR: #SW714 ELDER WHITE
EXTERIOR PAINT
- P12 STONESHIELD
ADD
ALT 1
COATING
COLOR: BEECHWOOD
- P13 'SILVER' POWDERCOAT

PLASTIC LAMINATE

- PL1 WILSONART
PATTERN: 7969K-12
WAREHOUSE OAK
- PL2 WILSONART
PATTERN: 7271K-12
UPTOWN WALNUT
- PL3 WILSONART
PATTERN: 4888-38
PEARL SOAPSTONE
- PL4 WILSONART
PATTERN: 1595-60
BLACK

RESILIENT FLOORING

- RF1 ARMSTRONG FLOORS
PRODUCT: MIGRATIONS BCT WITH BIOSTRIDE
RF1.1 COLOR: T3501 PLATINUM GRAY
RF1.2 COLOR: T3508 BARK BROWN
RF1.3 COLOR: T3510 NATURAL BEIGE
SIZE: 12 X 12
- RF2 TANDUS/CENTIVA
PRODUCT: CONTOUR VINYL PLANK FLOORING
COLOR: AMERICAN CHERRY #3205
SIZE: PLANKS 6" X 36" SQUARE EDGE (SE)
TEXTURE: TICK (TK)
- RF3 JOHNSONITE
PRODUCT: ARIA SHEET VINYL
COLOR: 650 GYPSY MOTH WIG
ROLL WIDTH: 6'-6"

SOLID SURFACE

- SS1 CORIAN SOLID SURFACING
COLOR: CLAM SHELL
- SS2 CAMBRIA QUARTZ SURFACING
COLOR: BRISTOL BLUE CLASSIC COLLECTION
THICKNESS: 2CM
EASED EDGE
- SS3 CORIAN SOLID SURFACING
COLOR: LINEN
- SS4 3 FORM VARIA
ACRYLIC RESIN DIFFUSER
PATTERN: TBD

SPECIALTIES

- SP1 BOBRICK RESTROOM PARTITIONS
SIERRA SERIES
COLOR: DESERT BEIGE SC02
FLOOR MOUNTED, OVERHEAD BRACED
CONTINUOUS PRIVACY HINGE

TILE

- T1 DAL TILE
PRODUCT: RITTENHOUSE SQUARE
T1.1 COLOR: ALMOND 0135 SEMI-GLOSS
T1.2 COLOR: ALMOND X735 MATTE
SIZE: 3 X 6
BULLNOSE TRIM TO MATCH T1.1
GROUT: G2
- T2 DAL TILE
PRODUCT: SANTINO PORCELAIN TILE
COLOR: CHIARO SN07
SIZE: 12 X 24
GROUT: G1
- T3 DAL TILE
PRODUCT: KEYSTONES COLORBODY PORCELAIN TILE
COLOR: ARTISAN BROWN D204
SIZE: 2 X 2 MOSAIC (DOT MOUNTED 1' X 2' SHEET)
TRIM: COVE BASE/CORNERS TO MATCH.
GROUT: G1
- T4 DAL TILE
PRODUCT: VISIONAIRE GLASS MOSAIC TILE
COLOR: WISSERSPRING STREAM V403
SIZE: 5/8" X 1-1/4" MOSAIC (PAPER FACE MOUNTED
ON 1/2" X 1/2" X 1/2" SHEET)
GROUT: G3
- T5 DAL TILE
PRODUCT: RITTENHOUSE SQUARE
T5 COLOR: ALMOND 0135 SEMI-GLOSS
SIZE: 6 X 6
BULLNOSE TRIM TO MATCH
GROUT: G2

WALK-OFF MAT

- WM1 NOT USED
- WM2 TANDUS FLOORING
PRODUCT: ABRASIVE ACTION II 02578
COLOR: WINTER GRAY 19103
TILE SIZE: 24 X 24 MODULAR BACKING

WALLCOVERING

- WC1 KOROSEAL
ARBOR SERIES WOOD VENEER WALLCOVERING
PRODUCT: PLANKED VENEER (MULTI SPECIES)
CUSTOM STAIN - SUBMIT SAMPLES
FINISH: ULTRA 70; BACKING: FIVE-PLY
WIDTH: 36"
HANG IN NUMERICAL SEQUENCE
- WC2 KOROGUARD WALLTALKERS
PRODUCT: TACWALL
COLOR: STONE C25004
WIDTH: 4' H X (LENGTH VARIES)
ALUMINUM J MOLD TRIM - 1/2"
- WC3 KOROGUARD WALLTALKERS
PRODUCT: TACWALL
COLOR: PEWTER 62
WIDTH: 4' H X (LENGTH VARIES)
ALUMINUM J MOLD TRIM - 1/2"

WALL PANELS

- WP1 KORSEAL
ARBOR WOOD VENEER WALLCOVERING
PATTERN: CUSTOM PLANK PATTERN, CUSTOM STAIN
COLOR
- WP2 NOT USED
- WP3 MARLITE FRP
COLOR: S100G WHITE
- WP4 ACOUSTIC WALL PANELS
PRODUCT:
THICKNESS:
FABRIC: FB5

WOOD FLOOR

- WD1 WOOD STAGE FLOOR
PAINTED PA, BLACK
- WD2 3/8" WOOD FLOOR
- WD3 5/8" PLYWOOD OVER 2X SLEEPERS
- WD4 WOOD GRILLE CEILING ACCENT -
REUSE OF EXISTING WOOD SLAT MATERIAL FROM
THEATER; BLACK FELT BACKER STAIN TO MATCH PL2;
SUBMIT SAMPLES
- WD5 GLOBAL
WOOD BENCH

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SOLANO COMMUNITY COLLEGE

BUILDING 1200 THEATER RENOVATION
INCREMENT 2
4000 SUISUN VALLEY ROAD, FAIRFIELD, CA



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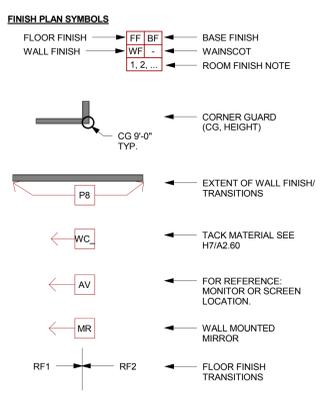
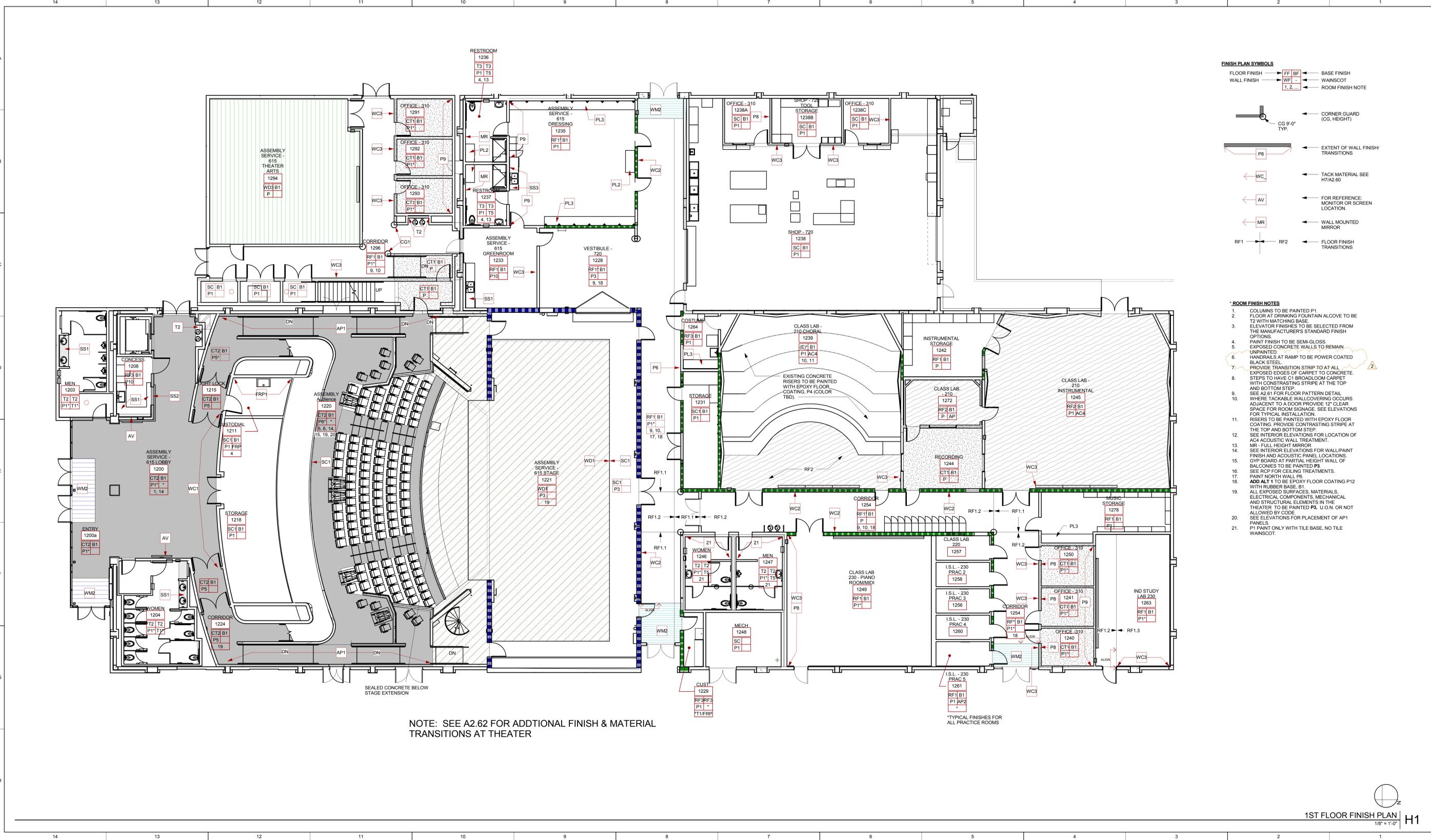


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MATERIALS LEGEND

SCCD PROJECT NO: 14-014
LPAS PROJECT NO: 764-0002
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SHEET NO:

A2.60



- *ROOM FINISH NOTES**
1. COLUMNS TO BE PAINTED P1
 2. FLOOR AT DRINKING FOUNTAIN ALCOVE TO BE T2 WITH MATCHING BASE
 3. ELEVATOR FINISHES TO BE SELECTED FROM THE MANUFACTURER'S STANDARD FINISH OPTIONS
 4. PAINT FINISH TO BE SEMI-GLOSS
 5. EXPOSED CONCRETE WALLS TO REMAIN UNPAINTED
 6. HANDRAILS AT RAMP TO BE POWER COATED BLACK STEEL
 7. PROVIDE TRANSITION STRIP TO ALL EXPOSED EDGES OF CARPET TO CONCRETE STEPS TO HAVE C1 BROADLOOM CARPET WITH CONTRASTING STRIPE AT THE TOP AND BOTTOM STEP.
 8. SEE A2.61 FOR FLOOR PATTERN DETAIL
 9. WHERE TACKABLE WALLCOVERING OCCURS ADJACENT TO A DOOR PROVIDE 12" CLEAR SPACE FOR ROOM SIGNAGE. SEE ELEVATIONS FOR TYPICAL INSTALLATION
 11. RISERS TO BE PAINTED WITH EPOXY FLOOR COATING PROVIDE CONTRASTING STRIPE AT THE TOP AND BOTTOM STEP
 12. SEE INTERIOR ELEVATIONS FOR LOCATION OF AIA ACOUSTIC WALL TREATMENT
 13. MR - FULL HEIGHT MIRROR
 14. SEE INTERIOR ELEVATIONS FOR WALLPAPER FINISH AND ACOUSTIC PANEL LOCATIONS
 15. GYP BOARD AT PARTIAL HEIGHT WALL OF BALCONIES TO BE PAINTED P3
 16. SEE RCP FOR CEILING TREATMENTS
 17. PAINT NORTH WALL P6
 18. ADD ALL 1 TO BE EPOXY FLOOR COATING P12 WITH RUBBER BASE. B1
 19. ALL EXPOSED SURFACES, MATERIALS, ELECTRICAL COMPONENTS, MECHANICAL AND STRUCTURAL ELEMENTS IN THE THEATER TO BE PAINTED P3, U.O.N. OR NOT ALLOWED BY CODE
 20. SEE ELEVATIONS FOR PLACEMENT OF AP1 PANELS
 21. P1 PAINT ONLY WITH TILE BASE. NO TILE WAINSCOT.

