

SPECIFICATIONS
(Volume 1 of 3)
DESIGN DEVELOPMENT PHASE



for

BLOOMFIELD PUBLIC LIBRARY
McMAHON WINTONBURY LIBRARY

1015 BLUE HILLS AVENUE
BLOOMFIELD, CT 06002

October 7, 2022

LIST OF CONSULTANTS

Architect

TSKP Studio, LLC (TSKP)
One Hartford Square West
146 Wyllys Street, Suite 1-203
Hartford, CT 06103
860-547-1970

Structural Engineers

Michael Horton Associates (MHA)
151 Meadow Street
Branford, CT 06405
203-481-8600

MEP/FP Engineers

RZ Design Associates (RZDA)
750 Old Main St., Suite 202
Rocky Hill, CT 06067
860-436-4336

Technology Consultant

D'Agostino & Associates (DAG)
477 Main Street, Suite 210B
Monroe, CT 06468
203-497-3064

Landscape Architect

Richter & Cegan, Inc. (R&C)
88 Canal Court
Avon, CT 06001
860-678-0669

Civil Engineers

SLR International Corp. (SLR)
99 Realty Drive
Cheshire, CT 06410
203-271-1773

Geotechnical Engineers

Walti Geotechnical, P.C. (WELT)
5227 Williams Street
Glastonbury, CT 06033
860-633-4623

Environmental Consultant

SLR International Corp. (SLR)
2 Commerce Drive, Suite 110
Bedford, NH 03110
603-945-6104

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DOCUMENT 003132 - GEOTECHNICAL DATA

1.1 GEOTECHNICAL DATA

- A. This Document along with its attachment provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information. This Document and its attachment are not part of the Contract Documents.
- B. Because subsurface conditions indicated by the geotechnical study are only a sampling in relation to the entire construction area, the Owner, the Architect, the Architect's consultants, and the firm reporting the subsurface conditions do not warranty the conditions below the depths of the borings or that the strata logged from the borings are necessarily typical of the entire site. Any party using the information described in the soil borings and geotechnical report shall accept full responsibility for its use.
- C. A geotechnical study for the Project, prepared by Welti Geotechnical, P.C., dated April 27, 2020, is appended to this Document.
 - 1. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by that engineer. Owner is not responsible for interpretations or conclusions drawn from the data.
 - 2. Any party using information described in the geotechnical report shall make additional test borings and conduct other exploratory operations that may be required to determine the character of subsurface materials that may be encountered.

END OF DOCUMENT 003132

WELTI GEOTECHNICAL, P.C.

GEOTECHNICAL ENGINEERING

227 Williams Street · P.O. Box 397
Glastonbury, CT 06033-0397

(860) 633-4623 / FAX (860) 657-2514

March 3, 2022

Ms. Nancy P. Haynes
Purchasing and Risk Manager
Town of Bloomfield
800 Bloomfield Avenue
Bloomfield, CT 06002

Re: Geotechnical Study for Proposed Addition to McMahon Library, 1015 Blue Hills Avenue, Bloomfield, CT

Dear Ms. Haynes:

1.0 Herewith are the data from the test borings taken at the above referenced site. Two borings were drilled at the proposed building addition to a maximum depth of 51 feet. The borings locations are shown on the attached plan. *The borings were drilled by Clarence Welti Associates, Inc. and sampling was conducted by this firm solely to obtain indications of subsurface conditions as part of a geotechnical exploration program. No services were performed to evaluate subsurface environmental conditions.*

2.0 The **Subject Project** will include the construction of a one story slab on grade building addition with a footprint about 2,000 sf. The finished floor will match the floor level of the existing building at Elev. 125. The existing grades in the proposed building addition footprint range from about Elev. 124 to Elev. 125.

3.0 The **Geologic Origin** of the natural inorganic soils on the site is from glacial lake deposits to about 50 feet below grade. These deposits consist generally of stratified sands to about 20 feet overlying silt or clayey silt to the top of the weathered rock at 49 feet.

3.1 The **Soils Cross Section** from the borings is generally as follows:

Topsoil to 5" to 13"

FILL, fine to medium SAND, trace Silt and Glass; or fine to coarse SAND, little Silt and Gravel to 2 to 3 feet, medium compact

Fine to medium SAND, trace to little Silt to 20 feet, medium compact

SILT, trace to little fine Sand to 26 feet

Varved SILT and CLAY to 49 feet, medium stiff

Weathered Bedrock to 51+ feet, very dense

3.2 The Water Table was at 9 feet below the existing grades at the completion of the borings.

4.0 The Criteria for Foundation Type and Loading are as follows:

1. The maximum total settlement should not exceed 3/4" and the maximum differential settlement should not exceed 1/2 the maximum settlement over a length of 50 feet.
2. The Foundations and Structures must address the seismic section of the building code.
3. The Slab at Grade floors must not settle differentially more than 1/2" in excess of the structure subsidence.

4.1 Regarding item 2 (above), the seismic site soil profile classification is “**D**”. The mapped MCE spectral response acceleration values for Bloomfield, CT are $S_1 = 0.064$ for one second period and $S_s = 0.180$ for short period. For transfer of ground shear on crushed stone atop the silt/fine sand soils the ultimate friction factor can be **0.60**.

5.0 Regarding Foundation Type, the building can be supported on spread footings. The footings should be on the natural inorganic soils at frost protection depth, or on a controlled fill placed after the removal of any existing fill, topsoil and subsoils. Controlled fills should conform to section 6.0 below and should extend horizontally beyond the footings for a distance equal to at least the depth of fill beneath the footings. Based on the borings footings will fall on fine to medium sand with trace to little silt. It is recommended that the footings be place a 4" layer of 3/8" crushed stone atop the natural sands.

5.1 The Allowable Bearing Pressure on the crushed stone atop natural soils or on controlled fill can be 4,000 psf. The allowable loading can be increased by 1/3 for seismic or wind loading. At retaining walls the maximum pressure on the toe can be 50% higher than the average pressure, cited above.

5.2 The Lateral Soil Loading (static) on retaining walls that are part of the building should be based on at-rest pressure using the at-rest coefficient cited in the table below. Lateral soil loading on retaining walls apart from the building can be designed with active pressure using the coefficient cited below for level backfill. The ultimate sliding coefficient for concrete on the crushed stone atop natural soils or on controlled fill is **0.60**.

5.3 The Frost Protection Depth is 3.5 feet below the finish grades in areas, which are exposed to weather.

5.4 Summary of Foundation Design Parameters:

Parameter	Value
Allowable Bearing Pressure	4,000 psf
Soil Unit Weight (Backfill) *	125 pcf
Internal Friction Angle (Backfill) *	34°
At-Rest Pressure Coefficient, K_o	0.45
Active Pressure Coefficient, K_A (level backfill)	0.28
Ultimate Sliding Coefficient, concrete on crushed stone over soil or rock	0.60
Seismic Site Soil Profile Classification	D
Mapped MCE Spectral Response Acceleration for one second period, S_1	0.064
Mapped MCE Spectral Response Acceleration for short period, S_s	0.180
Frost Protection Depth	3.5 feet

* Backfill material conforming to section 6.0 below

6.0 Regarding Controlled Fill, Backfill for Retaining Walls and Excavations at Columns and Walls, plus Slab at Grade Underlayment (to 6" below the slab bottom) the material should conform to the following or be 3/8" crushed stone:

Percent Passing	Sieve Size
100	3.5"
50 - 100	3/4"
25 - 75	No.4

The fraction, passing the No.4 sieve should have less than 15%, passing the No. 200 sieve.

All backfill and fill must be compacted to at least 95% of modified optimum density.

6.0.1 All topsoil and existing fills should be removed under slabs on grade. There should be a minimum of 18" of controlled fill beneath the slab on grade. This should include 12" of material conforming to the gradation in section 6.0 above. The 6" immediately beneath the slab on grade should be with 3/4" processed aggregate base conforming to the gradation cited below. This material

should be compacted at least 95% of modified optimum density (ASTM 1557D) to provide a sub grade modulus equal to at least 250 pci. A vapor retarder is required beneath the slab on grade floors.

3/4" minus processed aggregate base

Percent Passing	Sieve Size
100	1.25"
90 - 100	1"
75 - 100	3/4"
10 - 35	1/4"
3 - 12	No. 100
0 - 5	No 200

7.0 Regarding **Earthwork**, excavations in the natural soils will fall in OSHA Class C. This will that excavations, which are unshored and exceed 5 feet in height, should be cut back to slopes less than 34° from the horizontal (1.5H:1V).

8.0 This report has been prepared for specific application to the subject project in accordance with generally accepted soil and foundation engineering practices. No other warranty, express or implied, is made. In the event that any changes in the nature, design and location of structures are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing.

The analyses and recommendations submitted in this report are based in part upon data obtained from referenced explorations. The extent of variations between explorations may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report.

Welti Geotechnical, P.C., should perform a general review of the final design and specifications in order that geotechnical design recommendations may be properly interpreted and implemented as they were intended.

If you have any questions, please call our office.

Very truly yours,

Max Welti

Max Welti, P.E.
President, Welti Geotechnical, P.C.

Clarence Welti

Clarence Welti Ph.D., P. E.
Vice President

APPENDIX
BORING LOCATION PLAN
+
TEST BORING LOGS

N/F
CIL COMMUNITY RESOURCES
INCORPORATED
VOL. 1710, PAGE 58

N/F
MICHAEL C. ZAWADA
LINDA J. ZAWADA
VOL. 1673, PAGE 188

N/F
ANTONIO JOSE MEDINA
VOL. 2021, PAGE 36

N/F
FIRST BLOOMFIELD ASSOCIATES,
LLC
VOL. 1998, PAGE 160

LEGEND

	PROPERTY/STREET LINE
	EASEMENT LINE
	UTILITY POLE
	UNDERGROUND ELECTRIC
	IRON PIN FOUND
	CONCRETE MONUMENT FOUND
	WATER PIPE
	WATER VALVE
	HYDRANT
	SANITARY SEWER
	SANITARY MANHOLE
	STORM SEWER
	CATCH BASIN
	STORM DRAINAGE MANHOLE
	GAS MAIN
	UNDERGROUND COMMUNICATIONS
	COMMUNICATIONS MANHOLE
	METAL BEAM RAIL
	TREE LINE
	LIGHT POLE
	LANDSCAPED AREA
	ELECTRIC HANDHOLE
	BITUMINOUS CONCRETE LIP CURB
	CONCRETE CURB

TEST BORING LOCATIONS
CLARENCE WELTI ASSOCIATES, INC.
3/2/22

0' 30' 60' 90'
SCALE: 1"=30'



SURVEY NOTES:

1. THIS SURVEY AND MAP WERE PREPARED IN ACCORDANCE WITH THE REGULATIONS OF CONNECTICUT STATE AGENCIES SECTIONS 20-300b-1 THRU 20-300b-20 AND THE "STANDARDS FOR SURVEYS AND MAPS IN THE STATE OF CONNECTICUT" AS ADOPTED BY THE CONNECTICUT ASSOCIATION OF LAND SURVEYORS, INC. ON SEPTEMBER 26, 1996. IT IS A PROPERTY AND TOPOGRAPHIC MAP CONFORMING TO HORIZONTAL ACCURACY CLASS A-2 AND TOPOGRAPHIC ACCURACY CLASS 1-2. IT IS INTENDED TO DEPICT THE DEED LINES, LINES OF OCCUPATION, EASEMENTS AND ENCROACHMENTS AFFECTING THE PROPERTY. THE PROPERTY/BOUNDARY DETERMINATION OPINION PRESENTED HEREON IS BASED ON A RESURVEY.
2. REFERENCE IS HEREBY MADE TO THE FOLLOWING MAPS ENTITLED:
A. "MAP OF LAND MRS. KATE MCCROSSEN, BLOOMFIELD, CONN." PREPARED BY ERWIN M. PECK, SCALE 1"=50' AND DATED DEC. 1924. BLOOMFIELD LAND RECORDS MAP #50.
B. "RIGHT OF WAY MAP TOWN OF BLOOMFIELD BLUE HILLS AVE. FROM HARTFORD CITY LINE NORTHERLY TO PARK AVE. ROUTE NO. 311" PREPARED BY CONNECTICUT HIGHWAY DEPARTMENT, SCALE 1"=40', DATED MARCH 31, 1928 AND REVISED JULY 1983.
C. "EASEMENT MAP SHOWING EASEMENT TO BE ACQUIRED FROM TOWN OF BLOOMFIELD #997-#1011 BLUE HILLS AVENUE BLOOMFIELD, CONNECTICUT" PREPARED BY BARAKOS-LANDINO DESIGN GROUP, SCALE 1"=30' AND DATED FEBRUARY 12, 1998. B.L.R. MAP #3636.
D. "THE SUBDIVISION OF WINTONBURY LIBRARY & ROBERT WATKINS CENTER PREPARED FOR TOWN OF BLOOMFIELD 1015 BLUE HILLS AVENUE & 73 ROCKWELL AVENUE BLOOMFIELD, CONNECTICUT" PREPARED BY ED LALLY, SCALE 1"=40', DATED DECEMBER 5, 2012 AND REVISED ON 12-19-12. B.L.R. MAP #71-54.
3. THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEES THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN-SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THE SURVEYOR DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.
4. BEARINGS ARE BASED ON NAD83. ELEVATIONS ARE BASED ON NAVD88.
5. THIS PARCEL IS SUBJECT TO A SANITARY SEWER EASEMENT IN FAVOR OF THE METROPOLITAN DISTRICT COMMISSION AS RECORDED IN VOLUME 72, PAGE 289 OF THE BLOOMFIELD LAND RECORDS.
6. THIS PARCEL IS SUBJECT TO A DRAINAGE EASEMENT IN FAVOR OF READCO BLOOMFIELD, LLC AS RECORDED IN VOLUME B42, PAGE 246 OF THE BLOOMFIELD LAND RECORDS.
7. THIS PARCEL IS ZONED GNB. SETBACKS ARE GENERALLY FRONT 25', SIDE 10' AND REAR 20'.

PROPERTY AND TOPOGRAPHIC SURVEY

LAND NOW OR FORMERLY OF

TOWN OF BLOOMFIELD

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#1015 BLUE HILLS AVENUE
BLOOMFIELD, CONNECTICUT



JOB No.: 21-071

SCALE: 1"=30'

DATE: FEBRUARY 25, 2022

DWG. NO.: 1

SHEET: 1 OF 1

TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS
MAP IS SUBSTANTIALLY CORRECT AS NOTED HEREON

JONATHAN TARBOX

L.S. #70075

REVISIONS:

CLARENCE WELTI ASSOC., INC. P.O. BOX 397 GLASTONBURY, CONN 06033				CLIENT		PROJECT NAME ADDITION TO MCMAHON LIBRARY LOCATION 1015 BLUE HILLS AVENUE, BLOOMFIELD, CT				
		AUGER	CASING	SAMPLER	CORE BAR.	OFFSET	SURFACE ELEV. 124		HOLE NO. B-1	
TYPE	HSA			SS		LINE & STA.	GROUND WATER OBSERVATIONS		START DATE	3/2/22
SIZE I.D.	3.75"			1.375"		N. COORDINATE	AT 9.0 FT. AFTER 0 HOURS			
HAMMER WT.				140lbs		E. COORDINATE	AT FT. AFTER HOURS		FINISH DATE	3/2/22
HAMMER FALL				30"						
DEPTH	SAMPLE			A	STRATUM DESCRIPTION + REMARKS					ELEV.
	NO.	BLOWS/6"	DEPTH							
0	1	3-6-20-26	0.0'-2.0'		TOPSOIL 0.40					
					BR.FINE-MED.SAND, TRACE SILT - FILL 1.0					
	2	20-20-21-25	2.0'-4.0'		RED/BR.FINE-CRS.SAND SAND, LITTLE SILT & GRAVEL - FILL					
					BR.FINE-MED.SAND, TRACE TO LITTLE SILT 3.0					120
5	3	21-21-20-26	4.0'-6.0'							
										115
10	4	5-5-7	10.0'-11.5'							
										110
15	5	4-4-8	15.0'-16.5'							
										105
20	6	4-10-14	20.0'-21.5'		GREY SILT, TRACE FINE SAND 20.0					
										100
25	7	3-3-4	25.0'-26.5'		GREY/BR.VARVED SILT AND CLAY 26.0					
										95
30	8	2-3-4	30.0'-31.5'							
										90
35										
LEGEND: COL. A: SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%						DRILLER: T. CZMYR INSPECTOR:				
						SHEET 1 OF 2		HOLE NO. B-1		

[illegible]

CLARENCE WELTI ASSOC., INC. P.O. BOX 397 GLASTONBURY, CONN 06033				CLIENT TOWN OF BLOOMFIELD		PROJECT NAME ADDITION TO MCMAHON LIBRARY LOCATION 1015 BLUE HILLS AVENUE, BLOOMFIELD, CT	
	AUGER	CASING	SAMPLER	CORE BAR.	OFFSET	SURFACE ELEV. 125	HOLE NO. B-2
TYPE	HSA		SS		LINE & STA.	GROUND WATER OBSERVATIONS	
SIZE I.D.	3.75"		1.375"		N. COORDINATE	AT 9.0 FT. AFTER 0 HOURS	START DATE 3/2/22
HAMMER WT.			140lbs		E. COORDINATE	AT FT. AFTER HOURS	FINISH DATE 3/2/22
HAMMER FALL			30"				

DEPTH	SAMPLE			A	STRATUM DESCRIPTION + REMARKS	ELEV.
	NO.	BLOWS/6"	DEPTH			
0	1	3-3-5-4	0.0'-2.0'		TOPSOIL	125
					BR.FINE-MED.SAND, TRACE SILT & GLASS - FILL	1.1
	2	3-2-3-8	2.0'-4.0'		BR.FINE-MED.SAND, TRACE TO LITTLE SILT	2.0
5	3	7-8-10-14	4.0'-6.0'			
10	4	4-9-13	10.0'-11.5'			
15	5	6-9-8	15.0'-16.5'			
20	6	6-8-13	20.0'-21.5'		GREY/BR.SILT, LITTLE FINE SAND	20.0
					BOTTOM OF BORING @ 21.5'	21.5
25						
30						
35						

LEGEND: COL. A: SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%		DRILLER: T. CZMYR INSPECTOR:	
		SHEET 1 OF 1	HOLE NO. B-2

SECTION 012300 – ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for alternates.
- B. Sustainable Design Intent: Comply with certain prerequisites and credits needed to achieve sustainable design, measured and documented according to the LEED Green Building Rating System, of the United States Green Building Council (LEED v4 BD + C).

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added or deducted from the Base Bid amount if the Owner accepts an alternate material or a reduced quantity of material, or a reduced warranty, as outlined in the Schedule of Alternates.
 - 1. The add or deduct for each alternate is the net change to the Contract Sum. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

- E. All alternate pricing is valid for the entire project schedule unless written notice is submitted to the Owner 60 days prior to a required decision that will not affect the contract schedule.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

Refer to the drawings for the location and extent of these Alternates.

Alternate No. 1: Install a folding glass partition in Community Room (105).

END OF SECTION 012300

SECTION 015639 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the protection and stress reduction of existing trees and vegetation that interfere with, or are affected by, execution of the Work, whether temporary or permanent. Work is to be coordinated with the contract documents which shall include a tree preservation plan authored by a certified arborist.
- B. The following work is related to protection and stress reduction measures and coordination and oversight of the tree preservation Plan by the Owner. This work includes but is not limited to the following:
 - 1. Coordination of Temporary Tree and Plant Protection
 - 2. Root Pruning
 - 3. Temporary Site and Tree Protection Fencing and temporary sign installation referenced in Section 015000 Temporary Facilities and Controls
 - 4. Composted Mulching
 - 5. Liquid subsurface fertilization
 - 6. Temporary Limb Guying or Clearance Pruning for construction access
 - 7. Seasonal Supplemental Watering
 - 8. Monitoring and Treatment of Tree Health
 - 9. Supersonic Air Tool (SSAT) and Hand Excavation within the Critical Root Zones (CRZs)
 - 10. Tree Growth Regulator (Paclobutrazol)
 - 11. Soil Nutrient Testing and Soil Care
 - 12. Soil Restoration / Aeration
 - 13. Root Protection Matting for temporary construction access in TPAs
 - 14. Crown Pruning and Supportive Cabling
 - 15. Temporary Tree Trunk and Limb Protection Wrap
- C. Related Requirements:
 - 1. Section 015000 "Temporary Facilities and Controls" for temporary controls, utilities, support facilities, temporary site fencing, and, if applicable, temporary erosion and sedimentation controls if not specified in Section 311000 "Site Clearing".
 - 2. Section 311000 "Site Clearing" for removing existing trees and shrubs and for temporary erosion- and sedimentation-control measures if not specified in Section 015000 "Temporary Facilities and Controls".

1.3 DEFINITIONS

- A. Certified Arborist: Credential of an individual arborist issued and administered by the International Society of Arboriculture. This credential must be current and valid to qualify to use the copyrighted designation of “Certified Arborist”. Refer to www.isa-arbor.com for additional information.
- B. Contract Arborist: Arboricultural firm contracted to implement the approved tree preservation plans on site. All crews’ conduction arboricultural operations on site shall consist of at least one Certified Arborist who directly oversees all work by that crew. Arboricultural operations include, but are not limited to, pruning, tree protection device installation and maintenance (fence, matting, etc.), root pruning, air tool root excavation/exploration (SSAT), soil care activities, soil testing, mulch application, tree inspections, pesticide/chemical applications and tree removal. Special qualifications submittal is required for review and approval below. Contract Arborist will be sub-contracted by the Contractor and cannot also be the individual or entity contracted as the Project Arborist for the Architect and/or Owner.
- C. Tree Protection Area (TPA): Area indicated on Drawings surrounding individual trees or groups of trees to be protected during construction.
- D. Critical Root Zone (CRZ): Area occupied by the root system of a tree and considered a zone of high sensitivity to disturbance such that damage from excavation, soil compaction or other means will likely lead to declining health and/or stability of the tree. Any impacts within the CRZ must be mitigated based on severity up to and including tree removal if the impact or disturbance is severe.
- E. Structural Critical Root Zone (SCRZ): An area (radius) around a tree trunk that must be protected to ensure ground stability of the tree. Damage of roots within this area may likely compromise the tree's structural stability, possibly causing whole tree failure.
- F. Supersonic Airtool (SSAT): Hand held tool designed to focus highly compressed air (90-125 psi) provided from a large air compressor (185-375 cfm) at speeds close to 1400 mph at the tip of the tool. Widely used by arboricultural firms and consultants for multiple purposes including but not limited to: root collar investigation, CRZ investigation, root pruning (especially large roots > 1.5” diameter or where existing underground cables or conduits are located, radial mulching and restoration of compacted soils, excavation for utilities within protected CRZs to minimize root damage from construction.
- G. Tree Removal by Arborist: Action whereby the Contract Arborist removes trees designated for “Removal by Arborist” selected from inside the TPAs. Trees shall be taken down by hand sectionally, or directionally felled to minimize damage to adjacent tree canopies, root systems, or adjacent structures. Work shall be completed by a qualified contract arborist.
- H. Crown Pruning: Action by the Contract Arborist of pruning specific tree limbs to improve tree health, reduce hazard, and / or provide construction clearance.
- I. Supportive Cabling: Installation of supportive cabling for designated tree branches due to weak branch attachments.

- J. Root Pruning: Action indicated on Drawings to provide a more suitable cut for protected tree roots to minimize ripped or torn roots during excavations and grading with standard construction equipment. Various methods may be used.
- K. Mulching of Trees: Application of a wood mulch product to areas surrounding designated trees. Mulch increases moisture-holding capacity, helps mitigate soil compaction, and increases needed soil organic composition.
- L. Soil Amendments: Various product components applied to existing soil environment of protected trees, as indicated on Plan Notes.
- M. Tree Growth Regulator (*Paclobutrazol*): Products applied by qualified Arborist to designated trees used to regulate plant growth in such a way as to restrict canopy growth and free stored or produced energy for other uses in the tree. For highly impacted trees, more energy may be available for fibrous root growth (to combat root loss), thicker darker leaves (allowing for increased photosynthesis, and increased drought tolerance), and pest tolerance (often an issue with construction stressed trees); among other potential benefits.
- N. Limits of Disturbance (LOD) (also called Limits of Construction): Specific outer limits of all construction activities for the entire project.
- O. DBH (Diameter at Breast Height): Tree trunk diameter measured at 4.5 feet above grade.

1.4 PREINSTALLATION MEETINGS

- A. Pre-Construction Meeting: Conduct meeting at the project site prior to commencement of construction related activities.
 - 1. Contract Arborist, Project Arborist, Project Design Team, Owner and Contractors shall attend.
 - 2. Review methods and procedures related to tree protection and preservation including, but not limited to, the following:
 - a. Site Logistics Plan
 - b. Construction schedule – verify availability of material, personnel, and equipment needed to make progress and avoid delays.
 - c. Enforcement of requirements for tree protection areas.
 - d. Responsibilities of all parties, including coordination, access and timing requirements.
 - e. Field quality control

1.5 ACTION SUBMITTALS

- A. Product Data:
 - 1. General protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction
- B. Shop Drawings:

1. Include plans, elevations, and sections showing trees and plants to be protected, locations of protection-zone fencing and signage, and the relationship between equipment-movement routes and material storage locations with protection zones.
 2. Detail fabrication and assembly of protection-zone fencing and signage.
 3. Indicate extent of utility boring and trenching by hand or with air spade within protection zones.
- C. Pedestrian / Property Protection Plan: Contract Arborist to submit a written plan describing all protective measures proposed to be used. Protection measures shall be required for all on-site tree care activities including but not limited to Supersonic Airtool excavation, root pruning, canopy pruning, etc. to minimize potential impact to pedestrians and property.
- D. Maintenance Prescription: Contract Arborist shall submit for care and protection of trees as a result of construction, changes in weather patterns or events, and response in health from individual trees during and after completing the Work.
- E. Soil Samples: Submit soil sample for analysis during site work phase of this project. Take representative soil samples from all areas of protected trees (landscape areas and street tree planting pits). Samples and procedures per local cooperative extension shall be followed. Forward reports to Engineer and Owner.
- F. Soil Amendments: Contract Arborist shall submit specific fertilizer formulations, application rates and methods for review by Project Arborist. All fertilization and soil amendments shall be in conformance with soil test results.
- G. Site Documentation: Submit weekly reports to the Owner containing complete documentation of all tree impacts and tree preservation activities including but not limited to: root pruning, tree protection fencing, excavation within critical root zones, tree fertilization or other treatments, etc. Documentation shall include tree numbers of trees impacted and / or treated. Complete daily photographic record is also required.
- H. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damaged caused by construction activities.
- I. Use sufficiently detailed photographs or videotape.
- J. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.
- K. Tree and shrub removal of additional plants not under base contract will require a "request to remove plantings" form to be submitted to the Owner for approval prior to starting the removal.