NOTE: SEE A2.62 FOR ADDITIONAL FINISH & MATERIAL TRANSITIONS AT THEATER

1ST FLOOR FINISH PLAN 1/8" = 1'-0" H1

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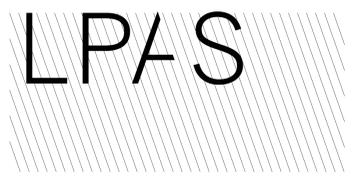
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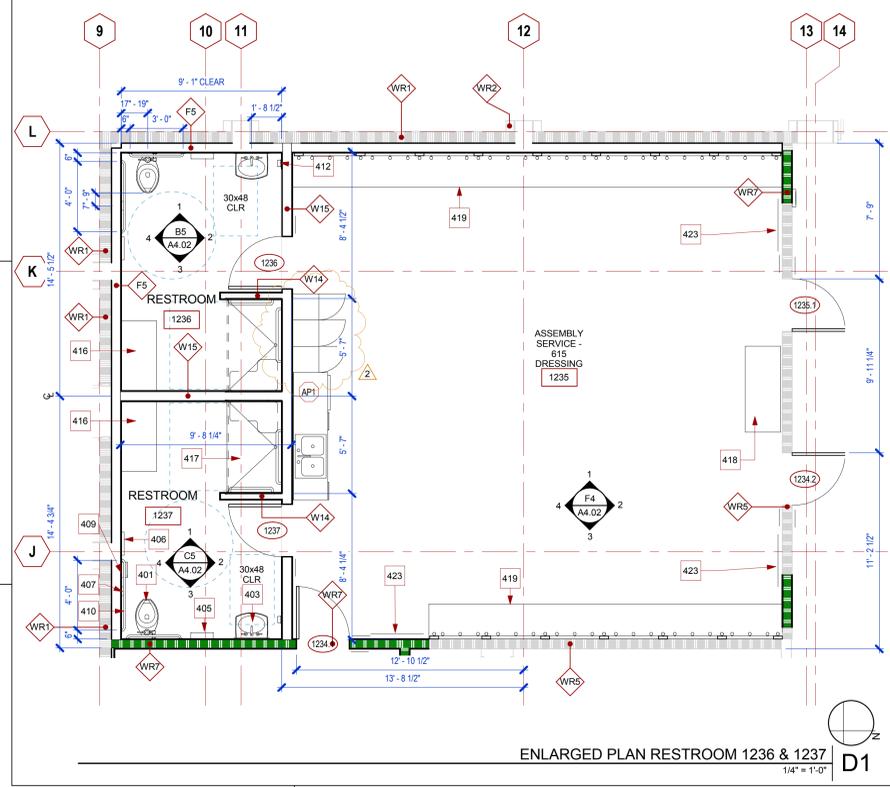
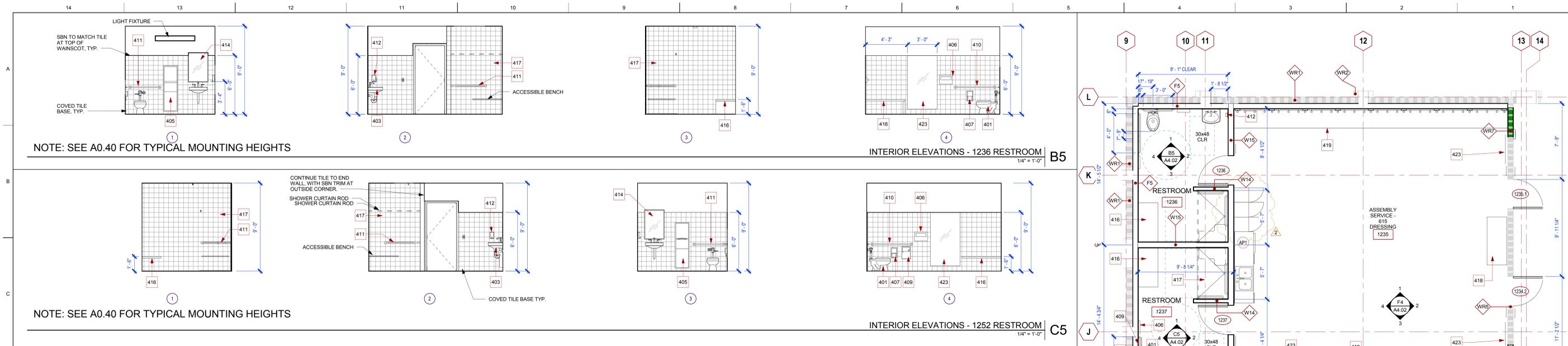
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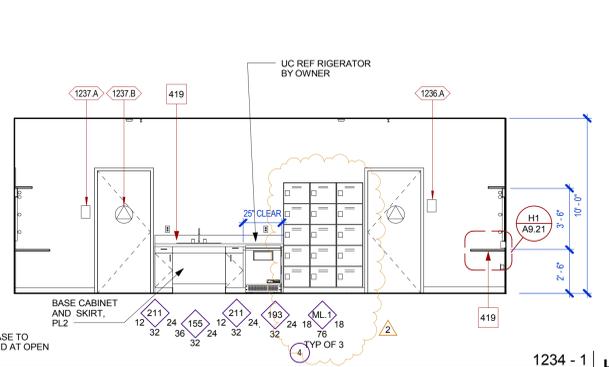
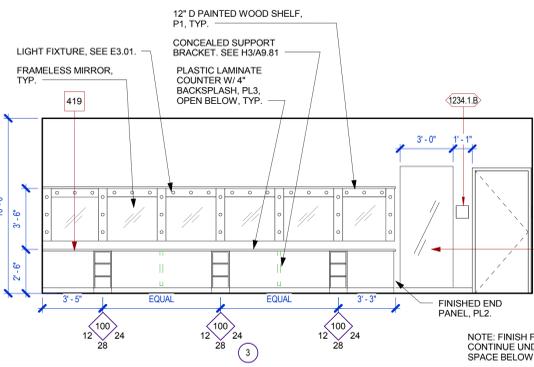
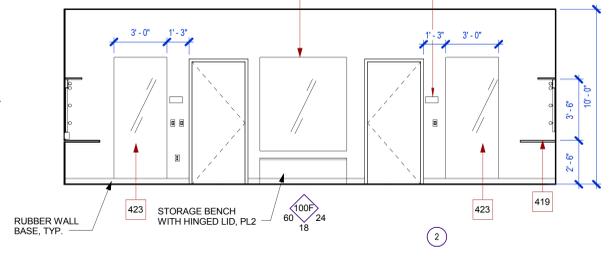
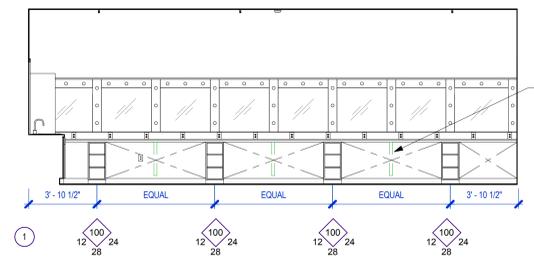
1ST FLOOR FINISH PLAN

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A2.61



NOTE: PAINT FINISH IN DRESSINGS ROOM TO BE WASHABLE (SATIN) ON ALL WALLS.



- RESTROOM FIXTURE KEYNOTES**
- 401 FLOOR MOUNTED FLUSH VALVE TOILET
 - 402 COUNTER MOUNTED LAVATORY
 - 403 WALL MOUNTED LAVATORY, WRAP EXPOSED DRAIN PIPE AND WATER LINE WITH INSULATION
 - 405 RECESSED COMBINATION PAPER TOWEL DISPENSER AND TRASH RECEPTACLE
 - 406 TOILET SEAT COVER DISPENSER
 - 407 TOILET PAPER DISPENSER
 - 408 RECESSED SANITARY NAPKIN DISPENSER
 - 409 SANITARY NAPKIN DISPOSAL
 - 410 42" GRAB BAR (D13/A0.40)
 - 411 36" GRAB BAR (D13/A0.40)
 - 412 WALL MOUNTED SOAP DISPENSER
 - 414 FRAMELESS MIRROR
 - 416 24" X 48" BENCH (H1/A9.80)
 - 417 ADA COMPLIANT SHOWER, SEE (F5/A0.40)
 - 418 24" X 60" BENCH
 - 419 24" PLASTIC LAMINATE COUNTERTOP @ 30" A.F.F. PROVIDE SUPPORT PER HS OR D11/A9.81 AT 36" O.C. MAX
 - 422 ACCESSIBLE SS AND GOOSENECK FAUCET
 - 423 FULL HEIGHT MIRROR
- RESTROOM FIXTURE GENERAL NOTES**
1. SEE SHEET A0.40 FOR FIXTURE MOUNTING HEIGHTS AND CLEARANCES
- ### SEE SHEET A9.70 FOR TYPICAL CABINET TYPES
- XX DEPTH
- XX HEIGHT
- XX WIDTH

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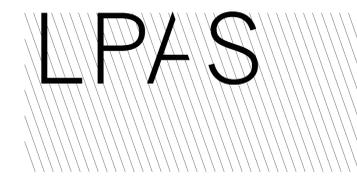


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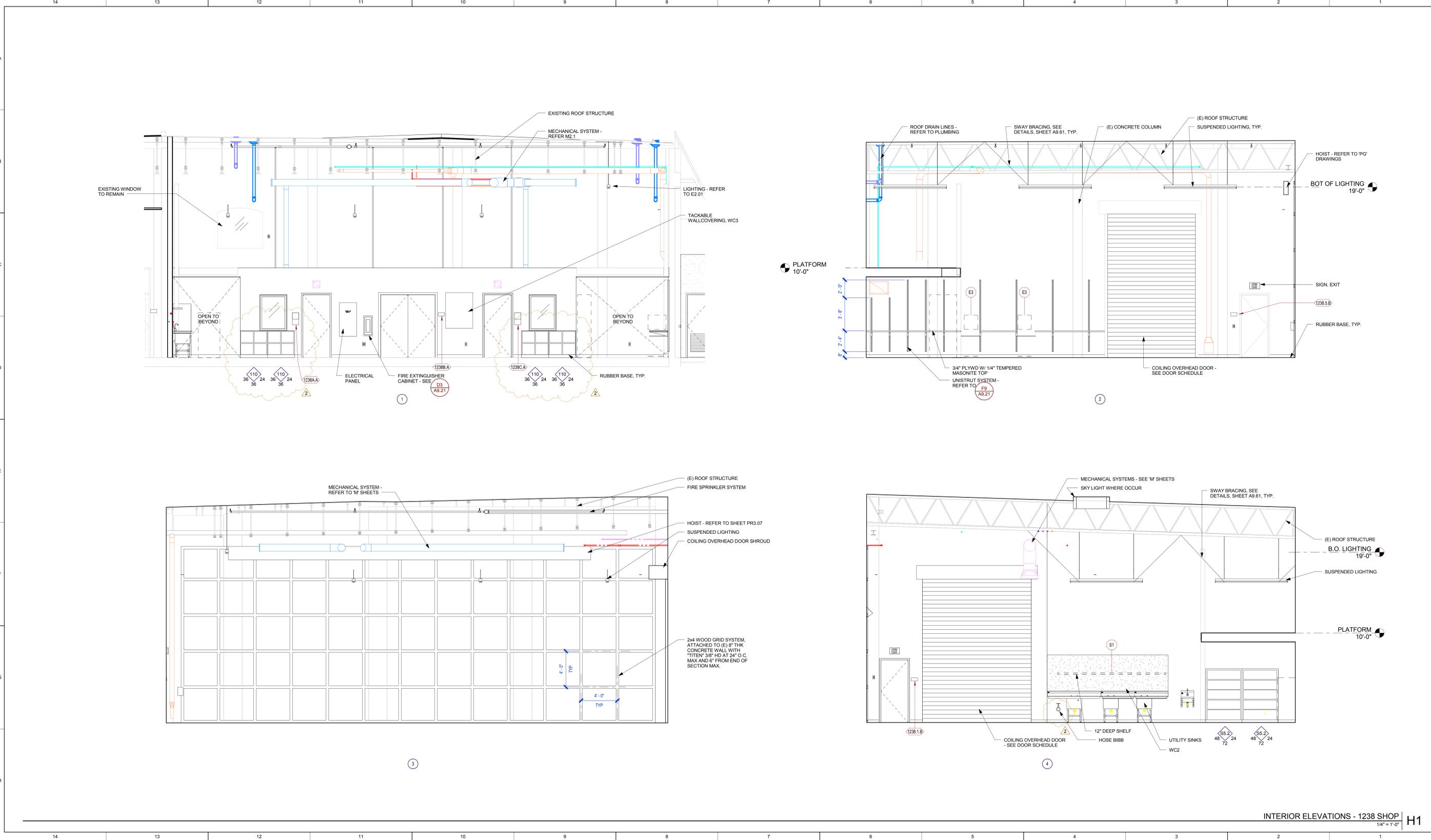
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ENLARGED DRESSING ROOM PLANS AND ELEVATIONS