1.6 INFORMATIONAL SUBMITTALS

1. Certification: For each phase, the Contract Arborist shall certify for each tree designated to remain has been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

2. Qualification Data: For Contract Arborist Firm Qualifications, submit firm and individual qualifications as follows:
 - a. Submit a minimum of two resumes and detailed qualifications from staff or team individuals assigned to this project as detailed under Quality Assurance below. Due to the complexity of this project, standard arboricultural experience may not qualify.
 - b. Provide references for above from a minimum of three commercial, non-governmental or governmental projects for whom similar tree preservation programs have been successfully implemented. Include the following information:
 - 1) Project Name, size and scope
 - 2) Number and species of trees involved
 - 3) Relevant photos or aerials
 - 4) Scope of services provided

B. Name and contact for project owner, designer, or contractor.

C. Qualification Statements: For arborist and tree service firm.

D. Certification: From arborist, certifying that trees indicated to remain have been protected during construction in accordance with recognized standards and that trees were promptly and properly treated and repaired when damaged.

E. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

F. 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.

1. Use sufficiently detailed photographs or video recordings.

2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

G. Quality-control program.

1.7 QUALITY ASSURANCE

A. Certified Arborist (individual) Qualifications: An arborist certified by the International Society of Arboriculture (ISA) and licensed in the jurisdiction where project is located. All work performed by Contract Arborist including any oversight and documentation work, shall be performed or directly supervised by at least one on-site arborist with these minimum qualifications.

B. Contract Arborist Firm Qualifications:

1. Contract Arborist Firm shall comply with the following:

- a. Established business with documented experience of at least five years.

- b. Experience working on a minimum of three commercial, nongovernmental or governmental projects where similar tree preservation programs have been successfully implemented.

- c. Properly licensed and insured to perform arboricultural work in the jurisdiction where the project is located.
 2. Provide names of each individual to comply with the following:
 - a. Minimum BS degrees in forestry, arboriculture, or related field and Certification in ISA.
 - b. Resumes should reflect combined 10 years full time experience on similar tree preservation projects.
 - c. Provide individual(s) names, certifications, and each anticipated role in this project. "Role(s)" shall be defined as one or more of the following:
 - 1) Project Manager
 - 2) Technical Oversight
 - 3) Field Arborist / Technician
 3. For each staff member, list a minimum of three construction projects and a minimum three years' experience in the following technical applications:
 - a. Soil amendment prescriptions and applications
 - b. Supersonic Airtool Excavations for underground utilities exceeding 24" depth.
 - c. Root Protection Matting or similar applications
- C. Part of this work to extent referenced shall include but not be limited to the following:
 1. ANSI A300 Standard Practices for Trees, Shrubs, and Other Woody Plant Maintenance.
 2. Part 1-2017, Pruning;
 3. Part 2-2018, Soil Management a. Modification, b. Fertilization and c. Drainage;
 4. Part 3-2013, Supplemental Support Systems;;
 5. Part 4-2014, Lightning Protection Systems;
 6. Part 5-2019, Management of Trees and Shrubs during Site Planning, Development and Construction;
 7. Part 6-2018, Planting and Transplanting;
 8. Part 7-2018, Integrated Vegetation Management;
 9. Part 8-2020, Root Management;
 10. Part 9-2017, Tree Risk Assessment;
 11. Part 10-2016, Integrated Pest Management;
 12. ANSI Z133– 2017 and most recent updates, Arboricultural Safety Standards. Fertilizer and pesticide will be applied in strict accordance with the manufacturers label instructions and applicable federal, state, and local requirements. Fertilizer, soil conditioners, and pesticide applications must be approved by the owner prior to application. Safety Data Sheets (SDS) will be available for fertilizers and pesticides in the Contract Arborists' possession while on the site.

1.8 FIELD CONDITIONS

- A. The following practices are prohibited within protection zones:
 1. Storage of construction materials, debris, or excavated material.
 2. Moving or parking vehicles or equipment.
 3. Foot traffic.
 4. Erection of sheds or structures.
 5. Impoundment of water.

6. Excavation or other digging unless otherwise indicated.
 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- B. Do not direct vehicle or equipment exhaust toward protection zones.
- C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.
- D. Take precautions to protect plants from airborne contaminants, such as paint or fireproofing overspray.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Tree Protection Fence
1. Chain-Link Fence: Galvanized steel chain-link fence with 11 gauge wire chain-link fabric; with 1-7/8 inch diameter line posts and 2-3/8 inch diameter terminal and corner posts; with tie wires, hog ring ties, gates and other accessories for a temporary fence system.
 2. Height: 6 feet.
- B. Wood Chip Mulch
1. Double ground hardwood, aged a minimum 6 months from production, free from deleterious materials. Green chips or mulch not aged at least 6 months shall not be used. No walnut mulch shall be used. Submittal shall include original material source(s), number and type of grindings / chippings, duration of aging, timing of turning / aeration.
- C. Hardwood Destruction Borer / Beetle Control: Bifenthrin, such as Onyx or equivalent. Applied per label.
- D. Tree Growth Regulator (*Paclobutrazol*)
1. Paclobutrazol is a compound used to regulate plant growth in such a way as to restrict canopy growth and free stored or produced energy for other uses in the tree. For highly impacted trees, this means more energy may be made available for fibrous root growth (to combat root loss), thicker darker leaves (allowing for increased photosynthesis, and increased drought tolerance), and pest suppression (often an issue with construction stressed trees); among countless other potential benefits. Trade name Cambistat® or equal.
- E. Soil Care/Soil Amendments
1. Fertilizer and soil amendment selection shall be based upon soil test results and recommendations.

- F. Temporary Root Protection Matting (RPM): geocomposite material comprised of a tri-planar geonet structure with thermally bonded nonwoven geotextiles on both sides.
 - 1. Material shall be SynTec ROADRAIN T-7 or approved equal.
 - 2. AlturnaMAT or 1" thick steel plates may be used in lieu of RPM, subject to approval by Project Arborist.
 - 3. Submit shop drawings/cut sheets and material samples for review by Project Arborist and project engineer.
 - 4. Wood chip mulch or gravel is required with these materials.
- G. Temporary Trunk/Limb Protection Wrap: to provide specific protection to tree trunks when construction activities are expected in close proximity to tree trunks and limbs.
 - 1. Material shall be SynTec ROADRAIN T-7 or approved equal.
 - 2. Alternative methods and materials may be submitted for review and consideration by the Project Arborist.
- H. Permanent Root Aeration Matting (RAM): geocomposite material comprised of a tri-planar geonet structure with thermally bonded nonwoven geotextiles on both sides.
 - 1. Material shall be SynTec ROADRAIN T-7 or approved equal.
 - 2. Submit shop drawings/cut sheets and material samples for review by Project Arborist and project engineer.

PART 3 - EXECUTION

3.1 TREE REMOVAL

- A. All trees, shrubs and hedges designated for removal shall be marked in red flagging for review and approval by the Owner's representative.
- B. All trees designated for removal shall be taken down sectionally or directionally felled to minimize damage to adjacent tree canopies and root systems by a qualified Contract Arborist. Damage to adjacent trees shall be reviewed by the Owner's representative for remedial recommendations or replacement.
- C. Motorized equipment shall operate on existing pavement and not enter tree preservation areas without prior approval by the Project Arborist. Temporary root protection matting may be required for such access to prevent rutting and compaction.

3.2 TREE PROTECTION AND STRESS REDUCTION MEASURES

- A. General

1. Refer to the TPAK for specific measures determined for each tree.
 2. Installation/implementation of the following measures shall be performed in the field by and ISA Certified Arborist as provided by the Contract Arborist
 3. All work, substitutions and /or modifications shall be subject to review and approval by the Owner.
 4. All work shall conform to applicable federal, state and local regulations and industry standards.
 5. The Contract Arborist shall be responsible for all items in this section.
- B. Coordination of Tree preservation plan. The work of the Contract Arborist coordination to include but not limited to the following:
1. Existing underground utility marker conflicts brought to the attention of the Contractor for resolution as well uncovered underground utilities as a result of work.
 2. Coordinate necessary survey layout of proposed construction elements in order to provide accurate locations for tree protection measures.
 3. Layout location of designated tree protection based upon proposed construction and methods of construction for that area.
 4. Site walk with Owner and Site Superintendent to verify location of all tree protection measures prior to execution.
 5. Notify Site Superintendent and Owner if construction adjacent to tree protection does not appear to follow specifications or prior agreement or conflicts with tree protection seem eminent.
 6. Coordinate with Site Superintendent and Owner, for access of deliveries, crews, equipment, start up, and cleanup of each item of work.
 7. Provide “as built” of any change to location of tree protection.
 8. Attend progress meetings as requested.
 9. Provide submittals as required.
 10. Notify Superintendent and Owner of any breach or damage to tree protection requiring attention.
- C. Pruning and Supportive Cabling
1. Specific canopy pruning for tree health, risk reduction, and construction clearance per Contract documents
 2. Size, health, species, and impact from proposed construction will be taken into consideration in determining pruning type for each designated tree. Risk Reduction

Pruning will remove dead, dying, and declining limbs 2" diameter and larger. No interior green branching including sprouts will be removed unless approved by Contract Arborist.

3. Contractor, Contract Arborist, and Owner shall meet at site to determine overhead clearance conflicts between trees and construction equipment/activities to prevent breakage, impacts, or aesthetic concerns. All work shall conform to ANSI A-300 arboriculture standards. An aerial assessment shall be made for all trees climbed to report any structural weakness of concern to the Owner.
4. Prior to climbing any tree a risk assessment will be performed using visual, sounding, or basic drilling as needed by the Contract Arborist. Trees deemed high risk should not be climbed; alternate methods should be used and the tree reported to the Owner immediately.
5. Supportive Cabling of weak unions may be recommended by the Contract Arborist if the need is discovered during pruning operations. ANSI Standards apply. Cabling may be included only if submitted to the Engineer and approved by the Owner.

D. Root Prune

1. Purpose of the root pruning is to provide a more suitable cut so as to not rip or tear roots during excavations and grading with standard construction equipment. The exact location and depth along the LOD or edge of utility excavation will be determined during the layout by a Certified Arborist.
2. Root Pruning for urban sites with specimen trees or for transplanting requires the use of SSAT excavation for hand pruning. Refer to SSAT specifications in the section
3. Sufficient moisture is necessary for reducing the level of dust, increase work efficiency, and provide a hospitable environment of the tree roots and pedestrians.
4. At a pre-work site inspection by the Contract Arborist more than 72 hours in advance of work start, subsurface probing to 24-36" with a tile probe or similar method will determine if sufficient soil moisture exists. If sufficient moisture is not found, immediate coordination with the site managers shall be made to irrigate the proposed work areas. Methodology may be soaker hose, sprinklers, soaker cans with small drilled holes to release water slowly or other methods. A second follow up inspection shall be made to determine final sufficiency to begin.
5. All root pruning operations shall be performed by the Contract Arborist and directed in the field by and ISA Certified Arborist with documented experience in similar SSAT excavation and root pruning.

E. Temporary Tree Protection Fence

1. Type and placement of fence to be designated on the Preservation Plans and Details.
2. Attach tree protection area signs at 30' feet spacing, facing construction activity. For fence lower than 6' feet in height, attach owner provided flagging as directed. Consult with the Owner for sign content.

3. Tree protection area signs shall be high visibility and all weather to last duration of the project / phase.
4. Install tree protection after root pruning if shown, and prior to all other mobilization such as demolition, clearing and/or excavation.
5. Install tree protection at 6" – 12" outside (construction side) of the Root Prune line or within the Root Prune Trench.
6. Silt fence will be outside (construction side) the tree protection fence, unless super silt fence is used in lieu of tree protection. Trenchless installation method shall be employed per Detail if Root Protection Matting is designated.
7. Exact placement of fence will be determined in walk-through with Contractor, Project Arborist, Contract Arborist, Engineer, and Owner.
8. Sequencing of the tree protection fence will be determined during the initial site walk. In any case, no construction activities shall occur in each phase or section until approved protection is installed.

F. Root Protection Mat (RPM)

1. The purpose of the RPM is to reduce compaction, rutting, and contamination of soils and root systems of trees to be retained should staging, temporary stockpile, or equipment access be required within CRZ areas due to extreme site constraints.
2. RPM shall be used for all access within CRZ areas of trees to remain. Matting is not required where existing pavements or concrete will remain undisturbed.
3. Trees anticipated receiving temporary or repetitive materials staging, foot traffic, or equipment access within protected root zones are to receive RPM. Wood chip mulch 4-6" in depth shall be installed under matting to further protect soils and roots.
4. If short duration access is needed, such as one day or less, the use of "AlturnaMATS," 1" steel plate, or approved equal may be needed to avoid rutting and compaction. These materials may be shifted and re-used as work progresses.
5. All weather staging, stockpile, or other repetitive construction operations may require a 12" depth stone layer over RPM to allow heavy vehicles have the potential to cause dynamic compaction yet without rutting original surface soils and roots. In this situation, the stone may be contained by silt fence or super silt fence where adjacent to or within a TPA.
6. All temporary RPM areas to be used beyond a single day or beyond continuous on site supervision of the Contract Arborist shall be surrounded by temporary tree protection fence as per specifications. For temporary staging of soils beyond 24 hours, "trenchless" silt fence fabric shall be installed on the lower/downhill side or as directed by the Project Arborist.
7. If silt fence is required for erosion control in RPM areas, installation of silt fence shall be coordinated with the Contract Arborist and must be performed by the Contract Arborist

to prevent damage to tree roots from trenching operations. Erosion control socks may be used in lieu of silt fabric if approved by the Engineer.

G. Temporary Tree Trunk and Limb Protection Wrap

1. Temporary trunk protection to cover the root flare and up to 12' height, or to the scaffold branches, or as determined for the situation.
2. Tree trunk (or limbs, as determined by Project Arborist) shall be wrapped with geocomposite material. More than one layer may be installed to reach suitable protection from the equipment or operations designated for work in the area. Attach with banding or strong tape that will not girdle the tree during the project timeframe. No nails or other devices are to penetrate the trunk.
3. Wrap shall be removed promptly after construction is complete.

H. Hand Excavation within Tree Protection Areas

1. For excavation within the critical root zone areas of trees to remain, the intent is to minimize tree and root damage from excavation activities.
2. Excavation shall be performed using SSAT, hand tools (shovels, etc.), or other approved non-damaging method. Roots shall not be damaged by the excavation except for approved root pruning.
3. Refer to "Supersonic Airtool Excavation" and "Construction Oversight by Arborist" specifications in this section for additional requirements.
4. All work shall be directly supervised by Contract Arborist in collaboration with the Owner's trades and subcontractors.
5. RPM (Root Protection Matting) shall be installed along trench sides to allow for temporary soil stockpile and access.
6. Excavate along the edge of the proposed trench closest to the trees to be protected as shown on the plans. Roots shall be uncovered and care taken to avoid damage to roots and bark.
7. Contract Arborist shall prune the exposed roots. Excavation shall not extend beyond the line where roots were pruned.
8. Contractor may proceed with conventional excavation methods or with hand excavation methods if clearance to the tree is inadequate for equipment access.
9. No roots shall be cut by the contractor.

I. Supersonic Airtool (SSAT) Excavation

1. Refer to "Hand Excavation within Tree Protection Areas" specification in this section for additional requirements

2. At a minimum, all SSAT work shall include the use of a barrier system such as temporary walls or tents to protect property and pedestrians from flying debris.
3. Excavate along the edge of the proposed trench closest to the trees to be protected as shown on the plans. Roots shall be uncovered and care taken to avoid damage to roots and bark.
4. Excavation shall proceed per the “Hand Excavation within Tree Protection Areas” specification in this section.

J. Special Demolition of Hardscape within Tree Protection Areas

1. Sidewalks and other hardscape items to be removed from within Tree Protection Areas (TPAs) shall be removed under direct supervision of the Contract Arborist. Site restoration, if required, shall also be supervised by the Contract Arborist.
2. No mechanized equipment shall enter the TPAs. All work shall be either done by hand (with hand-operated equipment such as jackhammers) or with equipment staged outside the TPA. Alternatives for specific situations shall be reviewed by Project Arborist and Engineer.
3. Sequence of work shall be reviewed and coordinated with the work of the Contract Arborist by the construction manager, contractor, Contract Arborist, Project Arborist, Engineer, and Owner as appropriate for the project. Methods of protection of overhead branches, trunks, and roots shall be reviewed. Refer to specifications for approved methods of temporary wrapping, or selective pruning.
4. Small equipment may operate upon existing hardscape or upon designated root protection matting if approved by the Project Arborist and Engineer. All staging or stockpiling of materials shall occur outside the TPA.
5. Demolition of paving shall not damage protected roots outside the limit of work nor below existing hardscape. Approved options include jackhammer and pick up by hand or break up by small excavator operating upon existing hardscape. Once hardscape is removed, no equipment shall operate upon stone base unless inspected and approved by Project Arborist as roots may have grown into base below hardscape.
6. Refer to “Hand Excavation within Tree Protection Areas” and “Supersonic Airtool Excavation” specifications in this section.

K. Wood Chip Mulch

1. Mulching for the duration of construction for protection and stress reduction. Mulching will increase moisture-holding capacity, minimize soil compaction, and increase needed organic composition. Mulch shall meet the specifications and shall be three (3) inches in depth.
2. For individual trees designated on the TPAK within the TPS or curvilinear TPA install mulch to a radius equal to trunk diameter inches equated to mulch ring diameter in feet (24” inch trunk diameter = 24’ feet diameter mulch ring). Where planting pit areas are restricted by hardscape, mulch the greatest area possible.

3. For linear TPAs along LOD Install mulch strips a minimum 10' feet wide the length of critical root zones along the outside of the LOD/Root Prune line (just inside the Tree Protection Zone) for designated significant trees impacted by proposed construction.
4. Motorized equipment shall not enter the Tree Protection Area (TPA) unless specifically approved by the Project Arborist and specific conditions met (RPM, AlturnaMATS, etc.). Any such motorized equipment shall be operated by a certified arborist while inside the TPA.
5. Do not allow mulch to contact trunk / root flare.
6. Mulch depth shall be 3" inches.

L. Tree Growth Regulator (*Paclobutrazol*)

1. Paclobutrazol is a compound used to regulate plant growth in such a way as to restrict canopy growth and free stored or produced energy for other uses in the tree. For highly impacted trees, this means more energy may be made available for fibrous root growth (to combat root loss), thicker darker leaves allowing for increased photosynthesis, and increased drought tolerance.
2. Specific methods and dosages are contained on the label and are determined by size and species, and applied by a state licensed pesticide applicator. Designated trees are shown on the Tree Protection Action Key (TPAK).

M. Supplemental Watering

1. This action is for high impact trees of significance during seasonal drought times of project construction. Based upon the number and size of trees various strategies can be considered to maintain adequate soil moisture during these times. These strategies may include but are not limited to the following:
 - a. Fire hydrant connection battery powered timer and drip irrigation hose/tubing;
 - b. Water tank truck and hand applied as directed;
 - c. Temporary above grade poly tank with battery-powered timers for drip or soaker hoses at each TPA.
 - d. 30-50 gallon watering cans with 6 – 8 drilled holes in bottom to allow slow seeping of water; spacing and rotation to reach desired gallons. Equivalent means of affectively watering trees as approved by Engineer or Project Arborist.
2. Trees requiring this treatment are indicated in the TPAK. Other trees will not receive this treatment.
3. Drought times shall be defined as:
 - a. Periods during the growing season of two weeks or longer, where daytime high temperatures reach 80 degrees Fahrenheit or higher and less than 3/4" rainfall are recorded per week. Or,
 - b. Periods during the growing season designated as "abnormally dry" or "drought" of any severity, by the U.S. Drought Monitor: <http://droughtmonitor.unl.edu/> Or,
 - c. Any period of extraordinary circumstance, as determined by the project arborist or engineer

4. A prescription for the number of gallons and strategy for watering designated trees will be developed. Large mature trees with impacts to root systems require as much as 100 – 250 gallons per week during 90 degree days during summer drought times.
5. Periodic inspections by an ISA Certified Arborist (provided by the Contract Arborist) as this time are critical. Depth of moisture in soils shall be determined by soil sample tube or other exploratory means.
6. Minimum watering shall be considered to be 6 applications per growing season typically July through October with the exact timing and duration to be determined by the ISA Arborist.

N. Overhead Clearance

1. Trees to remain shall be assessed prior to construction for overhead clearance for construction activities. Contract Arborist shall recommend either canopy pruning, temporary guying/tying of select limbs, or alternative construction methods.
2. Pruning for clearance shall not remove branches above 12' feet or over 6" inches diameter.
3. All pruning proposed by the Contractor and / or Contract Arborist shall first be reviewed and approved by the Owner and Project Arborist.
4. Equipment exhaust should be directed away from trees as much as possible. Stationary equipment shall not exhaust directly under or toward trees.
5. Contractor shall use appropriate equipment near trees to ensure that trees are not damaged by construction. Contractor shall provide any specialized equipment needed at no additional cost to the owner.
6. Any pruning shall also conform to the pruning specifications in this section.

O. Soil Tests and Soil Care/Fertilization

1. Initial soil testing within tree protection areas is required. Conduct individual soil tests for separate tree protection areas (small adjacent areas may be tested together). Soil test shall be a representative sample from each area. Soil testing shall include a texture analysis (sand, silt, and clay percentages), soluble salts, and sodium tests.
2. Treatments to the tree protection areas for specified trees (see TPAK) shall be based on the results of the soil analysis. Fertilization should be consistent with the recommendations of the ANSI A-300 (Part 2) Tree, Shrub, and Other Woody Plant Maintenance – Standard Practices (Fertilization) 2004, except as described herein.
3. Application rates shall not exceed a rate of 1 pound of actual nitrogen per 1,000 square feet annually. Fertilizer used should include humic acids, soluble seaweed extracts and soil biological inoculants (mycorrhizae, etc.).

4. Applications to confined areas (i.e. street tree planting pits) should be made by soil injection. In areas where adequate application rates cannot be achieved, injection should be made to the point of refusal.

P. SSAT Landscape Planting Excavation

1. Proposed landscape planting of B&B plants within Critical Root Zones within TPAs shall be reviewed by the Contract Arborist, contractor, and Owner in the field to determine potential for damage to priority roots of select trees and layout the limit of work.
2. Pre-watering of the proposed areas of excavation during summer and fall months is recommended to maintain root/soil moisture.
3. The Contract Arborist shall provide a qualified arborist crew experienced with the SSAT and landscape planting excavation to protect adjacent natural resources and construction work, open the excavation, hand prune minor roots, and identify and protect priority roots to remain. Coordination with the appropriate sub-contractor shall be made to determine appropriate width, depth, and sequencing.

Q. Soil Restoration / Aeration (using compressed air-powered tool such as Airspade or equivalent)

1. Treatments using various methods to relieve soil compaction and restore healthy soil conditions by the introduction of air space and organic amendments into the soil, decreasing soil bulk density. Specialized root zone and soil excavation operations shall include, but not be limited to:
 - a. Soil aeration and decompaction, Air Tilling (Root Invigoration).
 - b. Radial trenching.
 - c. Vertical mulching.
 - d. Root collar excavation.
 - e. Root pruning.
 - f. Bare rooting.
 - g. Soil replacement.
 - h. Transplanting.
 - i. Root training.
 - j. Root trenching.
 - k. Excavation or trenching required for construction or utility work in CRZ.
2. All proposed methods, materials, and schedule for effecting soils and critical root zones shall be in accordance with ANSI A300 (all parts), and shall be submitted by a certified Contract Arborist for review by the Project Arborist, Landscape Architect and Owner.
3. Refer to Airspade Pneumatic Soil Excavation Technical Applications Bulletin for additional information: www.airspade.com/guide.

3.3 FIELD QUALITY CONTROL AND MONITORING

A. Tree Condition Monitoring

1. An ISA Certified Arborist (provided by the Contract Arborist) shall perform monitoring twice per month year round to monitor insects, disease, soil moisture levels, weather, and health changes on all trees designated on Tree Protection Action Key.
2. The monitoring will include a report that details problematic areas that have been addressed, treatments provided to reduce the problem, and anticipated treatments forecast for 30 days. This report will be forwarded to the Project Arborist, Engineer and Owner for documentation.
3. Any treatments recommended by the Contract Arborist not already included in the project scope shall be noted in the reports for review by the Project Arborist, Engineer and Owner. No additional work is to be performed unless approved in writing by the Owner.

B. Construction Oversight by Contract Arborist

1. Any work within CRZs of retained trees shall be directly supervised by the Contract Arborist.
2. If roots are encountered during excavation, work shall progress as directed by the Contract Arborist. Contract Arborist, in coordination with the construction and design teams, shall determine appropriate means and methods to address the roots. Options may include, but not be limited to, severing the roots, hand or SSAT excavation. Contractor shall not cut roots.
3. Refer to "Hand Excavation within Tree Protection Areas" specification in the section.
4. All work shall be documented thoroughly, including photo documentation. Refer to site documentation submittal requirements.

3.4 CONTRACTOR DAMAGE AND PENALTIES

A. Remedial Measures

1. Any damage caused to the trees by the work of this contract through negligence by the contractor shall be immediately remedied by the contractor. Contractor shall be responsible for any associated costs.
2. Remedial work may include pruning, cabling, or any other measures up to and including removal and replacement, as determined by the Project Arborist and Landscape Architect.
3. Remedial work shall be performed by the Contract Arborist, as approved by the Project Arborist and Landscape Architect.
4. All required remedial work shall be performed to the satisfaction of the Project Arborist and Landscape Architect, at no additional cost to the owner.

B. Tree Replacement

BLOOMFIELD PUBLIC LIBRARY - MCMAHON LIBRARY

1. If damage to any tree is severe, because of negligence by the contractor as determined by the Project Arborist and Engineer, it shall be replaced with a new tree of equal size caliper and species as that of the damaged tree.
 2. If a replacement tree of equal size and caliper is not possible as determined by the Project Arborist and Engineer, it shall be replaced on and inch by inch basis with new trees of a minimum caliper size of 2"-3".
- 3.5 Replacement trees shall be supplied and installed at no additional costs to the owner, including all incidental costs including the costs of inspection of the tree at the nursery and any other incidental costs associated with tree replacement.

END OF SECTION 015639

SECTION 015713 – TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section “Summary”, Paragraph 1.1A, entitled “Related Documents.”