SCCD PROJECT NO: 14-014
LPAS PROJECT NO: 764-0002
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SHEET NO:

A4.02



INTERIOR ELEVATIONS - 1238 SHOP 1/4" = 1'-0" H1

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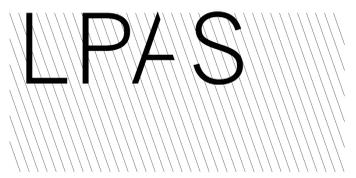


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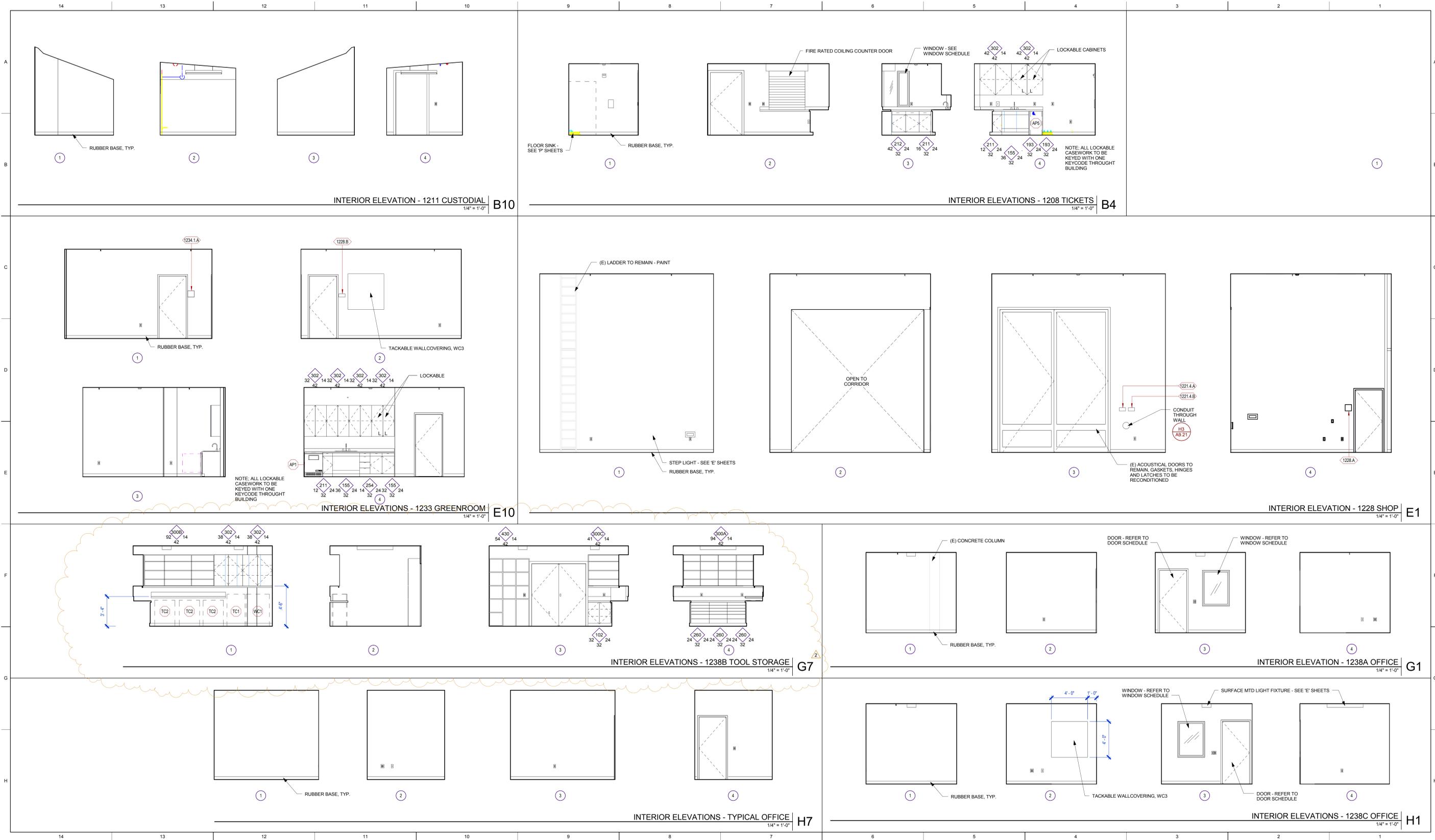
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INTERIOR ELEVATIONS

SCCD PROJECT NO: 14-014
 LPAS PROJECT NO: 764-0002
 DATE: 04-22-2015
 SHEET NO:

A5.05



NO. ISSUE
2 ADDENDUM #2

DATE
06/26/2015

SOLANO COMMUNITY COLLEGE

BUILDING 1200 THEATER RENOVATION
INCREMENT 2
4000 SUISUN VALLEY ROAD, FAIRFIELD, CA

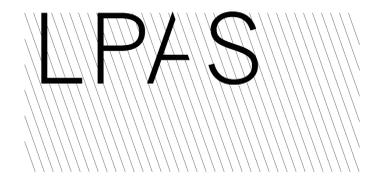


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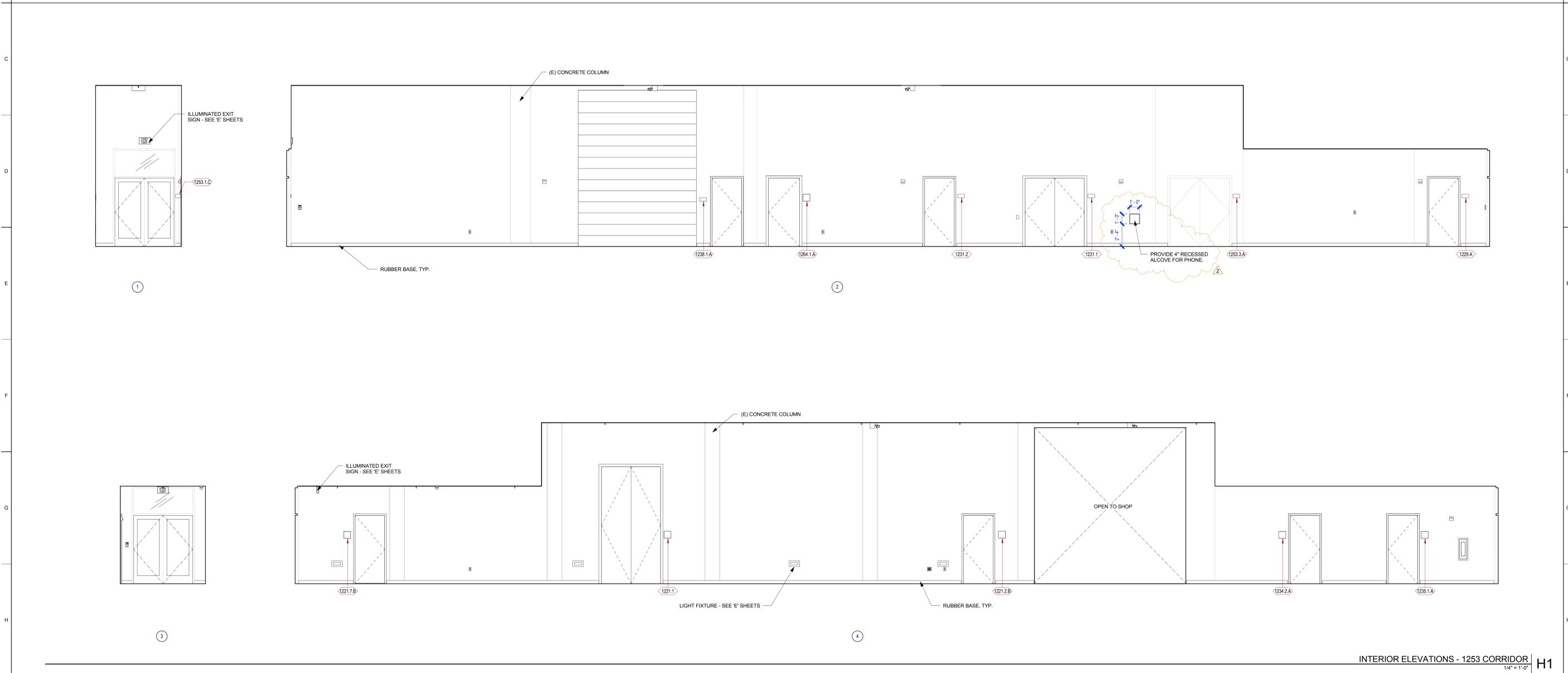
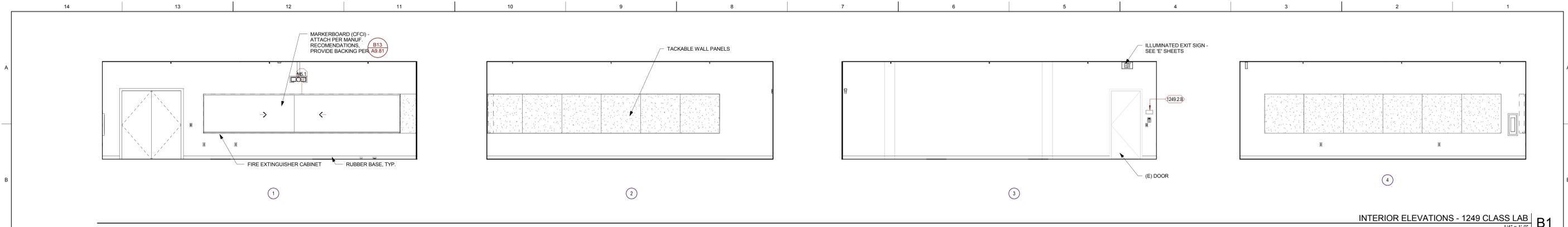
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INTERIOR ELEVATIONS

SCCD PROJECT NO: 14-014
LPAS PROJECT NO: 764-0002
DATE: 04-22-2015
SHEET NO:

A5.06



NO.	ISSUE	DATE
2	ADDENDUM #2	06/26/2015

SOLANO COMMUNITY COLLEGE

BUILDING 1200 THEATER RENOVATION
INCREMENT 2
4000 SUISUN VALLEY ROAD, FAIRFIELD, CA



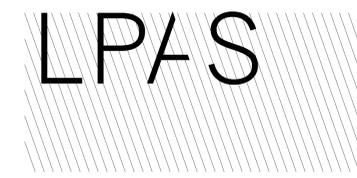
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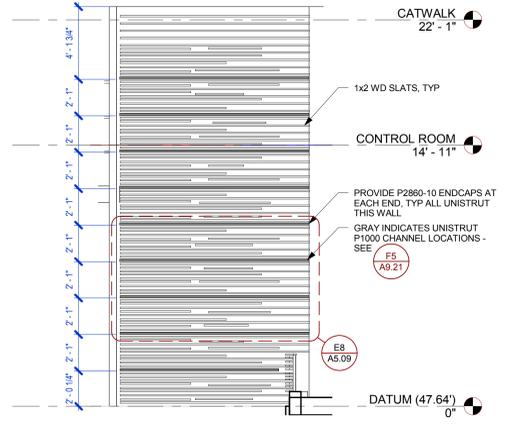
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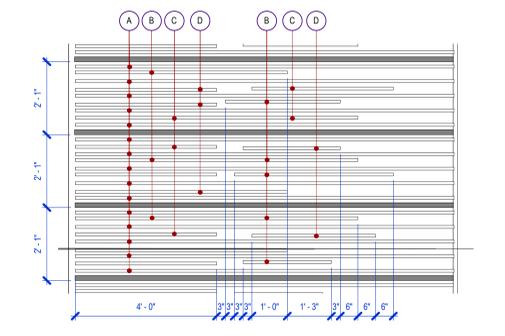
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SCCD PROJECT NO: 14-014
LPAS PROJECT NO: 764-0002
DATE: 04-22-2015
SHEET NO:

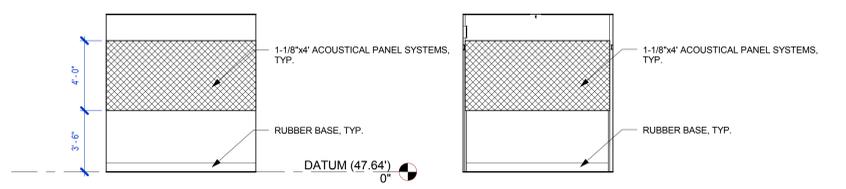
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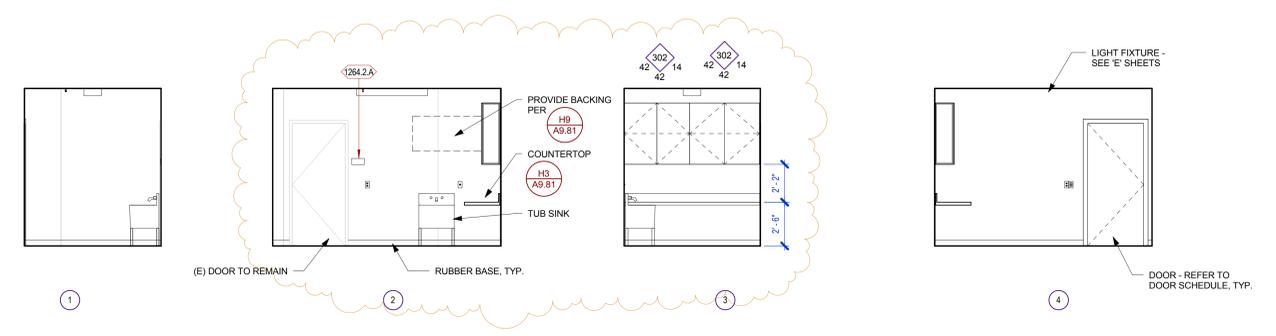
HOUSE RIGHT PROSCENIUM WALL (HOUSE LEFT SIM OPP HAND) 1/4" = 1'-0" C8



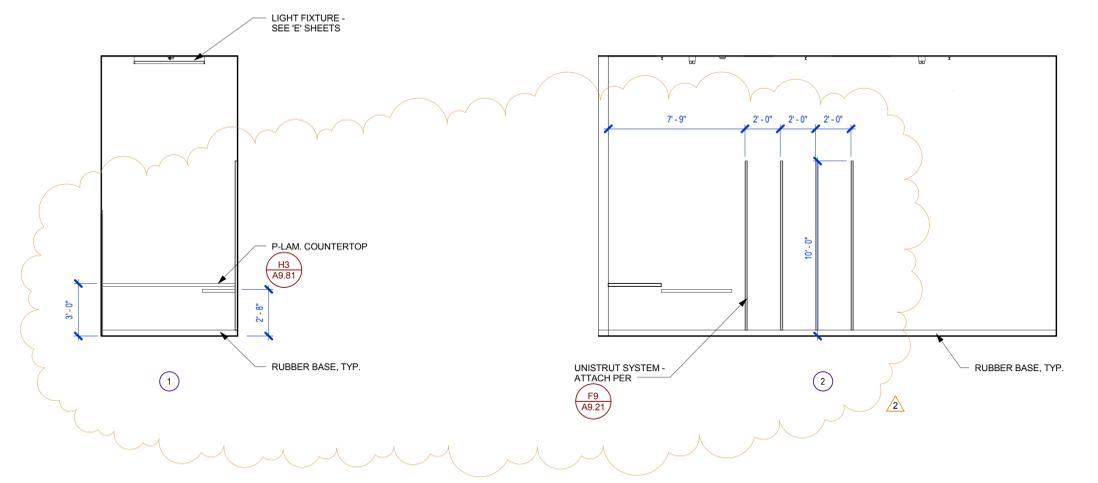
ENLARGED VIEW AT PROSCENIUM WALL 1/2" = 1'-0" E8



LIGHT LOCK 1216 1/4" = 1'-0" H8



INTERIOR ELEVATIONS - 1264 COSTUME 1/4" = 1'-0" C1



INTERIOR ELEVATIONS - 1231 STORAGE 1/4" = 1'-0" H1

NO.	ISSUE	DATE
2	ADDENDUM #2	06/26/2015

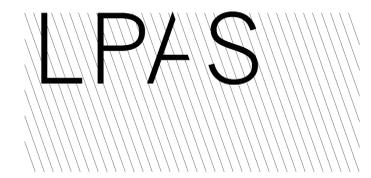
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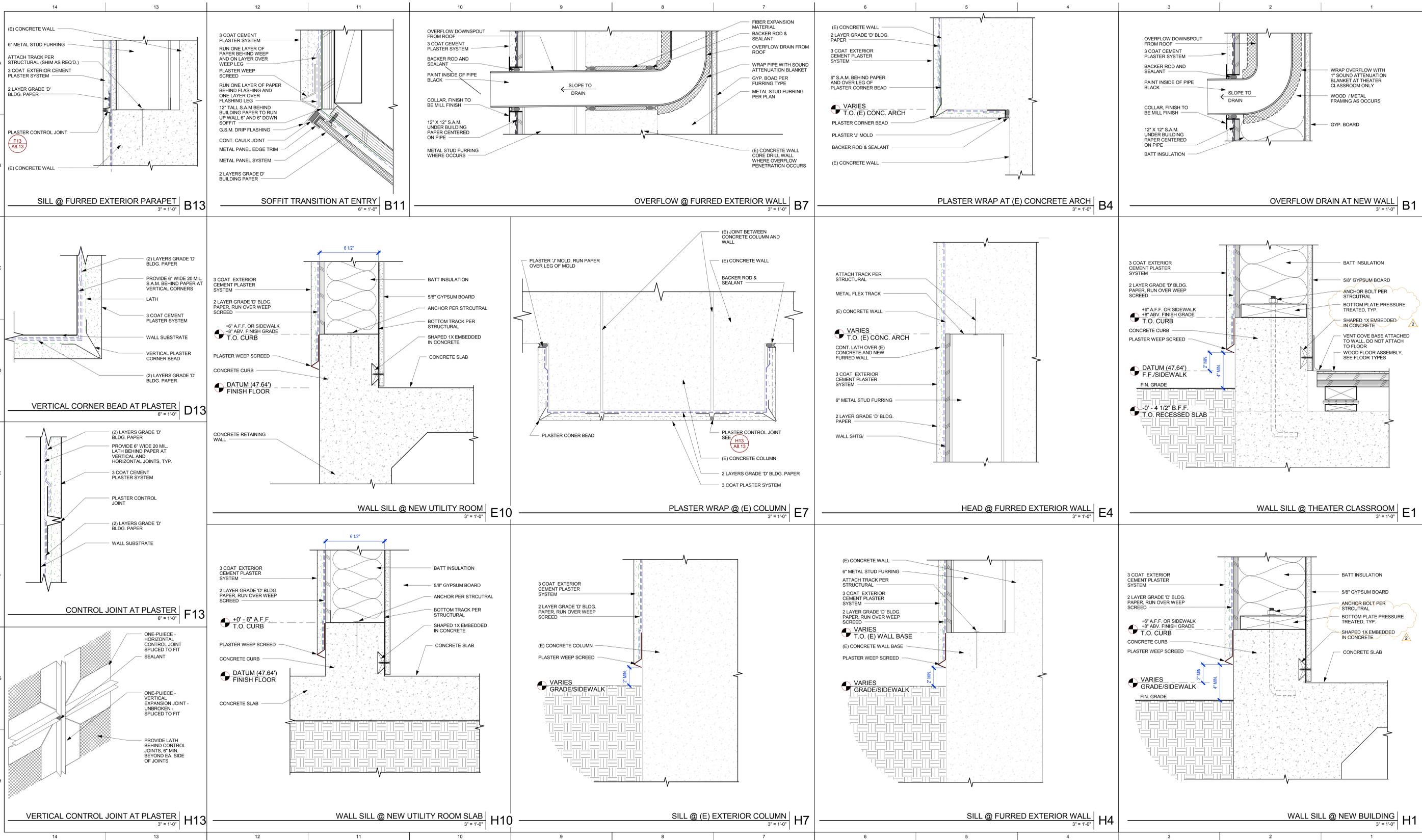
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INTERIOR ELEVATIONS

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 DATE: 04-22-2015
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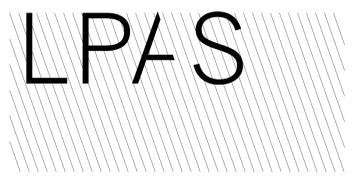