1.02 EROSION AND SEDIMENTATION CONTROL

A. General

- 1. The Contractor shall be totally responsible for protection of all onsite and offsite lands or properties as may be subject to any effect or by-product of his demolition/construction effort. Special care shall be taken to avoid erosion onto adjacent property or downstream siltation or diversion of existing surface drainage. Any damage is to be corrected immediately at the contractor's expense.
- 2. Erosion control measures in the locations shown and as detailed and described in the plans, shall be considered minimum requirements and the Contractor shall take whatever other erosion and sedimentation control steps that are necessary to avoid siltation.
- 3. Installation of Erosion controls shall be done prior to the commencement of demolition, site preparation or earthwork operations. The Contractor shall install any additional protective measures as may be required to control siltation from the site.

B. Materials

1. Silt Fence

- a. Silt Fence Fabric: Conform to Article M.08.01-26 of Form 818. The fabric must be recommended, by the manufacturer, for use as silt fencing. It shall be a minimum of 30” high.
- b. Posts: Provide hardwood or metal posts of the size shown in the plans and of sufficient strength to support the filter fabric.

2. Straw hay bales and silt sacks for catch basin protection.

3. Erosion Control Lining: As specified in the plans

C. Submittals

- 1. Product Data: For each type of product.
- 2. Resume of Erosion Control Inspector

D. Installation

1. Silt Fence:

- a. Install silt fences in the locations shown in the plans.
- b. Drive the support posts firmly into the ground so as to maintain the silt fence in position.
- c. Attach the filter fabric firmly to the stakes with the bottom edge of the fabric buried in a trench.

2. Erosion Control Lining:

- a. Install erosion control lining on all exposed temporary and permanent cut/fill slopes to protect against rainfall and wind erosion and hold moisture content to enhance vegetation growth in seed where shown in the plans.
- b. Install erosion control lining in the required locations immediately after the area has been seeded.
- c. Place the erosion control lining over the seed mulch to fit against the contours of the area. It shall be applied without stretching, lie smoothly but loosely, and be free of wrinkles and bunches. Roll the material in place and in the direction of the flow of surface water. Anchor the up-grade end of the erosion lining in a narrow trench 6" deep. Firmly tamp the trench backfill in place.
- d. In ditches and on slopes, provide check or junction slots at no greater than 50' intervals.
- e. Where the erosion lining comes into contact with the edges of catch basins or other structures, place a tight fold in the edge of the material and bury it a minimum of 6" into the soil.
- f. Install staples no more than 6" apart at all anchor, junction or check slots.
- g. Where two lengths of erosion control lining are joined, the end of the upgrade strip shall overlap the downgrade by a minimum of a 6" strip and the two strips shall be anchored together.

3. Catch Basins:

- a. Existing catch basins shall be wrapped with filter fabric and ringed with hay bales or silt sacks installed.
- b. Proposed catch basins and yard drains shall be wrapped and ringed with hay bales or silt sacks installed promptly after installation.

E. Maintenance and Cleaning

1. General: All temporary erosion and sedimentation control devices shall be maintained and cleaned as required from the time of their installation until their final removal. Permanent erosion control devices shall be maintained and cleaned as required until their final acceptance.
2. Erosion Control Supervisor:
 - a. The Contractor shall name one individual as his sediment and erosion control supervisor whose responsibility will be inspection, maintenance and repair of all on-site erosion and control measures. He will keep a daily log of his activities and an updated schedule of proposed construction activities. The log shall be made available to the local authority as well as any State/Federal Inspectors. The supervisor shall have experience with this role on similar sized projects.
3. Silt Fences: Remove silt as required to maintain the integrity of silt fences. If required, remove the silt fence completely and remove all accumulated silt, then reinstall.
4. Erosion Control Lining: The Contractor shall maintain and protect the outlined areas until such time as the turf grass is established. The Contractor shall replace or repair all erosion control lining areas damaged by fire, water or other causes including construction operations.

F. Dust Control

1. Conduct operations and maintain the area of activities, including sweeping and sprinkling of area as necessary, so as to minimize the creation and dispersion of dust. If it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread the material as directed.

G. Removal and Cleanup

1. At the end of construction, when turf is established, remove and legally dispose of, off site, all non-permanent erosion control devices and restore the damaged areas. Leave the site neat and clean.

PART 2 - PRODUCTS

1. Products shall conform to Form 818 and the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control (DEP Bulletin 34).

PART 3 - EXECUTION

1. Installation shall conform to Form 818 and the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control (DEP Bulletin 34).

END OF SECTION 015713

SECTION 018113 - SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general requirements and procedures for compliance with certain prerequisites and credits needed for Project to obtain "LEED V 4 BD+C Silver certification."
 - 1. Specific requirements for LEED are also included in other Sections.
 - 2. Some LEED prerequisites and credits needed to obtain LEED certification depend on product selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests and comparable product requests.
 - 3. A copy of the LEED Project checklist is attached at the end of this Section for information only.
 - a. Some LEED prerequisites and credits needed to obtain the indicated LEED certification depend on Architect's design and other aspects of Project that are not part of the Work of the Contract.

1.3 DEFINITIONS

- A. LEED: USGBC's "LEED V 4 BD+C."
- B. Chain-of-Custody Certificates: Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001. Certificates shall include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
- C. Regional Materials: Materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by cost) shall contribute to the regional value.
- D. Recycled Content: The recycled content value of a material assembly shall be determined by weight.
 - 1. "Postconsumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.

2. "Pre-consumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials, such as rework, regrind, or scrap, generated in a process and capable of being reclaimed within the same process that generated it.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site. Review LEED requirements and action plans for meeting requirements.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Respond to questions and requests from Architect and the USGBC regarding LEED credits that are the responsibility of the Contractor, that depend on product selection or product qualities, or that depend on Contractor's procedures until the USGBC has made its determination on the Project's LEED certification application. Document responses as informational submittals.

1.6 ACTION SUBMITTALS

- A. General: Submit additional sustainable design submittals required by other Specification Sections.
- B. Sustainable design submittals are in addition to other submittals.
 1. If submitted item is identical to that submitted to comply with other requirements, include an additional copy with other submittal as a record copy of compliance with indicated LEED requirements instead of separate sustainable design submittal. Mark additional copy "Sustainable design submittal."
- C. Sustainable Design Documentation Submittals:
 1. Credit EA 3: Product data and wiring diagrams for sensors and data collection system used to provide continuous metering of building energy-consumption performance over time.
 2. Credit MR 5: Comply with Section 017419 "Construction Waste Management and Disposal."
 3. Credit MR 2: Provide Environmental Product Declarations (EPD's) for permanently installed materials.
 4. Credit MR 3: Product data for recycled content, indicating postconsumer and pre-consumer recycled content and cost.
 5. Credit MR 3: Product data for regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each regional material.
 6. Credit MR 3: Product data and chain-of-custody certificates for products containing certified wood. Include statement indicating cost for each certified wood product.
 7. Credit MR 4: Provide materials ingredients reporting documentation for permanently installed materials. Accepted reporting documents include Health Product Declarations (HPD's), Cradle to Cradle certificates, and Living Building Challenge Declare labels.

8. Credit EQ 3:

- a. Construction indoor-air-quality (IAQ) management plan.
- b. Product data for temporary filtration media, MERV 8 or higher.
- c. Product data for filtration media used during occupancy, MERV 13 or higher.
- d. Construction Documentation: Six photographs at each of three different times during the construction period, along with a brief description of the SMACNA approach employed, documenting implementation of the IAQ management measures, such as protection of ducts and on-site stored or installed absorptive materials.

9. Credit EQ 4:

- a. Signed statement describing the building air flush-out procedures, including the dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.
- b. Product data for filtration media used during flush-out and during occupancy, MERV 13 or higher.
- c. Report from testing and inspecting agency, indicating results of IAQ testing and documentation showing compliance with IAQ testing procedures and requirements.

10. Credit IEQ 4: Laboratory test reports for the following products and systems installed inside the weatherproofing system, indicating compliance with requirements for low-emitting materials.

- a. Adhesives and sealants – UL Greenguard Gold certified
- b. Paints and coatings. – UL Greenguard Gold certified
- c. Composite wood and agrifiber products – Manufacturer declaration of UF Free content
- d. Flooring - SCS Floorscore certified
- e. Carpet – CRI Green Label Plus certified
- f. Ceiling & Wall Assemblies – UL Greenguard Gold certified
- g. Furniture – UL Greenguard Gold certified

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For LEED coordinator.

- 1. Must be permanently assigned to the project for the duration of the project.
- 2. Must have LEED Green Associate or LEED AP BD+C credential
- 3. Must have documented experience with at least one LEED project during the past 5 years.

- B. Project Materials Cost Data: Provide statement indicating total cost for materials used for Project. Costs exclude labor, overhead, and profit. Include breakout of costs for the following categories of items:
1. Furniture.
 2. Plumbing.
 3. Mechanical.
 4. Electrical.
 5. Specialty items, such as elevators and equipment.
 6. Wood-based construction materials.
- C. Sustainable Design Action Plans: Provide preliminary submittals within 30 days of date established for the Notice to Proceed, indicating how the following requirements will be met:
1. Credit MR 5: Waste management plan complying with Section 017419 "Construction Waste Management and Disposal."
 2. Credit MR 3: List of proposed materials with recycled content. Indicate cost, postconsumer recycled content, and pre-consumer recycled content for each product having recycled content.
 3. Credit MR 3: List of proposed regional materials. Identify each regional material, including its source, cost, and the fraction by weight that is considered regional.
 4. Credit MR 3: List of proposed certified wood products. Indicate each product containing certified wood, including its source and cost of certified wood products.
 5. Credit MR 2: List of proposed products with current Environmental Product Declarations (EPD's)
Credit MR 4: List of proposed products with current materials ingredients reporting certifications, including Health Product Declarations, Cradle to Cradle certiifcates, and/or Living Building Challenge Declare labels.
 6. Credit EQ 3: Construction IAQ management plan.
- D. Sustainable Design Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with sustainable design action plans.
1. Waste reduction progress reports complying with Division 01
 2. Recycled content.
 3. Regional materials.
 4. Certified wood products.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Provide products and procedures necessary to obtain LEED credits required in this Section. Although other Sections may specify some requirements that contribute to these LEED credits, the Contractor shall provide additional materials and procedures necessary to obtain LEED credits indicated.

2.2 RECYCLED CONTENT OF MATERIALS

- A. Credit MR 3: Building materials shall have recycled content such that postconsumer recycled content plus one-half of pre-consumer recycled content for Project constitutes a minimum of 20 percent of cost of materials used for Project.
 - 1. Cost of postconsumer recycled content plus one-half of pre-consumer recycled content of an item shall be determined by dividing the weight of postconsumer recycled content plus one-half of pre-consumer recycled content in the item by the total weight of the item and multiplying by cost of the item. total cost of the item.
 - 2. This applies to Divisions 3-10 and 31-32 only.

2.3 REGIONAL MATERIALS

- A. Credit MR 3: Not less than 20 percent of building materials, by cost, shall be regional materials.
 - 1. This applies to Divisions 3-10 and 31—32 only.

2.4 CERTIFIED WOOD

- A. Credit MR 3: Not less than 50 percent, by cost, of wood-based materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001.
 - 1. Wood-based materials include, but are not limited to, the following materials when made from wood, engineered wood products, or wood-based panel products:
 - a. Rough carpentry.
 - b. Miscellaneous carpentry.
 - c. Heavy timber construction.
 - d. Wood decking.
 - e. Metal-plate-connected wood trusses.
 - f. Structural glued-laminated timber.
 - g. Finish carpentry.
 - h. Architectural woodwork.
 - i. Wood paneling.
 - j. Wood veneer wall covering.
 - k. Wood flooring.
 - l. Wood lockers.
 - m. Wood cabinets.
 - n. Furniture.
 - 2. This applies to Divisions 3-10 and 31—32 only.

2.5 LOW-EMITTING MATERIALS

- A. Credit EQ 2: The following products and systems, where installed inside the weatherproofing system, shall comply with the testing and product requirements of the California Department of

Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

- a. Adhesives and sealants – UL Greenguard Gold certified
- b. Paints and coatings. – UL Greenguard Gold certified
- c. Composite wood and agrifiber products – Manufacturer declaration of UF Free content
- d. Flooring - SCS Floorscore certified
- e. Carpet – CRI Green Label Plus certified
- f. Ceiling & Wall Assemblies – UL Greenguard Gold certified
- g. Furniture – UL Greenguard Gold certified

PART 3 - EXECUTION

3.1 NONSMOKING BUILDING

- A. Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.

3.2 REFRIGERANT REMOVAL

- A. Credit EA 6: Remove clean-agent fire-extinguishing agents that contain HCFCs or halons according to Section 024119 "Selective Demolition" and replace with agent that does not contain HCFCs or halons. See Section 212200 "Clean-Agent Fire-Extinguishing Systems" for additional requirements.

3.3 CONSTRUCTION WASTE MANAGEMENT

- A. Credit MR 5: Comply with Division 01 Section "Construction Waste Management and Disposal."

3.4 CONSTRUCTION IAQ MANAGEMENT

- A. Credit EQ 3: Comply with SMACNA's "IAQ Guideline for Occupied Buildings under Construction."
 - 1. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in Division 01 Section "Temporary Facilities and Controls," install MERV 8 filter media according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.
 - 2. Replace air filters immediately prior to occupancy.

3.5 IAQ ASSESSMENT

A. Flush-Out:

1. After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total volume of 14000 cu. ft. (4 300 000 L) of outdoor air per sq. ft. (sq. m) of floor area while maintaining an internal temperature of at least 60 deg F (16 deg C) and a relative humidity of no higher than 60 percent.
2. If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500 cu. ft. (1 070 000 L) of outdoor air per sq. ft. (sq. m) of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm per sq. ft. (1.52 L/s per sq. m) of outside air or the design minimum outside air rate, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14000 cu. ft./sq. ft. (4 300 000 L/sq. m) of outside air has been delivered to the space.

B. Air-Quality Testing: Engage testing agency to perform the following:

1. Conduct baseline IAQ testing, after construction ends and prior to occupancy, using testing protocols consistent with the EPA's "Compendium of Methods for the Determination of Air Pollutants in Indoor Air," and as additionally detailed in the USGBC's "Reference Guide for Green Building Design and Construction."
2. Demonstrate that the contaminant maximum concentrations listed below are not exceeded:
 - a. Formaldehyde: 27 ppb.
 - b. Particulates (PM10): 50 micrograms/cu. m.
 - c. Total Volatile Organic Compounds: 500 micrograms/cu. m.
 - d. 4-Phenylcyclohexene (4-PH): 6.5 micrograms/cu. m.
 - e. Carbon Monoxide: 9 ppm and no greater than 2 ppm above outdoor levels.
3. For each sampling point where the maximum concentration limits are exceeded, conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting noncomplying building areas, take samples from same locations as in the first test.
4. Air-sample testing shall be conducted as follows:
 - a. All measurements shall be conducted prior to occupancy but during normal occupied hours, and with building ventilation system starting at the normal daily start time and operated at the minimum outside-air flow rate for the occupied mode throughout the duration of the air testing.
 - b. Building shall have all interior finishes installed, including, but not limited to, millwork, doors, paint, carpet, and acoustic tiles. Nonfixed furnishings, such as workstations and partitions, are encouraged, but not required, to be in place for the testing.
 - c. Number of sampling locations will vary depending on the size of building and number of ventilation systems. For each portion of building served by a separate ventilation system, the number of sampling points shall not be less than one per

25,000 sq. ft. (2300 sq. m) or for each contiguous floor area, whichever is larger, and shall include areas with the least ventilation and greatest presumed source strength.

- d. Air samples shall be collected between 3 and 6 feet (0.9 and 1.8 m) from the floor to represent the breathing zone of occupants, and over a minimum four-hour period.

END OF SECTION 018113

SECTION 020800

ASBESTOS ABATEMENT

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all sections within DIVISION 1 – GENERAL REQUIREMENTS that are hereby made a part of this Section and all Addenda.

1.02 RELATED REQUIREMENTS

- A. Examine all Attachments and/or Documentation for MCMAHON WINTONBURY LIBRARY (1015 Blue Hills Avenue, Bloomfield, CT), and all other Sections of the Specifications for requirements affecting the Work of this Section whether or not such Work is specifically mentioned in this Section.
- B. Coordinate Work with that of all other trades affecting or affected by Work of this Section. Cooperate with such trades to assure the steady progress of all Work under the Contract.
- C. The following items are closely related to this Work, but not included in this Section, and will be performed under the designated Sections.
1. Section 013520 – Asbestos and Other Hazardous Materials Notice

1.03 DESCRIPTION OF WORK

A. PROJECT DESCRIPTION

The Asbestos Abatement Contractor (CONTRACTOR) shall furnish all labor, materials, equipment, and services for the removal and disposal of all specified asbestos-containing materials (ACM), asbestos contaminated materials, and asbestos contaminated demolition debris, associated with the demolition activities of the Project Areas.

1. The project involves the full containment removal of all specified interior ACMs, associated wood substrates, and asbestos-contaminated surfaces/materials located throughout the Project Areas.

More specifically, the following ACM/ACM contaminated materials to be removed and disposed of as part of the scope of work:

Material Description	Location
Joint Compound	Interior Gypsum Walls
Black Sink Undercoating	Break Room Sink
Carpet Adhesive (with Residual Brown Floor Mastic)	Floor Beneath Carpet (Green)
12"x12" Gray Mottle Floor Tile	Storage Room Floor
Black Mastic associated with 12"x12" Gray Mottle Floor Tile	
Vent Mastic (Black)	Main Roof - Center (Lower Near HVAC Unit)

2. The CONTRACTOR is responsible for removing non-contaminated movable objects and

equipment within the project areas prior to abatement activities. Fixed items within project areas shall be wet wiped/decontaminated while under full containment.

3. CONTRACTOR is required to verify the quantities of materials prior to the bid deadline, including the dimensions and locations of areas requiring abatement as well as the types of materials to be abated. If further investigation time is required for the quantity verification, arrangements shall be made as needed. This estimation shall be performed prior to the submission of the bid. Bidders shall inform the ENGINEER of any discrepancies between the quantities and types of materials specified herein and those verified to be present by the Bidder. If appropriate, an adjustment shall be made as to the types and/or quantities to be included in the Bid. If no discrepancies with the types and/or quantities of materials to be abated are brought to the attention of the ENGINEER prior to the Bid due date, it will be understood that the Bidders are in agreement with the types and quantities of materials specified herein, and no change orders will be allowed for these materials if quantity discrepancies are identified after bids are received.
4. The CONTRACTOR shall include Pre-cleaning and disposal of all debris present and clean up of contaminated items shall also be conducted in each work area.
5. In the event that additional (currently obscured) types and/or quantities of materials are to be removed, the CONTRACTOR shall refer to the Unit Pricing Section for applicable unit pricing to be used in the work of this project. Unit prices shall be submitted per shift rates (8-hour) per supervisor and per each worker shown within the bid form respective of each building. For a material to be verified as an extra, the CONTRACTOR shall notify the ENGINEER of the conditions believed to warrant a claim prior to the disturbance of the material. The ENGINEER shall field verify the CONTRACTOR'S claim, and if deemed an extra, the contract price shall be adjusted by the unit price or through negotiation. No claims for any increase in the contract price shall be considered if the material has been removed by the CONTRACTOR without prior authorization by the ENGINEER.
6. The CONTRACTOR is responsible for conducting all OSHA related safety and structural investigations for general and roofing conditions within the building that could pose a hazard to their workers. The CONTRACTOR shall perform these investigations and corrective measures required to abate any unsafe conditions and protect workers during abatement activities.

B. GENERAL SCOPE OF WORK

The following is the General Scope of Work at a minimum, required to be performed by the CONTRACTOR for asbestos abatement work. The CONTRACTOR shall adhere to the Scope of Work outlined below and any additional requirements stated herein.

1. Work area preparation, including pre-cleaning, installation of critical barriers and polyethylene sheeting, construction of decontamination facilities, work area enclosures, sealing, isolation, and other activities as directed by the ENGINEER.
2. Installation and operation of HEPA filtration units sufficient to achieve a minimum of four to six air changes per hour in each containment. The exact locations of HEPA filtration units, decontamination units, and other stationary equipment shall be coordinated with the ENGINEER.
3. Removal and disposal of all specified ACMs, asbestos contaminated materials and non-ACMs as specified herein. Dispose of all specified materials and debris as asbestos waste in accordance with Connecticut regulations.
4. Pre-cleaning of all asbestos-containing debris, as necessary, in all work areas prior to abatement.
5. Encapsulation of all abated surfaces in each work area.

6. Furnishing of all labor, materials, equipment, and services required for all work included in this specification.
7. Compliance with all applicable federal, state, and local regulations, as well as, all requirements set forth in these specifications.
8. Decontamination, teardown and clean up following abatement activities.
9. Performance of any other work or activities required by this specification, applicable regulations, or as necessary to perform a complete job to the satisfaction of the ENGINEER.
10. The ENGINEER reserves the right to collect samples of any suspect ACM to verify that the asbestos has been satisfactorily removed by the CONTRACTOR in accordance with the Specifications.

C. SPECIFIC SCOPE OF WORK

The following Work shall be conducted for this project. Examine all documents pertaining to asbestos for full extent and locations of Work to be conducted.

1. General Building Areas
 - a. The CONTRACTOR is responsible for the installation of temporary lighting in all work areas (as applicable) and provide a licensed electrician to assess the facility electrical conditions for making all necessary hookups to existing power for the abatement work (if unavailable by Owner).
 - b. Remove and dispose of ACM from all specified equipment, piping, floors, walls, ceilings, and other components. Coordinate this work with other contractors at the site and the ENGINEER. Coordinate all system shutdowns with the Owner in advance.

2. (Project Areas)

All of the above-described work shall be conducted within full containment with negative pressure and three-stage decontamination unit(s), where applicable.

1.04 SEQUENCE OF WORK

The following provisions shall apply for asbestos abatement work as identified by this section. The CONTRACTOR shall apply these provisions to all work areas throughout the building.

- A. The CONTRACTOR shall decontaminate, remove, and properly dispose of all specified ACM.
- B. Prior to the commencement of the work, all stored items and general items in each area, as well as all movable furnishings and other miscellaneous items in all work areas deemed to be non-contaminated, except as noted herein, shall be removed from each work area and disposed as construction debris. All non-contaminated non-movable items in all work areas, including but not limited to electrical panels, equipment, shelving, etc. shall be covered with two (2) layers of 6-mil polyethylene sheeting and sealed with duct tape.
- C. All critical barriers shall be sealed with plywood and two (2) layers of six-mil polyethylene sheeting and negative pressure established.
- D. The CONTRACTOR shall pre-clean all floor areas, floor drains and non-movable items of any asbestos

debris present. Pre-cleaning shall include the use of wet misting, wet wiping and/or HEPA vacuuming of all affected surfaces (as applicable).

- E. All work shall take place under full containment, and all workers shall utilize appropriate protective coveralls (*i.e.*, Tyvek Disposable Suit) and, at a minimum, a half-face negative pressure respirator equipped with HEPA cartridges.
- F. All work shall be performed in accordance with all federal, state, and local regulations governing asbestos abatement. The CONTRACTOR shall assume full responsibility and liability for compliance with all applicable federal, state, and local regulations pertaining to work practices, hauling and disposal of asbestos waste, and protection of workers, visitors to the work site, and persons occupying areas adjacent to the work site.
- G. The scheduling and sequencing of the Work of this Contract shall be proposed by the CONTRACTOR for approval by the ENGINEER. Multiple and distinct phases needing separate notifications may be required.

1.05 WORK INCLUDED

The total scope of work shall not be based solely on the information provided in this specification. The CONTRACTOR is required to perform quantity take-offs and measurements of the amount of material to be removed and decontaminated using all Documentation, and based on a site visit. Work shall be based on the CONTRACTOR'S own quantity take-offs of the work required by examination of the documentation and Site conditions.

1.06 SPECIAL CONSIDERATIONS

The Owner will pay for the first set of final clearance air sampling and analyses for each work area. In the event that these analyses do not pass the clearance criteria, all subsequent air sampling and analyses for the affected work areas that need to be rerun will be paid for by the CONTRACTOR. Phase Contrast Microscopy (PCM) shall be utilized for clearance of all areas less than or equal to 1,500 square feet or 500 linear feet of ACM; otherwise, Transmission Electron Microscopy (TEM) clearance air testing will be analyzed by the TEM method in Appendix A of 40 CFR Part 763 subpart E. All additional monitoring and sampling costs will be automatically deducted from the CONTRACTOR'S contract price until the area in question passes the clearance criteria established in this section.

1.07 SUBMITTALS

- A. Before preparations are allowed to begin, the CONTRACTOR shall submit the following to the ENGINEER for approval:
 - 1. Copies of all notifications, permits, applications, licenses, and like documents required by federal, state, or local regulations obtained or submitted in proper fashion,
 - 2. CONTRACTOR'S written site-specific Health and Safety Plan that includes Hazardous Communication, Respiratory Protection, Lockout/Tagout and Confined Space Entry Programs with site-specific written plans.
 - 3. Copies of CONTRACTOR'S CTDPH licenses for asbestos,
 - 4. A sketch of the proposed containment(s) that includes all entrances, HEPA exhausts, and critical barriers,
 - 5. A proposed timetable for the complete job that shows the preparation, removal and disposal, clean up, testing, and teardown portions of the job for each work area. A critical path showing

completion dates for each area shall be included,

6. Proof of the abatement supervisor's certification and training, including the most recent refresher course completed and current CTDPH licenses for asbestos,
7. Proof of each asbestos abatement worker's certification and training, including the most recent refresher courses completed and current CTDPH licenses for asbestos,
8. Written site-specific Respiratory Protection Program for employees throughout all phases of the job, including make, model and NIOSH approval numbers of respirators to be used on this specific job,
9. Proof that the abatement supervisor and workers have been examined by a qualified physician within the past 12 months, and are capable of wearing respiratory protection and are able to perform asbestos abatement work and other related activities,
10. Proof that the asbestos abatement supervisor and workers have been fit-tested within the past twelve months for using a negative-pressure respirator equipped with HEPA filter cartridges.
11. Proposed electrical safeguards to be implemented, including but not limited to location of transformers, GFCI outlets, lighting, and power panels necessary to safely perform the job, including a description of electrical hazards safety plan for common practices in the work area,
12. A list of all equipment to be used on site, by make and model, including ventilation equipment, HEPA vacuums, etc.,
13. Chain of Command of responsibility at work site including supervisors, foreman, and competent person, their names, and resumes,
14. Proposed Emergency Plan and route of egress from work areas in case of fire or injury, including the name, directions/map and phone number of nearest medical assistance center,
15. The name and address of the CONTRACTOR'S personal air monitoring and testing laboratory including certification of Connecticut accreditation and proof of NIOSH proficiency in the asbestos Proficiency Analytical Testing (P.A.T.) Program,
16. An SDS or equivalent, in accordance with the OSHA Hazard Communication Standard (29CFR 1910.1200) for all products and materials proposed for use on the project. Include a separate attachment for each sheet indicating the specific worker protective equipment proposed for use with the material indicated. A copy of the CONTRACTOR'S complete OSHA Hazard Communication Standard will also be submitted and be kept on site at all times describing the CONTRACTOR'S Asbestos and Hazardous Materials HazCom Program,
17. A current negative exposure assessment in accordance with OSHA 1926.1101 providing recent data (less than six months old) indicating personal exposures to airborne asbestos during Class I operations for comparable workers. This data must show that workers' exposures to airborne asbestos on an eight-hour time weighted average (TWA) basis are less than 0.1 fibers per cubic centimeter of air (f/cc),
18. Any other documentation that applies and is called for by this or other sections of the specifications.
19. No work on the project will be allowed to begin until the ENGINEER, as listed herein, approves the Pre-Job Submittals. Any delay caused by the CONTRACTOR'S refusal to submit this documentation in a timely manner does not constitute a cause for change order or a time extension.