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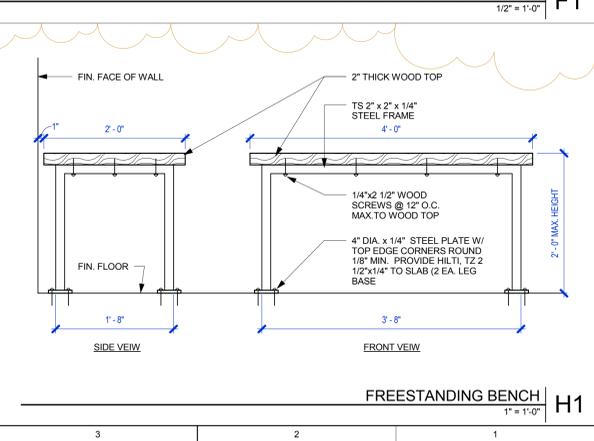
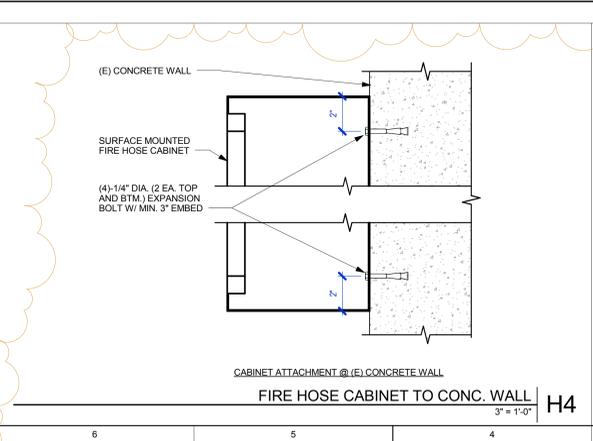
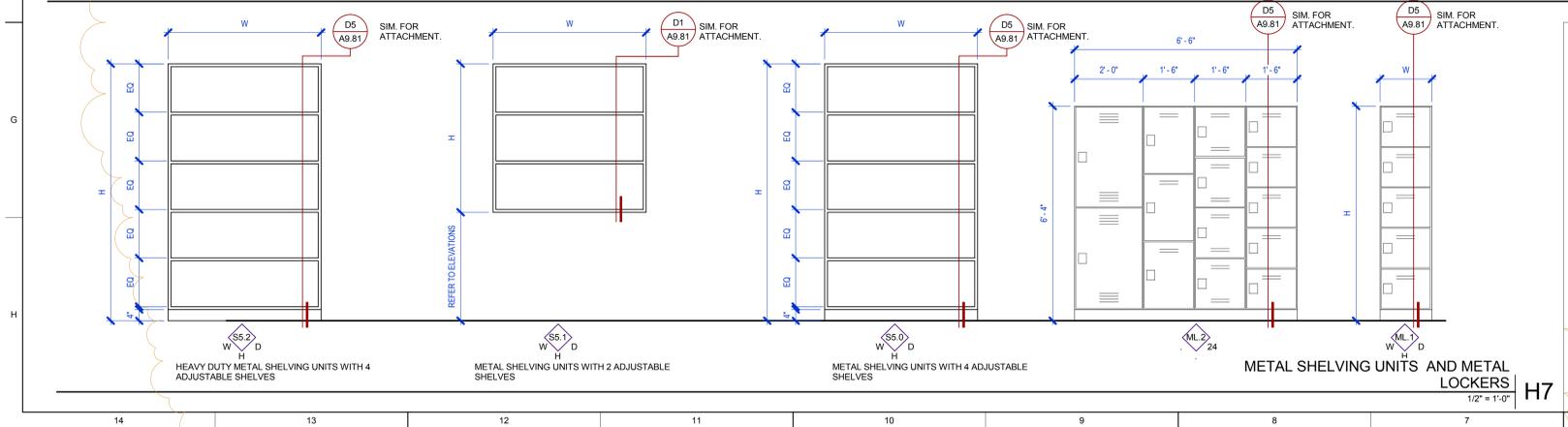
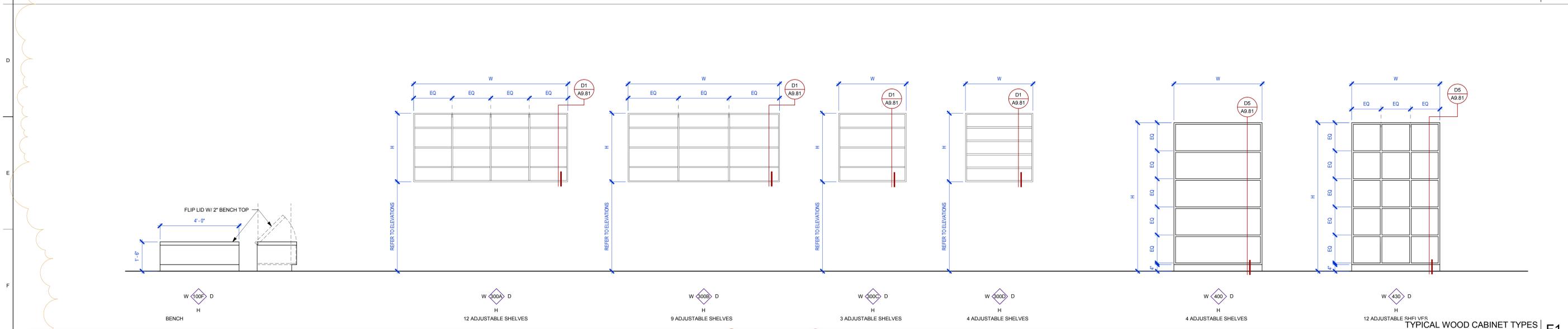
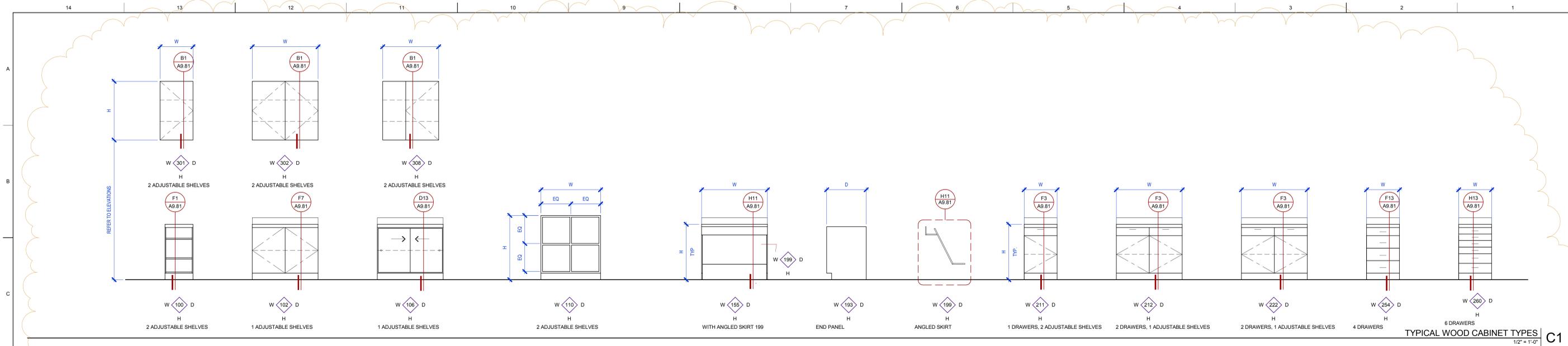
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EXTERIOR WALL DETAILS

SCCD PROJECT NO: 14-014
LPAS PROJECT NO: 764-0002
DATE: 04-22-2015
SHEET NO:

A8.13



NO.	ISSUE	DATE
2	ADDENDUM #2	06/26/2015

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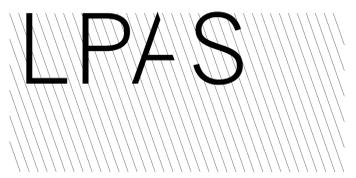
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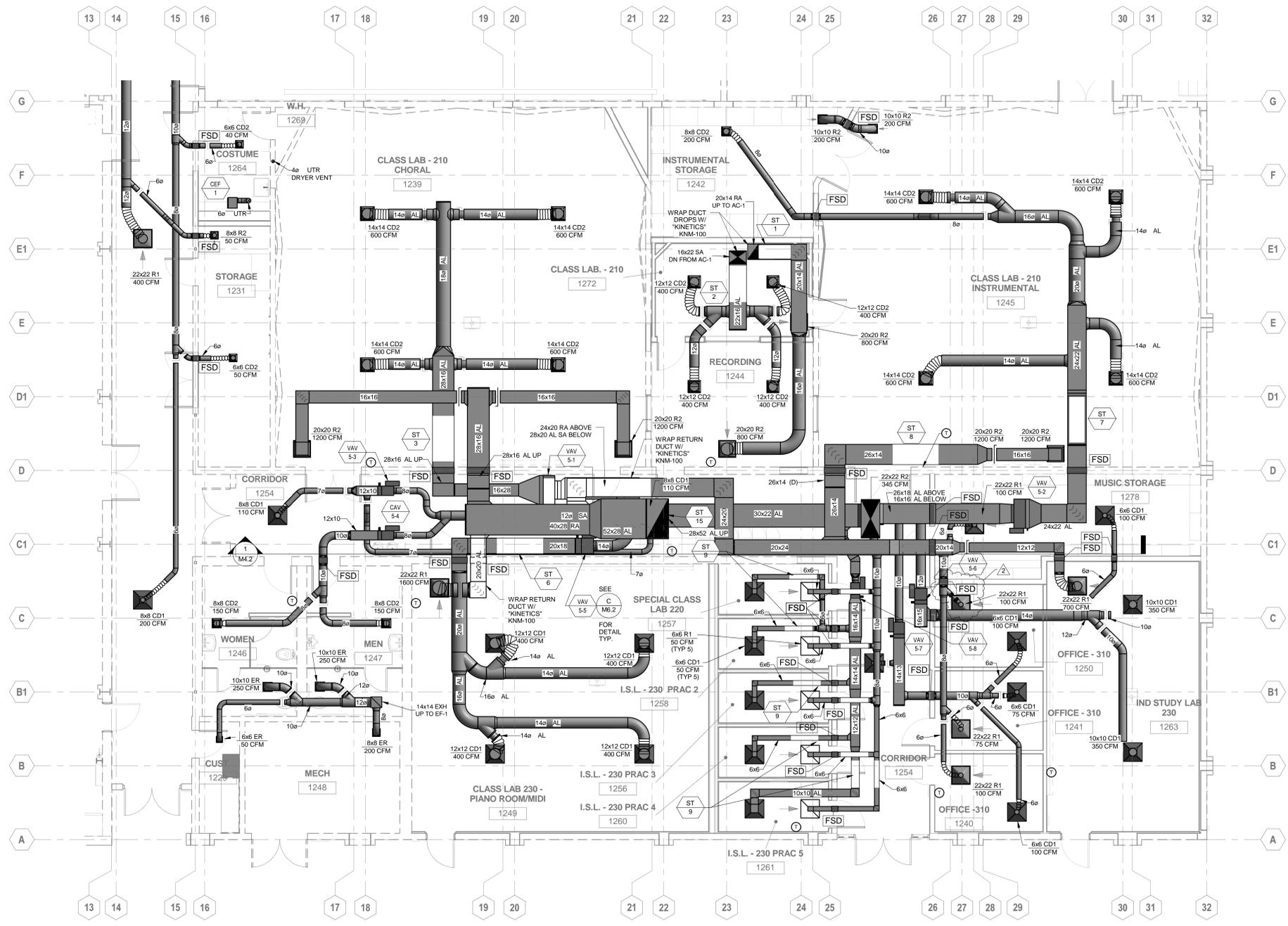


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TYPICAL CABINET TYPES

SCCD PROJECT NO: 14-014
 LPAS PROJECT NO: 764-0002
 DATE: 04-22-2015
 SHEET NO:

A9.80



1 ENLARGED MECHANICAL FIRST FLOOR PLAN
SCALE: 3/16" = 1'-0"

GENERAL NOTES

1. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR SEISMIC BRACING USING A PRE-APPROVED MANUFACTURER SUCH AS "TOLCO", "WASCON", ETC. THE CONTRACTOR WILL SUBMIT SEPARATE SEISMIC DRAWINGS, SEPARATE FROM THE SHOP DRAWINGS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ADDITIONAL STEEL, ENGINEERING AND PROCESSING.

NO.	ISSUE	DATE
2	ADDENDUM # 2	2015-06-26

SOLANO COMMUNITY COLLEGE

BUILDING 1200 THEATER RENOVATION INCREMENT 2
4000 SUISUN VALLEY ROAD, FAIRFIELD, CA



ARCHITECT / CONSULTANT

TURLEY & ASSOCIATES
MECHANICAL ENGINEERING GROUP, INC.
1914 S STREET
SACRAMENTO, CA 95811
Phone: (916) 324-1000
Fax: (916) 324-1000
Email: office@turleymech.com

Project Engineer:	BP	Job Number:	1200R
Project Manager:	TR	Plot Date:	9/15/15
Project Designer:	JPC	Copy:	7

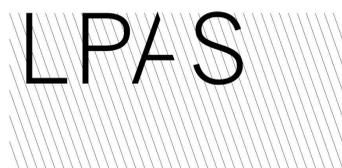
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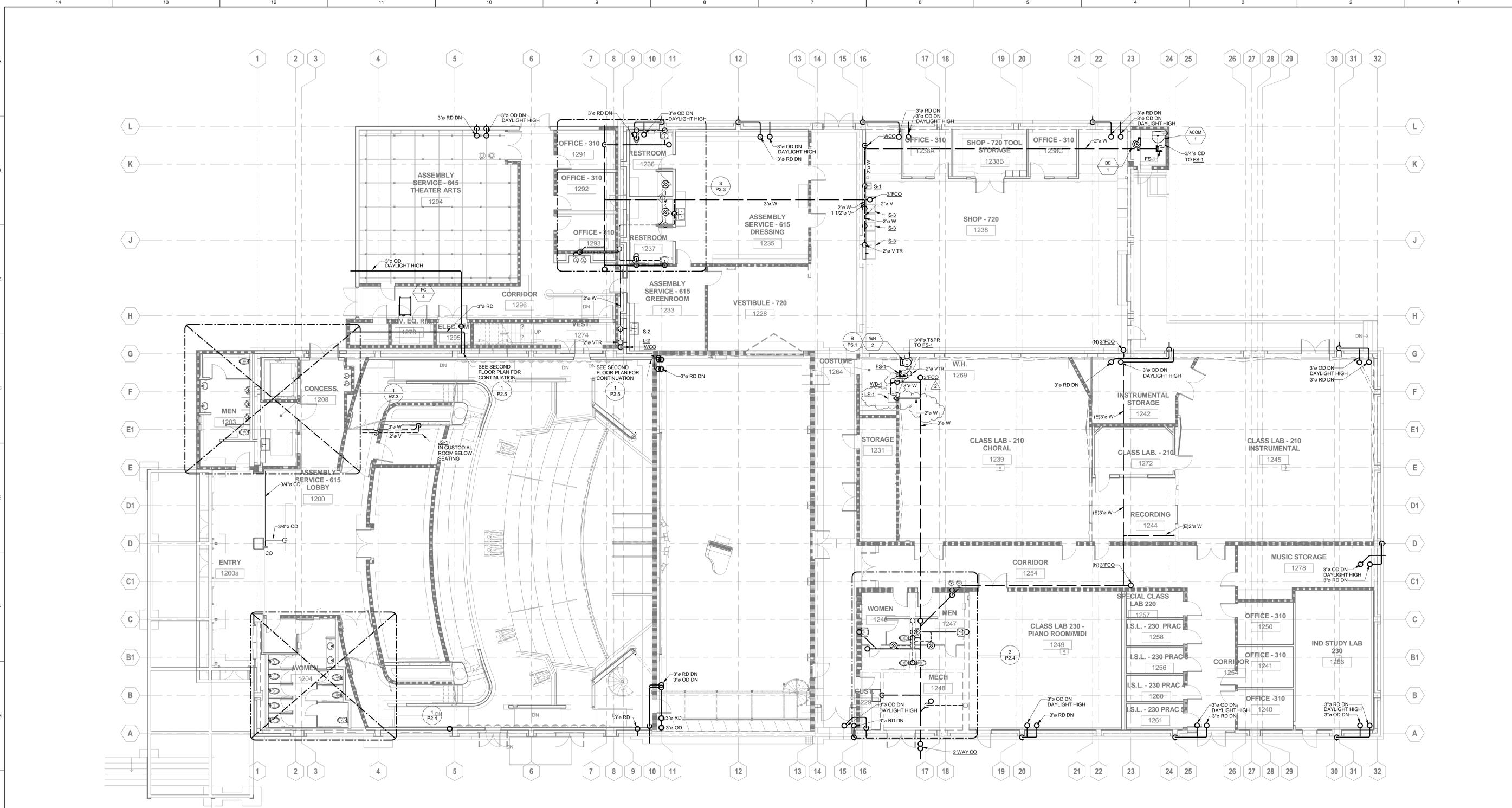