20. CONTRACTOR shall specify and submit qualification information as described herein for an on-site Supervisor who is fully qualified in all aspects of hazardous materials abatement practices and procedures, and have, in addition to the training specified elsewhere in these specifications. above, a minimum of one year experience working with hazardous materials of this nature, 8 hours training in managing hazardous waste operations, and current certification in first aid and cardiopulmonary resuscitation (CPR) by a recognized approved organization. Submit list of comparable projects that involve this type of work.
 21. Copies of appropriate medical monitoring results as required by 29 CFR 1910.120 or a notarized statement by the examining medical doctor that such examinations took place according to 29 CFR 1910.120 and when, for each employee to be used on project.
 22. Name, address, and ID number of the hazardous waste hauler(s), waste transfer route(s), and proposed disposal (incineration/recycling) site(s).
- B. Upon completion of the asbestos and hazardous materials abatement work, the CONTRACTOR shall submit the following to the OWNER and/or ENGINEER:
1. All manifests and landfill receipts detailing disposal of all asbestos and asbestos-containing waste materials generated by the work.
 2. All analytical results of personal asbestos air samples collected in accordance with OSHA regulations to verify that the 8-hour time weighted average (TWA) concentrations of asbestos fibers in the breathing zone of the workers has not exceeded the permissible exposure limit (PEL) of 0.1 f/cc.
 3. A notarized copy of the entry-exit logbook.
 4. Copies of manifests, bills of lading and receipts acknowledging disposal of all hazardous waste materials, drums, tanks and transformers from the project, showing delivery date, quantity, and appropriate signature of recycling/incineration site's authorized representative.

1.08 TRAINING AND QUALIFICATIONS

A. Worker Training

All personnel who work on this project shall be provided, at a minimum. the following training:

1. The health hazards of asbestos including the nature of asbestos related diseases, routes of exposure, known dose-response relationships, the synergistic relationship between asbestos exposure and cigarette smoking, latency periods, and health basis for standards.
2. Personal protective equipment (PPE) including the types and characteristics of respirator classes, limitations of respirators, proper selection, inspection, donning, use, maintenance and storage of respirators, field testing the face piece to face seal (positive and negative pressure fit tests), qualitative and quantitative fit testing procedures, variations between laboratory and field fit factors, factors that affect respirator fit, selection and use of disposable clothing, use and handling of washable clothing, non-skid shoes, gloves, eye protection, and hard hats.
3. Medical monitoring requirements for workers including required and recommended tests, reasons for medical monitoring and employee access to records.
4. Air monitoring procedures and requirements for workers including description of equipment and procedures, reasons for monitoring, types of samples and current standards with recommended

changes.

5. Work practices for asbestos and hazardous materials abatement including purpose, proper construction and maintenance of airtight plastic barriers, job set-up of airlocks, posting of warning signs, engineering controls, electrical and ventilation system lockout, proper working techniques, waste clean up, storage and disposal.
6. Personal hygiene including entry and exit procedures for the work area, use of showers and prohibition of eating, drinking, smoking, and chewing in the work area.
7. Special safety hazards that may be encountered including electrical hazards, air contaminants (CO, wetting agents, encapsulants), fire and explosion hazards, scaffold and ladder hazards, slippery surfaces, confined spaces, heat stress, and noise.
8. Workshops allowing both supervisory personnel and abatement workers the opportunity to observe and experience the construction of containment barriers and decontamination facilities.
9. Lockout/Tagout and Confined Space Entry procedures.

B. Site Supervisor Qualifications

1. The CONTRACTOR shall provide one Site Supervisor, whose responsibilities include coordination, safety, security, and execution of all phases of the asbestos and hazardous materials abatement project. The Site Supervisor will not be used as an abatement worker, and will be assigned full-time to the project.
2. The Site Supervisor shall be fully qualified in all aspects of asbestos and hazardous materials abatement practices and procedures, and have a one-week asbestos training course within the previous year prior to the commencement of asbestos related work. The asbestos training course will cover all topics listed above as well as training in contract specifications, liability insurance and bonding, legal considerations related to abatement, establishing respiratory protection medical surveillance programs, and EPA and OSHA record-keeping programs.
3. At least one licensed asbestos supervisor should be on site at all times who is certified in CPR and Emergency First Aid by an appropriate authority, as well as having received the required training under the OSHA Bloodborne Pathogen Standard.
4. The Site Supervisor shall be fully qualified and experienced in all aspects of hazardous waste operations to be conducted as part of this work and shall have an additional 8 hours of training in managing Hazardous Waste Operations.

1.09 REGULATORY SUBMITTALS

- A. The CONTRACTOR shall notify the following agencies in appropriate manner and place of impending work, and shall provide evidence of notifications at the pre-construction meeting:
1. U.S. EPA, Region 1
J.F. Kennedy Federal Building
Boston, MA 02203
(10 business days in advance)
 2. STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH
ASBESTOS PROGRAM
410 Capitol Avenue- MS # 51 AIR

PO BOX 340308
Hartford, CT 06134
(10 business days in advance)

3. Connecticut Department of Energy and Environmental Protection (DEEP)
Compliance Analysis & Coordination Unit
Bureau of Air Management
79 Elm Street
Hartford, CT 06106-5127
4. Local Fire and Police Departments, Building Department, and other state or city agencies as required by law or ordinance.

B. Permits

The CONTRACTOR shall be responsible for securing and paying for all necessary permits for asbestos and hazardous materials related work, including hauling, removal and disposal, building, fire, tank permits, and materials usage, Police and Fire details, or any other permits required to perform the specified work.

C. Fees, Licenses, Patents, and Copyrights

1. The CONTRACTOR shall pay all licensing fees, royalties, and other costs necessary for the use of any copyrighted or patented product, design, invention, or process in the performance of the job specified herein. The CONTRACTOR shall be solely responsible for costs, damages, or losses resulting from any infringement of these patent rights or copyrights.
2. The CONTRACTOR shall hold the Owner and the ENGINEER harmless from any costs, damages, and losses resulting from any infringement of these patent rights or copyrights.
3. If the Contract Specification requests the use of any product, design, invention, or process that requires a licensing fee or royalty fee for use in the performance of the job, the CONTRACTOR shall be responsible for the fee or royalty fee and shall disclose the existence of such rights.
4. The CONTRACTOR shall be responsible for costs of all licensing requirements, where applicable, and notification requirements and all other fees related to the CONTRACTOR'S ability to perform the work in this section.

1.10 SAFETY CONSIDERATIONS

- A. This project is subject to compliance with Public Law 91-596, "Occupational Safety and Health Act of 1970" (OSHA), with respect to all Rules and Regulations pertaining to construction, including Volume 36, Numbers 75 and 105, of the Federal Register, as amended, and as published by the U.S. Department of Labor.
- B. In addition to any detailed requirements of the Specification, the Abatement Contractor shall at their own cost and expense comply with all laws, ordinances, rules and regulations of Federal, State, Regional and Local Authorities regarding handling and storage of asbestos, lead and other hazardous waste materials.
- C. All staging and scaffolding (if needed) shall be furnished and erected by the CONTRACTOR in accordance with all applicable requirements and be maintained in safe condition at no additional cost to the Owner.
- D. The CONTRACTOR is responsible for using safe procedures to avoid electrical hazards. When a

hazard exists, work will be stopped and power will be shut off and checked before work begins again. All electrical panels and exposed wires within the work site shall be de-energized prior to the commencement of any wetting or removal operations. All extension cords and power tools used within the work area shall be attached to Ground Fault Circuit Interrupters (G.F.C.I.) in accordance with 1910.120 and the CONTRACTOR'S Lockout/Tagout and Confined Space Entry programs.

1.11 SECURITY

- A. The Owner will provide specific access as required during the project to the CONTRACTOR and personnel assigned to the project. The access shall be determined by the Owner. The CONTRACTOR will be responsible for the security of the building involved in the abatement project. The CONTRACTOR shall maintain security in the building using appropriate secure barriers and locks. It will also be the CONTRACTOR'S responsibility to allow only authorized personnel into each work area, and to secure all assigned entrances and exits at the end of the workday. Authorized personnel include licensed CONTRACTOR staff, the Owner, ENGINEER, and all other personnel with the appropriate training, medical approval, respirator fit testing, and personal protective equipment. The CONTRACTOR shall cover each window, door, grate, or other opening made by abating these components with secured plywood coverings to prevent unauthorized access into the building.
- B. Any person entering or leaving the contained areas must sign the CONTRACTOR'S bound logbook and enter the date and time. The logbook must be located immediately outside the entrance to the Decontamination Unit at all times, and be open for inspection by the ENGINEER.

1.12 REFERENCES

The following references are cited as applicable publications:

- A. Environmental Protection Agency
Asbestos Regulations (NESHAPS) Title 40 CFR Part 61, as currently amended. Guidance for Controlling Friable Asbestos Containing Materials in Buildings, Final Rule and Notice. Asbestos Hazard Emergency Response Act (AHERA) Title 40 CFR Part 763.
- B. Occupational Safety and Health Administration
Title 29 CFR 1910.1001 (amended)
Title 29 CFR 1926.1101 (amended)
Title 29 CFR 1926.62 (amended)
- C. Connecticut Department of Health (DPH)
Title 19a-CHAPTER 368I CARCINOGENIC SUBSTANCES Section 19a-332 through 19a-333
Title 20-CHAPTER 400a Asbestos Contractors and Asbestos Consultants- Section 20-435 through 20-441
Title 19a-Health and Well-being; Subtitle 19a-332a
Title 20-Professional and Occupational Licensing, Certification
- D. Connecticut Department of Energy and Environmental Protection (DEEP)
- E. U.S. Department of Transportation Regulations (49 CFR Parts 172 and 173)
- F. Toxic Substances and Control Act (TSCA) (40 CFR 761).
- G. Hazard Communication Standard (29 CFR 1926.59).
- H. Hazardous Waste Operations and Emergency Response (29 CFR 1910.120).
- I. National Contingency Plan (CERCLA, Section 105).

- J. Spill Prevention Control and Countermeasures Plan (40 CFR, Part 112).
- K. All regulations by these and other governing agencies in their most recent version are applicable. These specifications refer to many requirements found in these references, but in no way intend to cite or reiterate all provisions therein or elsewhere. It is the CONTRACTOR'S responsibility to know, understand, and abide by all such regulations and common practices.
- L. Other provisions contained in these references may, from time to time during the execution of this contract, be enforced by the ENGINEER at their own discretion.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

The CONTRACTOR shall provide new materials and new or used equipment in undamaged and serviceable condition. Only materials and equipment that are recognized as being suitable for the intended use, by compliance with appropriate standards, are to be used during the project.

A. Fire Extinguishers

The CONTRACTOR shall provide multi-purpose ABC minimum rating to A40BC fire extinguishers. The CONTRACTOR shall comply with the applicable recommendations of NFPA Standard 10 "Standard for Portable Fire Extinguishers." Fire extinguishers shall be located where they are most convenient and effective for their intended purpose, but provide not less than one extinguisher inside each work area in the Equipment Room and one outside each work area in the Clean Room.

B. Construction Lumber

Construction lumber for critical barrier walls shall consist of nominal, fire-retardant, 2" x 4" framing, sixteen inches center to center.

C. Plastic Sheeting

The CONTRACTOR shall provide non-combustible, fire-retardant, 6-mil thick clear, frosted, or black plastic sheeting in the largest size possible to minimize seams. Spray plastic will not be allowed for use on this project.

D. Adhesive Materials

The CONTRACTOR shall provide duct tape in 2" or 3" widths, with an adhesive that is formulated to aggressively stick to plastic sheeting. The CONTRACTOR may also provide spray adhesive in aerosol cans that is specifically formulated to stick tenaciously to plastic sheeting.