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ENLARGED MECHANICAL FIRST FLOOR PLAN

PROJECT NO: 14-014
DATE: 04-22-2015
SHEET NO:

M2.2



1 OVERALL PLUMBING FIRST FLOOR PLAN-WASTE AND VENT
SCALE: 1/8" = 1'-0"

NO.	ISSUE	DATE
2	ADDENDUM # 2	2015-06-26

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BUILDING 1200 THEATER RENOVATION INCREMENT 2
4000 SUISUN VALLEY ROAD, FAIRFIELD, CA



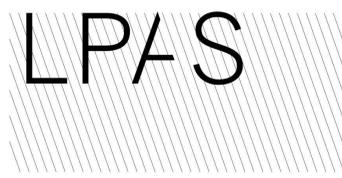
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APPROVAL

Project Engineer	BP	Job Number	1200
Project Manager	TR	Plot Date	7/1/15
Project Designer	PCD	Copy	1

TURLEY & ASSOCIATES MECHANICAL ENGINEERING GROUP, INC.
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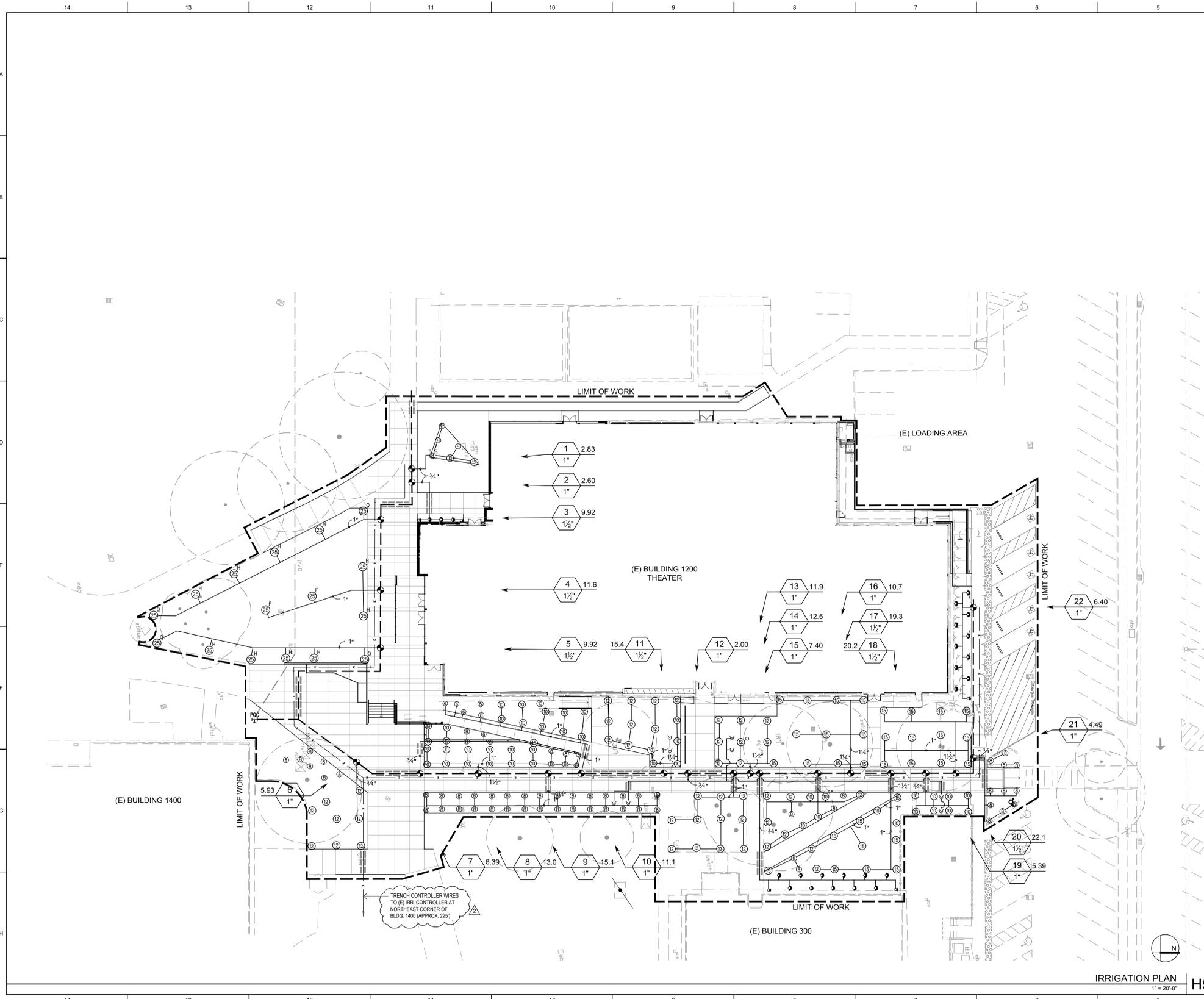


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OVERALL PLUMBING FIRST FLOOR PLAN - WASTE & VENT

PROJECT NO: 14-014
DATE: 04-22-2015
SHEET NO:

P2.1



- ### IRRIGATION NOTES
- GENERAL**
- ALL LOCAL MUNICIPAL AND STATE LAWS, RULES AND REGULATIONS GOVERNING OR RELATING TO ANY PORTION OF THIS WORK ARE HEREBY INCORPORATED INTO AND MADE A PART OF THESE SPECIFICATIONS AND THEIR PROVISIONS SHALL BE CARRIED OUT BY THE CONTRACTOR.
 - THE CONTRACTOR SHALL VERIFY THE LOCATIONS OF ALL EXISTING UTILITIES, STRUCTURES AND SERVICES BEFORE COMMENCING WORK. THE LOCATIONS OF UTILITIES, STRUCTURES AND SERVICES SHOWN IN THESE PLANS ARE APPROXIMATE ONLY. ANY DISCREPANCIES BETWEEN THESE PLANS AND ACTUAL FIELD CONDITIONS SHALL BE REPORTED TO THE OWNER'S REPRESENTATIVE.
 - THE CONTRACTOR SHALL OBTAIN THE PERTINENT ENGINEERING OR ARCHITECTURAL PLANS BEFORE BEGINNING WORK.
 - THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS REQUIRED TO PERFORM THE WORK INDICATED HEREIN BEFORE BEGINNING WORK.
 - THIS DESIGN IS DIAGRAMMATIC. ALL IRRIGATION EQUIPMENT SHOWN IN PAVED AREAS IS FOR DESIGN CLARITY ONLY AND IS TO BE INSTALLED WITHIN PLANTING AREAS.
 - THE CONTRACTOR SHALL NOT WILLFULLY INSTALL ANY EQUIPMENT AS SHOWN ON THE PLANS WHEN IT IS OBVIOUS IN THE FIELD THAT UNKNOWN CONDITIONS EXIST THAT WERE NOT EVIDENT AT THE TIME THESE PLANS WERE PREPARED. ANY SUCH CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER'S REPRESENTATIVE PRIOR TO ANY WORK OR THE IRRIGATION CONTRACTOR SHALL ASSUME ALL RESPONSIBILITY FOR ANY FIELD CHANGES DEEMED NECESSARY BY THE OWNER.
 - INSTALL ALL EQUIPMENT AS SHOWN IN THE DETAILS AND PER SPECIFICATIONS.
 - ALL CONTROLLER WIRE SHALL BE INSTALLED IN SCH. 40 CONDUIT, MINIMUM SIZE SHALL BE 1 1/2".
 - THE CONTRACTOR SHALL PROVIDE ADEQUATE IRRIGATION TO ALL PLANTERS. IRRIGATION COVERAGE OF PLANTER MAY REQUIRE ADDITIONAL IRRIGATION EQUIPMENT TO PROVIDE REQUIRED COVERAGE TO SUSTAIN HEALTHY PLANT GROWTH.
- PIPE**
- MAINLINE SHOWN WITHIN PAVING FOR CLARITY ONLY. ACTUAL MAINLINE LOCATION TO BE A MINIMUM OF 18" OFF ADJACENT HARDSCAPE, FENCE, PROPERTY LINES AND OTHER OBSTACLES TYP.
 - NO IRRIGATION MAINLINES SHALL BE INSTALLED WITHIN THE PUBLIC RIGHT OF WAY.
 - LATERAL LINES ARE SHOWN WITHIN PAVING FOR CLARITY ONLY. ACTUAL LOCATION TO BE WITHIN PLANTER. CONFIRM LAYOUT IN FIELD WITH OWNER'S AUTHORIZED REPRESENTATIVE PRIOR TO COMMENCING WORK.
 - ALL MAINLINE PIPE UNDER PAVED AREAS TO BE INSTALLED IN SLEEVE TWICE THE DIAMETER OF THE PIPE CARRIED. LATERAL LINE SHALL BE INSTALLED IN SLEEVE TWICE THE DIAMETER OF THE PIPE CARRIED. SLEEVES TO EXTEND AT LEAST 18" PAST THE EDGE OF THE PAVING. SLEEVE ENDS SHALL BE FILLED WITH EXPANDING FOAM TO KEEP OUT DIRT AFTER PIPE IS INSTALLED.
 - ALL PIPE SIZES SHALL CONFORM TO THOSE SHOWN ON THE DRAWINGS. LATERAL PIPE NOT SIZED ON DRAWING AND THAT ARE DOWNSTREAM OF 1" PIPE SHALL BE MINIMUM OF 3/4" PIPE SIZE. THE ONLY ALLOWED PIPE SIZE SUBSTITUTIONS WILL BE FOR LARGER SIZED PIPE.
 - CONTRACTOR TO FLUSH MAINLINE AND LATERAL IRRIGATION CLEAR OF ALL DEBRIS BEFORE LINES ARE PRESURIZED.
- VALVES**
- ALL QUICK COUPLER AND REMOTE CONTROL VALVES TO BE INSTALLED IN SHRUB OR GROUND COVER AREAS WHERE POSSIBLE.
 - ALL QUICK COUPLER AND REMOTE CONTROL VALVES TO BE INSTALLED AS SHOWN ON THE INSTALLATION DETAILS. INSTALL ALL QUICK COUPLER AND REMOTE CONTROL VALVES WITHIN 18" OF HARDSCAPE.
 - REMOTE CONTROL VALVES AND ISOLATION VALVE LOCATIONS ON THIS DRAWING ARE APPROXIMATE. THE LANDSCAPE CONTRACTOR SHALL STAKE OUT EACH REMOTE CONTROL VALVE AND ISOLATION VALVE LOCATION FOR REVIEW AND APPROVAL BY OWNER REPRESENTATIVE PRIOR TO INSTALLATION OF ALL VALVES. MINOR MODIFICATIONS OF REMOTE CONTROL VALVES AND ISOLATION VALVE LOCATIONS AS REQUESTED BY THE OWNER'S REPRESENTATIVE SHALL BE PROVIDED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
- POP-UP SPRAY**
- ALL HEADS ARE TO BE INSTALLED WITH THE NOZZLE, SCREEN AND ARCS SHOWN ON THE PLANS. ALL HEADS ARE TO BE ADJUSTED TO PREVENT OVER SPRAY ONTO BUILDINGS, WALLS, FENCES AND PAVED SURFACES. THIS INCLUDES, BUT NOT LIMITED TO, ADJUSTMENT OF DIFFUSER PIN OR ADJUSTMENT SCREW, REPLACEMENT OF NOZZLES WITH MORE APPROPRIATE RADIUS UNITS AND THE ADJUSTMENT OF ADJUSTABLE ARC NOZZLES.
 - SPACING OF POP-UP SPRAY HEADS SHALL ALLOW HEAD TO HEAD COVERAGE.
 - CONTRACTOR SHALL ADJUST ALL HEADS AS REQUIRED TO ACCOMMODATE ANY VERTICAL OBSTRUCTIONS THAT MAY OCCUR, INCLUDING BUT NOT LIMITED TO LIGHT POLES, FIRE HYDRANTS, ETC. VERIFY ALL HEAD LAYOUT WITH OWNER'S AUTHORIZED REPRESENTATIVE PRIOR TO COMMENCING WORK.
- SUBSURFACE DRIPPERLINE**
- SUBSURFACE DRIPPERLINE IS DESIGNED FOR APPLICATIONS UTILIZING A GRID DESIGN, THE RESULT BEING A COMPLETE WETTED AREA WITHIN THE GRID.
 - LAYOUT DRIPPERLINE ROWS LENGTHWISE IN A ZONE, RATHER THAN IN SHORTER ROWS ACROSS A ZONE.
 - SUBSURFACE DRIPPERLINE FOR SHRUB AREAS SHALL HAVE A MINIMUM 3" OF COMPACTED MULCH COVER. SUPPLY AND EXHAUST MANIFOLDS SHALL HAVE A MINIMUM 12" COVER.
 - SUBSURFACE DRIPPERLINE BEDS SHALL BE SMOOTH AND UNIFORM WITHOUT DIPS.
 - THE SUBSURFACE DRIP SYSTEM IS DESIGNED TO MEET A MINIMUM FLUSH FLOW VELOCITY OF 0.617 GPM/100 FEET OF TUBING. THE CONTRACTOR SHALL BE RESPONSIBLE TO FLUSH THE ENTIRE SYSTEM OF DEBRIS PRIOR TO PRESSURIZING DRIP VALVE ZONES.
 - DRIPPERLINE SUPPLY AND EXHAUST MANIFOLDS WILL BE INSTALLED FOR EACH ZONE. FLUSH MANIFOLDS ARE DESIGNED TO FEED INTO A FLUSH VALVE. BOTH SUPPLY AND FLUSH MANIFOLDS SHALL BE SIZED TO ACCOMMODATE THE MINIMUM FLUSH FLOW VELOCITY.
 - SPACE DRIPPERLINE PER PLAN. OFFSET DRIPPERLINE A MINIMUM 12" FROM HARDSCAPE UNLESS NOTED ON DRAWINGS OR DETAILS.
 - MAXIMUM LENGTH OF RUN SHALL NOT EXCEED MANUFACTURER'S SPECIFICATIONS.
 - STAKE DRIPPERLINE MINIMUM OF EVERY 30' ALONG ENTIRE LENGTH OF TUBING. CRISS-CROSS TWO (2) STAKES AT EACH FITTING.
 - AFTER DRIPPERLINE IS BACKFILLED AND COVERAGE TEST IS APPROVED, APPLY BARK MULCH OVER ENTIRE PLANTER BED PER PLANTING PLAN.
 - DRIPPERLINE SHOWN IS A SCHEMATIC. REFER TO DETAILS AND NOTES FOR LAYOUT OF DRIPPERLINE.
- CONTROLLER**
- CONTRACTOR TO INSTALL CONTROLLER IN STEEL CABINET ENCLOSURE PER MANUFACTURER'S RECOMMENDATIONS.
 - CONTRACTOR TO COORDINATE 110 V ELECTRICAL SUPPLY POWER FOR CONTROLLER.
 - CONTROLLER TO BE GROUNDED PER MANUFACTURER AND INDUSTRY STANDARDS.

IRRIGATION NOTES NO SCALE D1

IRRIGATION SCHEDULE

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	PSI	GPM	DETAIL
⊙	Rain Bird RD-12-S-P30-F HE-VAN-08 Shrub Spray, 12.0" Pop-Up, with 30 psi in-stem pressure regulation, Seal-A-Matic check valve, and Flow-Shield Technology.			
⊙	Rain Bird RD-12-S-P30-F HE-VAN-10 Shrub Spray, 12.0" Pop-Up, with 30 psi in-stem pressure regulation, Seal-A-Matic check valve, and Flow-Shield Technology.			
⊙	Rain Bird RD-12-S-P30-F HE-VAN-12 Shrub Spray, 12.0" Pop-Up, with 30 psi in-stem pressure regulation, Seal-A-Matic check valve, and Flow-Shield Technology.			
⊙	Rain Bird RD-12-S-P30-F HE-VAN-15 Shrub Spray, 12.0" Pop-Up, with 30 psi in-stem pressure regulation, Seal-A-Matic check valve, and Flow-Shield Technology.			
⊙	Rain Bird 1806-SAM-5 Series Stream w/ PCS Stream Bubbler 6.0" pop-up with check valve, pressure compensating screen.			
⊙	Rain Bird RWS-B-C Root Watering System with 4.0" diameter x 36.0" long with locking grate, semi-rigid mesh tube, and check valve. Rain Bird bubbler 1401 0.25 gpm.			
⊙	Rain Bird 5006-SAM-R-SS-MPR Turf Rotor, 6.0" Pop-Up, Stainless Steel Riser, Matched Precipitation Rotor (MPR nozzle), Arc and Radius 25 ft-rod. With Seal-A-Matic Check Valve, Pressure Regulating.			
SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	DETAIL		
⊙	Griswold DWS Brass, In-Line, On-Off, Solenoid Control Valve, Normally Closed, refer to valve call out for size. Ideal for use with Reclaimed or "Dirty" Water, Self-Cleaning, Slow-Closing and Opening Feature.			
⊙	Point of Connection 6"			
---	Irrigation Lateral Line: PVC Schedule 40 PVC Schedule 40 irrigation pipe. Only lateral transition pipe sizes 1" and above are indicated on the plan, with all others being 3/4" in size.			
---	Irrigation Mainline: 3" PVC Schedule 40			
---	Irrigation Pipe Sleeving Schedule 40 Typical pipe sleeve for irrigation pipe. Pipe sleeve size shall allow for irrigation piping and their related couplings to easily slide through sleeving material. Extend sleeves 18 inches beyond edges of paving or construction.			
---	Controller wire, provide one wire per valve, plus common wire, plus 2 spare wires per controller specification. Install 2" schedule 40 conduit.			
⊙	Valve Callout			
⊙	Valve Number			
⊙	Valve Flow			
⊙	Valve Size			

IRRIGATION LEGEND NO SCALE H1

NO.	ISSUE	DATE
2	ADDENDA 2	2015-06-26

SOLANO COMMUNITY COLLEGE

BLDG 1200 - THEATER RENOVATION
INCREMENT 2
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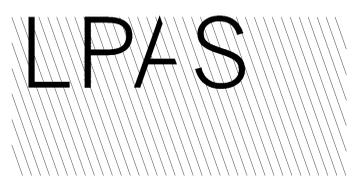
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IRRIGATION PLAN ALTERNATE #4

PROJECT NO: 764-0002
DATE: 06.15.2015 Revised

SHEET NO:

L2.00-ALT CONSTRUCTION SET

NAME	DVBE Cert. #	ADDRESS	CITY	STATE	ZIP	EMAIL	PHONE	FAX	WEBSITE	BUSINESS TYPE	NAICS CODES	WORKSCOPE KEYWORDS
DALE'S EXCAVATING	1771054	1624 CENTRAL AVE SUITE D	ALAMEDA	CA	94501	ddaleebrown@aol.com	(510) 506-5302	(510) 263-8064		Construction;	721411; 721527; 721535; 721539;	Demolition, Excavating, Grading, Trucking, Curbing, Sidewalks, Dirt Work, Land Clearing, Site Preparation
ANTIOCH PAVING CO INC	57058	PO BOX 1669	ANTIOCH	CA	94509	apc.rich@live.com	(925) 757-0123	(925) 757-1286		Construction;	721411;	GENERAL ENGINEERING CONTRACTOR PAVING GRADING ASPHALT MAINTENANCE DEMOLITION
GOOD SPIRIT TRUCKING	1745192	PO Box 2867	ANTIOCH	CA	94531	revljenescalles@att.net	(925) 439-5390	(925) 439-5395		Construction;	111416; 241128; 251019; 301216; 471217; 721210; 721411; 761219; 761220; 781018; 781817; 921215; 951216;	Hauling and Transporting Structural Steel; Dirt and Gravel; Rebar and Asphalt; Hazardous Waste; Road and Off-Road Oversize Vehicles and Dry Commodities.
GECMS, INC	1730480	1650 Alcatraz Ave	BERKELEY	CA	94703	bagiron@gironcms.com	(925) 263-1318	(925) 263-1318	http://www.gironcms.com	Construction;	301917; 721210; 721211; 721410; 721411; 721527; 721537;	General engineering and construction
MALONEY FINE BUILDING, INC.	1034618	1936 Berryman St.	BERKELEY	CA	94709	mbuilding@mbuilding.com	(510) 717-0791	v	http://www.mbuildi.com	Construction; Service;	221019;	residential, commercial, industrial, SB, DVBE, construction, general contractor, b, site,
BILL DUNN CONSTRUCTION	1212300	8231 LICHEN DRIVE	CITRUS HEIGHTS	CA	95623	bill@dunncnstruction.com	(916) 879-2607	(916) 751-1841		Construction;	721211;	General Contracting
BLITE SIGN PROFESSIONALS	42086	P O BOX 3029	CITRUS HEIGHTS	CA	95611	el@esignpros@comcast.net	(916) 967-7821	(916) 967-7851	http://ELITESIGNPROS.COM	Construction;	551217; 721540;	SIGN MANUFACTURING, SIGN INSTALLATION
JT CORRAL CONSTRUCTION	1769660	568 EL PINTADO RD	DANVILLE	CA	94526	colonel.papa@att.net	(925) 820-3972			Construction; Service;	111017; 111216; 111715; 111915; 111916; 111917; 131016; 261215; 261216; 301015; 301017; 301018; 301022; 301029; 301031; 301032; 3010515; 301510; 301520; 301615; 301616; 301617; 301717; 301919; 302664; 311337; 311519; 311521; 311615; 311621; 311629; 311630; 312016; 312311; 312312; 312818; 312817; 313112; 313113; 313114; 313115; 313116; 313117; 313212; 313213; 313214; 313215; 313216; 313217; 313310; 313312; 321310; 391217; 391221; 391222; 391310; 401417; 401419; 401517; 401615; 401715; 401717; 401718; 401719; 401720; 401721; 401722; 401723; 401724; 401725; 401726; 401727; 401728; 551217; 701315; 721110; 721111; 721414; 721417; 731019; 801417;	Building Material Supplier, Equipment Rental, Electrical Supplier, Plumbing Supplier, Erosion Control Supplier, Metal Supplier
CCITE INC	1798873	136 Windover Drive	DANVILLE	CA	94506	cticknor@ccite.net	(925) 683-6829			Construction; Service;	261216; 432217; 432225; 432226; 432233; 721515; 801116; 801117; 811117; 811138; 811615; 831121; 821310; 321515; 321516; 321517; 321518; 321519; 391210; 391211; 391213; 391214; 391215; 391216; 391217; 391218; 391219; 391220; 391221; 391222; 391310; 391316; 391317; 811017; 811024;	Telecommunication telecom VOIP RCD0 C-07 C7 communication network voice data video audio cable fiber laas infrastructure information tech IT PBX presentation technical staff low volt voltage staff consult network system services design Avaya Norrel
SMARTHOME IQ	1753212	6711 Sierra Court Suite A	DUBLIN	CA	94568	jabar@smarthomeiq.com	(925) 230-8555		http://www.smarthomeiq.com	Construction; Service;	711230; 711613; 721015; 721029; 721033; 731520; 801016; 801017; 801616; 811016; 811017; 811414; 721015; 721029; 721033; 721210; 721211; 721212; 721213; 721214; 721215;	low voltage, electrical engineering, sound masking, automation control, audio video, HVAC, lighting control, irrigation control, climate control, security
IL SKYE, INC.	50903	1022 Westchester Court	FAIRFIELD	CA	94533	jadeipaul@ilskye.com	(707) 631-3292	(707) 402-6492	http://www.ilskye.com	Construction; Service;	711230; 711613; 721015; 721029; 721033; 731520; 801016; 801017; 801616; 811016; 811017; 811414; 721015; 721029; 721033; 721210; 721211; 721212; 721213; 721214; 721215;	Project Management, Facilities Management, Facilities Maintenance, Utilities, Engineering, Energy Management
ICON-STRUCT.COM	1421560	4396 Solano Road	FAIRFIELD	CA	94533	strem@icon-struct.com	(707) 399-8224	(707) 399-8229	http://icon-struct.com	Construction;	721213; 721214; 721215;	Construction, construction management
ROOF RANGERS INC	1755591	po box 5114	GALT	CA	95632	roofrangers@hotmail.com	(209) 745-5753			Construction;	721526; 721532;	Roofing all type, experienced and certified bur TPO metal, composition and most others electrical
JOHNSTON AND SONS ELECTRIC, INC.	1785253	426 West Elm Street	LODI	CA	95240	johnston_family1@msn.com	(209) 712-3653			Construction;	711230; 711614; 721015; 721110; 721111; 721210; 721211; 721212; 721213; 721214; 721215; 721414; 721414; 721416; 721515; 721531; 721537; 721540;	electrician construction maintenance repair
GROUND LEVEL CONSTRUCTION, INC.	1789568	1985 La Salle Street	MARTINEZ	CA	94553	mroegelstad@groundlevelconstruction.com	(925) 387-0820		http://www.groundlevelconstruction.com	Construction;	721211; 721410;	underground utilities grading paving demolition site work excavation footings sewer water storm foundations
SEQUOIA CONSTRUCTION & DEVELOPMENT INC	53406	822 Alhambra Avenue #2	MARTINEZ	CA	94553	jim.sdg@gmail.com	(925) 957-6430	(615) 744-1188	http://www.seqcdi.com	Construction;	721029; 721210; 721211; 721410; 721411; 721414; 721415; 721537; 761016; 771116; 771216; 771318; 811026;	EXCAVATION GRADING PAVING DEMOLITION HAZARDOUS REMEDIATION UNDERGROUND UTILITIES LANDSCAPING CONCRETE SLIDE REPAIR ASPHALT EMERGENCY RESPONSE
P.J. MCNAMARA INC	37170	PO BOX 3128	MARTINEZ	CA	94553	mcsapes@aol.com	(925) 228-9558		http://www.pjmcnamara.com	Construction; Service;	701115; 701116; 701117;	LANDSCAPING, EROSION CONTROL, PLANT ESTABLISHMENT, GROUNDS MAINTENANCE, IRRIGATION SYSTEM, PLANTING, REVEGETATION
SUSTAINABLE GROUP, INC.	1684600	1480 Moraga Rd. Suite #374	MORAGA	CA	94556	nykle@sustainable-group.com	(925) 899-9721	(925) 320-5607	http://www.sustainable-group.com	Construction; Service;	711230; 721411; 721527; 771015; 771019; 771118; 801016; 801116; 801616; 811015; 811418;	General Contractor, Civil Engineering, Project Management, Construction Management, Facilities Management, Public Works, Civil Construction, Site Construction, Environmental Remediation, Energy Services OWNER REPRESENTATION, DESIGN & CONSTRUCTION MANAGEMENT, DESIGN-BUILD, BUILD-TO-SUIT & SPECULATIVE REAL ESTATE DEVELOPMENT, DISPUTE RESOLUTION, INDUSTRIAL, INSTITUTIONAL, COMMERCIAL, NON-RESIDENTIAL PRODUCT TYPES OWNER REPRESENTATION, DESIGN & CONSTRUCTION
REAL ESTATE STRATEGIES & SOLUTIONS	49224	15 NORTHWOOD CT	ORINDA	CA	94563	resources@ressapproach.com	(510) 334-5349		http://www.ressapproach.com	Construction; Service;	561115; 721210; 721211; 721214; 721215; 721410; 801016; 801616;	fabricated structural metal plate work boiler shops architectural ornament misc. steel, structural
R.G CAMPBELL COMPANY	106	608 STONY POINT RD	PETALUMA	CA	94952	rgcsteel@aol.com	(707) 490-4606			Construction;	301036; 721529;	electrical (general) warm air heat, ventilating, air conditioning temperature controls
SYSTEMS MECHANICAL INC	10323	660 MARINA WAY SOUTH	RICHMOND	CA	94804	zina@systemsmechanical.com	(510) 236-3794	(510) 236-3795	http://www.systemsmechanical.com	Construction;	721512; 721515;	FENCING FENCE INSTALLATION DOORS AUTOMATIC GATES ACTIVATING DEVICES REDWOOD LUMBER CHAINLINK ORNAMENTAL FENCE WROUGHT IRON FENCE STEEL TEMPORARY POSTS METAL WIRE FABRIC BUILDING BARBWARE RAZOR RIBBON SECURITY FENCING HANDRAILS OPE SUPPLIES
S & S FENCE COMPANY INC	11530	7448 REESE RD	SACRAMENTO	CA	95828	stephen@fencing-contractors.com	(916) 682-1100	(916) 682-4433	http://www.fencing-contractors.com	Construction; Non-Manufacturer;	111216; 301520; 301720;	ELECTRICAL MATERIALS, LABOR INSTRUMENTATION MATERIALS AND LABOR, SCADA AND PLC PROGRAMMING
MG ELECTRIC SERVICES		10 ASTERISM CT	SACRAMENTO	CA	95834	electricsservices1831@gmail.com	(408) 621-9864			Construction;	391211; 721515; 721542; 811017;	CUSTOM MILLWORK KITCHEN CABINETS MOLDING PARTITIONS PANELING ENTRY DOOR WINDOW REPLACEMENT SHUTTERS ROOFING COMMERCIAL RESIDENTIAL CABINERY FINISH CARPENTRY GENERAL BUILDING CONTRACTOR
AGARD MILLWORK & CONSTRUCTION	996	7720 Skander Way	SACRAMENTO	CA	95828	agard20@comcast.net	(916) 682-3977	(916) 682-3977		Construction; Non-Manufacturer;	241020; 301618; 301619; 301715; 301716; 601321; 721214; 721523; 721526; 721536; 721540; 761113; 321210; 321911; 321990; 337110;	GENERAL ENGINEERING BUILDING CONSTRUCTION HIGHWAY ASPHALT PAVING AGGREGATE BASE SEAL COAT SLURRY REPAIRS CONCRETE CURB GUTTER MANAGEMENT ENGINEERING CONSULTANT Micro Surfacing Parking Lots, SWPPP, WPCP, Lead Compliance
SAPPER WEST INC	1390180	1927 49TH STREET	SACRAMENTO	CA	95819	mconrad@sapperwest.com	(916) 736-2267	(916) 379-9153	http://www.sapperwest.com	Construction; Service;	201115; 201211; 201218; 221016; 221017; 221019; 221020; 231315; 241016; 301217; 411128; 461665; 551217; 721410; 721411;	Heavy Highway Equipment Sales, Crane, Bridge, Concrete, Traffic Control and Signage Supplier
HANK REARDEN, INC.	1512842	2554 Millcreek Dr.	SACRAMENTO	CA	95833	Dewey@aol.com	(916) 649-4512			Construction; Service;	721539; 811015;	general engineering home improvement certification
MOODY CONSTRUCTION	331	7601 AMBROSE WAY	SACRAMENTO	CA	95833	dan.moody@att.net	(916) 427-1927	(916) 429-2096		Construction;	721015; 721111; 721210; 721211; 721212; 721213; 721214; 721215; 721410; 721411; 721414; 721415; 721537; 761016; 771116; 771216; 771318; 811026;	general contractor construction pre-engineered metal building commercial industrial public office warehouse concrete agricultural
SEBERT CONSTRUCTION	1787804	1108 Fremont Way	SACRAMENTO	CA	95818	steven.sebert@gmail.com	(916) 599-1782			Construction;	121618; 121624; 121625; 221016; 221017; 301120; 301217; 721029; 721033; 721410; 721411; 721414; 721537; 951115; 951116;	asphalt paving repair repairs sealcoating slurry seal micro microsurfacing chip seal road maintenance roads crack sealing crack filling parking lots pavement preservation rubber overkote steelguard concrete street streets asphalt-rubber ADA airport
CALIFORNIA PAVEMENT MAINTENANCE COMPANY, INC.	1758533	9390 Elder Creek Rd	SACRAMENTO	CA	95829	grayner@cpmamerica.com	(916) 381-8033	(916) 381-3703	http://www.cpmamerica.com	Construction; Service;	261215; 261216; 261317; 261318;	HVAC, LIGHTING, MECHANICAL, ENERGY MANAGEMENT, ENERGY RETRO-FIT, ENERGY CONTROLS, ELECTRIC, ELECTRONIC CONTROLS, HEATING, AIR, CHILLERS, REFRIGERATION, CONSTRUCTION, DUCTING, BOILERS, HEAT PUMP, HYDRONIC HEATING, HYDRONIC COOLING, VENTILATION
STAY SAFE MECHANICAL	49163	4201 SIERRA POINT DR STE 101	SACRAMENTO	CA	95834	ken@staysafesolutions.com	(916) 640-1300	(916) 263-9758	http://www.staysafesolutions.com	Construction;	721512; 721515;	TRAFFIC CONTROL CONES DELINEATORS CHANNELIZER DRUMS RETRACTING MOVABLE FIXED TRAFFIC BOLLARDS CONTROL BEACONS SIGNS SAFETY FENCE
SITE SAFE	1792717	113 MURRAY COURT	VACAVILLE	CA	95688	m	(844) 464-7233			Construction;	461615; 551217; 951115; 951116;	GENERAL ENGINEERING TRENCHING SITE CLEARING GRADING BACKHOE EXCAVATING BACKFILLING ENGINEERED FILL
IDIG BACKHOE SERVICE	217	5093 ELLSWORTH RD	VACAVILLE	CA	95688	loria@idigbackhoeservice.com	(707) 451-2757	(707) 451-2797	http://www.idigbackhoeservice.com	Construction; Service;	221015; 221017;	Electrical Supply, cable, wire, conduit, demolition, removal, joint trench, utility, marine, residential, infrastructure industrial, commercial
PRESIDIO ELECTRIC INC	1749579	100 Scenic Way	VALLEJO	CA	94950	thields@presidioelectric.com	(415) 490-8826		http://www.presidioelectric.com	Construction; Non-Manufacturer;	261215; 261216; 261317; 261318;	Industrial Painting and Coating, Blasting and Abatement
JEFFCO PAINTING & COATING, INC.	1592120	P.O. Box 1888	VALLEJO	CA	94594	geneglockner@jeffcopt.com	(707) 362-1900			Construction;	721015; 721110; 721111; 721210; 721211; 721212;	Remodel, Construction, demolition, renovation, commercial, residential, industrial, warm-air heating, ventilating & air conditioning
MD GOVERNMENT CONTRACTORS INC	1770395	1243 Alpine Rd #220	WALNUT CREEK	CA	94596	millwood11@outlook.com	(510) 326-0064			Construction; Service;	721512; 721540;	

TOTAL TEAM CONSTRUCTION SERVICES, INC.	1054696	PO Box 980903	WEST SACRAMENTO	CA	95798	ttcsj@totalteamcs.com	(916) 456-5250	(916) 456-5251	http://www.totalteamcs.com	Construction;	721211;	Service Disabled Veteran, HUBZone, General Construction Contractor offering superior services in the areas of design build, commercial, light industrial, renovation, building demolition, and new construction projects.
HORIZON CONTRACT GLAZING INC	27341	1200 TRIANGLE CT	WEST SACRAMENTO	CA	95605	michelle@horizonglass.com	(916) 373-9900	(916) 373-9930	http://www.horizonglass.com	Construction;	721210, 721211;	GLASS, GLAZING, ALUMINUM STOREFRONT, CURTAINWALL, AUTOMATIC ENTRANCES, GLAZING HOME IMPROVEMENT CERTIFICATION
C & H VETERAN ENTERPRISES INC	35850	PO BOX 695	WEST SACRAMENTO	CA	95691	mcaldwellpvbg@yahoo.com	(916) 371-0148	(916) 373-3176	http://www.chveteranenterprises.com	Construction; Service;	211022; 701518; 761016; 761219; 811015;	HAZARDOUS NON HAZARDOUS WASTE HAULING RESTRICTED WASTE TRANSPORTATION DISPOSAL ROLL-OFF BIN RENTAL WASTE TIRE HAULER, RENTAL EQUIPMENT AND WATER TRUCK, DEMOLITION, EXCAVATION, CONSTRUCTION SITE REMEDIATION