E. Shower Assembly

1. The CONTRACTOR shall provide a leak tight shower enclosure with integrated drain pan fabricated from fiberglass or other durable waterproof material, approximately 3' x 3' square with minimum 6' high sides and back. The CONTRACTOR shall structurally support the unit as necessary for stability and equip it with a hose bib, mounted at approximately 4'-0" above drain pan.
2. The CONTRACTOR shall provide a factory-made showerhead producing a spray of water that can be adjusted for spray size and intensity. The CONTRACTOR shall feed shower with water mixed from hot and cold supply lines, arranged so that control of water temperature, flow rate, and shutoff is from inside shower without outside aid.
3. The CONTRACTOR shall provide a totally submersible waterproof sump pump with an integral float switch. The unit shall be sized to pump two times the flow capacity of all showers or hoses supplying water to the sump, through the filters specified herein when they are loaded to the extent that replacement is required. The unit shall be capable of pumping debris, sand, plaster or other materials washed off during decontamination procedures without damage to mechanism of pump. The CONTRACTOR shall adjust float switch so that a minimum of 3" remains between top of liquid and top of sump pan.

F. Negative Air Filtration System

The CONTRACTOR shall provide air-filtering equipment capable of filtering particles to 0.3 micrometers at 99.97% efficiency and of sufficient quantity and capacity to cause a complete air change within the work area at least once every 15 minutes. Such equipment shall exhaust the filtered air so as to maintain a negative pressure inside the work area. Air shall flow in through the Decontamination Unit and exhaust through the negative air filtration unit by means of flexible duct leading outside the work area, preferably outside of the building. Negative air filtration shall be in operation at all times.

G. HEPA Vacuum

The CONTRACTOR shall utilize high efficiency filter vacuums to filter particles of 0.3 micrometers or larger at 99.97% efficiency or greater. The CONTRACTOR shall obtain HEPA vacuum attachments, such as various size brushes, crevice tools, and angular tools to be used for varied application, and service the HEPA vacuum routinely to assure proper operation. Caution shall be used any time the vacuum is opened for HEPA filter replacement or debris removal. Operators shall wear protective clothing and respirators when using the HEPA vacuum. Vacuuming by conventional means is unacceptable.

H. Amended Water

For wetting prior to disturbance of asbestos-containing materials, the CONTRACTOR shall use an amended water solution. The CONTRACTOR shall provide water to which a commercial surfactant (i.e., not dish detergent) has been added. The CONTRACTOR shall use a mixture of surfactant and water, which results in wetting of the asbestos-containing material and retardation of fiber release during disturbance of the material, equal to or greater than that provided by the use of one ounce of a surfactant, consisting of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with five gallons of water.

I. Disposal Bags

The CONTRACTOR shall provide appropriately labeled 6-mil thick leak tight plastic bags of sufficient size for application.

J. Water Service

All temporary water connections to the Owner's water source shall include back-flow protection. The CONTRACTOR shall provide heavy-duty abrasion-resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system to provide water into the work area and to the Decontamination Unit. The CONTRACTOR shall provide a UL rated 40-gallon electric hot water heater to supply hot water for each Decontamination Unit shower.

K. Electrical Service

1. The CONTRACTOR shall provide temporary power service to the Decontamination Unit sub panel with minimum 60 amp, 2 pole circuit breaker or fused disconnect connected to the auxiliary power source. The sub panel and disconnect shall be sized and equipped to accommodate all electrical equipment required for completion of the work. The CONTRACTOR shall comply with applicable NEMA, NECA, and UL standards and governing regulations for materials and layout of temporary electric service.
2. The CONTRACTOR shall provide identification-warning signs of voltage differences at power outlets that are other than 110-120 volt power and provide polarized outlets for plug-in type outlets, to prevent insertion of 110-120 volt plugs into higher voltage outlets. Dry type

transformers shall be provided where required to provide voltages necessary for work operations.

3. The CONTRACTOR shall provide receptacle outlets equipped with ground-fault circuit interrupters (GFCI), with reset button and pilot light, for plug-in connection of power tools and equipment. No electrically powered tools or equipment shall be operated without a Ground-Fault Interrupter. The CONTRACTOR shall provide the ENGINEER with documentation proving that the GFCI's are in proper working order.
4. The CONTRACTOR shall use only grounded extension cords. Use "hard-service" cords where exposed to abrasion and traffic. Single lengths of electric cord shall be used or waterproof connectors shall be used to connect separate lengths of electric cords, if single lengths will not reach areas of work.
5. The CONTRACTOR shall provide general service incandescent lamps of wattage required for adequate illumination (in accordance with OSHA 29 CFR 1910.56, "Illumination"). Lamps shall be equipped with guard cages or tempered glass enclosures where fixtures are exposed to breakage by construction operations. Exterior fixtures shall be provided where fixtures are exposed to the weather or moisture.

PART 3 - PROJECT EXECUTION

3.01 GENERAL CONSIDERATIONS

A. Approvals and Inspection

All temporary facilities, work procedures, equipment, materials, services, and agreements must strictly adhere to and meet these contract specifications along with EPA, OSHA, NIOSH, regulations and recommendations as well as any other federal, state, and local regulations. Where there exists overlap of these regulations, the most stringent one applies. All work performed by the CONTRACTOR is further subject to approval of the ENGINEER. Modifications to these isolation and sealing methods, procedures, and design may be considered if all elements of proper and safe procedures to prevent contamination and exposure can be demonstrated. Written modifications to these specifications must be provided to the ENGINEER for review and approval before they can be used for work on this project.

B. Shut Down and Lock Out Systems

Wherever possible, shut down and lock out electric power to all work areas. Provide temporary power and lighting according to these specifications. Coordinate with the Owner in advance prior to conducting shutdowns and lockouts. Whenever the work area cannot be completely de-energized, the CONTRACTOR will provide the Owner with a plan for protecting workers and electrical equipment. Shut down and lock out all heating, cooling, and air conditioning system (HVAC) components that are within, supply, or pass through the work area. This will be done with the advice and counsel of the Owner, but the CONTRACTOR is responsible to ensure all systems are shut down and it is impossible to re-energize until clearance is obtained.

1. Investigate the work area and agree on pre-abatement condition with the Owner.
2. Seal all intake and exhaust vents in the work area with tape and 2 layers of 6-mil polyethylene.
3. Seal any seams in system components that pass through the work area.
4. Remove all HVAC system filters and place in labeled, 6-mil polyethylene bags for staging and eventual disposal as asbestos-contaminated waste.

C. Barriers and Isolation Areas

1. The CONTRACTOR shall construct and maintain suitable critical barriers at the exterior and if required within the building to separate work areas. Critical barriers shall be of sufficient size and strength to prevent unauthorized persons from entering the work areas.
2. Warning signs shall be posted on all critical barriers at the commencement of the work area preparation, as required in 1926.1101 of the Occupational Safety and Health Standards. The signs shall display the proper legend in the lower panel, with letter sizes and styles of a visibility at least equal to that specified in OSHA Standard 1926.1101. The signs will read as follows:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATOR AND PROTECTIVE CLOTHING
REQUIRED IN THIS AREA

3. The signs shall be posted at the perimeters of asbestos removal, demolition or construction areas where the asbestos-containing material to be removed exists.
4. The CONTRACTOR shall maintain all temporary and critical barriers, facilities and controls as long as necessary for the safe and proper completion of the work. All containments shall consist of floors and walls covered with 2 layers of 6-mil poly sheeting, except in those instances where such floors are deemed impervious by the ENGINEER.
5. Any breaches in the containment will be corrected at the beginning of each shift and as necessary during the workday. Work will not be allowed to commence until all control systems are in place and operable.
6. No barriers shall be removed until the work areas are thoroughly cleaned and all debris has been properly bagged and removed from work areas, and the air has passed final clearance tests, in accordance with provisions detailed herein.

3.02 ACM LOCATION PREPARATION AND REMOVAL

A. Area Cleaning and Preparation

1. PRE-CLEANING: In areas designated under the Sequence of Work as having asbestos debris on surfaces, remedial cleaning will be required. Cleaning will be done using HEPA vacuums and wet methods. Pre-removal cleaning will be required in areas where visible asbestos debris is present on the floors and other surfaces as described in Section 1.0. Respiratory protection and protective clothing will be required as defined by OSHA regulation 1926.1101. All pre-cleaning will be inspected by the ENGINEER. During pre-cleaning activities, the work area shall have its primary and critical barriers in place and be under adequate negative pressure as described herein. Any changes to this shall be at the approval of the ENGINEER. It should be noted that pre-cleaning shall take place in all work areas prior to commencement of abatement. Pre-cleaning shall include wet wiping and HEPA vacuuming of the floor areas and non-movable items. In addition, all movable items deemed "contaminated" by the ENGINEER shall also be pre-cleaned.
2. PRIMARY BARRIERS: Prior to the construction of each asbestos abatement area, all primary barriers shall be sealed with a minimum of one layer of 6-mil plastic sheeting and duct tape on plywood. Primary barriers consist of all windows, vents, closed and locked doors, and openings to adjacent spaces from the work area.

B. Decontamination Unit and Procedures

1. It is the CONTRACTOR'S responsibility to ensure work areas shall be equipped with decontamination facilities consisting of: a clean room, a shower room, and an equipment room. Each room shall be separated from the other and from the work area by airlocks such as will prevent the free passage of air or asbestos fibers and shall be accessible through doorways protected with two (2) overlapping 4 mil polyethylene sheets. The clean room (or change room) shall be equipped with suitable hooks, lockers, shelves, etc. for workers to store personal articles and clothing. The shower room shall be contiguous to the clean room and equipment room. All personnel entering or leaving the work area shall pass through the shower room. The number of showers provided shall satisfy the requirements of OSHA 29 CFR 1910.141 (d) (3) (ii). Warm water shall be supplied to the showers. The equipment room (dirty room) shall be situated between the shower room and the work area, and separated from both by means of suitable barriers or overlapping flaps such as will prevent the free passage of air or asbestos fibers.
2. (b) No person or equipment shall leave the asbestos abatement project work area unless first decontaminated by showering, wet washing or HEPA vacuuming to remove all asbestos debris.

No asbestos contaminated materials or persons shall enter the clean room.

3. Where feasible, decontamination systems shall abut the work area. In situations where it is not possible, due to unusual conditions, to establish decontamination systems contiguous to the work area, personnel shall be directed to remove visible asbestos debris from their persons by HEPA-filtered vacuuming prior to donning clean disposable coveralls while still in the work area, and proceeding directly to a remote decontamination system to shower and change clothes.
4. In specific situations where the asbestos contractor determines that it is not feasible to establish a contiguous decontamination system at a work site, the asbestos contractor shall provide written notification and provide a copy to the facility owner of intent to utilize a remote decontamination system. Such systems must be operated in conformance with 29 CFR 1926.1101(j). Such notice shall be made with the notification required under Section 19a-332a-3.
5. Each room shall be separated from other rooms by a double flap of 6-mil polyethylene sheeting acting as an airlock. This shall be designed to minimize fiber migration and airflow between the decontamination unit rooms. A separate equipment and waste decontamination unit shall also be constructed. This can be adjacent to the personnel shower room.
6. The rooms shall be framed with 2" X 4" lumber, masked, sealed and attached to the entry/exit ways of asbestos/lead work areas.
7. The rooms together shall be referred to as the Decontamination Unit. A Decontamination Unit will be required for each separate containment area, if work is to be divided into sections.
8. For those areas deemed acceptable for the utilization of glovebags, a remote Decontamination Unit can be used.
9. The Equipment Room shall serve as a transfer room for decontamination procedures to occur in. This room shall be vacuumed and washed whenever necessary in order to prevent asbestos dust and debris accumulations or when required by the ENGINEER. Workers leaving the containment shall remove and dispose of disposable protective suits in the Equipment Room and proceed into the Shower Room.
10. The Shower Room shall contain an appropriate number of shower heads supplied with hot and cold water adjustable at the tap. Uncontaminated soap, shampoo, and towels shall be available at all times. The shower water shall be drained, collected, and filtered through a system with at least 5.0-micron particle size collection capability. A system containing a series of several filters with progressively smaller pore sizes shall be used to avoid rapid clogging of the filtration system by large particles. Filtered wastewater shall either be discharged in accordance with the applicable local codes or otherwise disposed of as asbestos waste. Contaminated filters shall be disposed of as asbestos waste.
11. The Clean Room shall store abatement workers' clean protective clothing and clean respirator equipment. Contaminated clothing, respirators, tools, equipment, or other materials shall not be allowed into the Clean Room or beyond. The Clean Room will serve as an access for personnel entering the work area, and for the donning of respiratory protection and protective clothing. The CONTRACTOR shall provide space in the Clean Room for the workers' personal clothing. This shall be in the form of lockable lockers.

C. HEPA Filtration

Adequate negative pressure shall be provided within the enclosure as specified below.

1. After asbestos work area is totally isolated, and prior to commencement of work, the ENGINEER will perform a visual inspection of the work area. This will consist of checking the integrity of barriers including smoke testing the containment if deemed necessary by the ENGINEER. This does not in any way relieve the CONTRACTOR'S responsibilities to ensure the isolation of the work area. The volume of air within the contained work area shall be changed a minimum of four (4) times per hour. A pressure differential reading of -0.02 inches of water shall be maintained in the negative pressure work area relative to adjacent areas. A manometer with a strip chart recorder shall be used to show that the proper pressure differential is being maintained.
2. Equipment used for producing a negative pressure work area shall have a filtering device that is at least 99.97% efficient at a 0.3-micron pore size. Filters meeting these standards are referred to as High Efficiency Particulate Absolute (HEPA) filters. The HEPA filtration units shall be equipped with the following:
 - a. Magnehelic gauge to monitor the unit's air pressure difference across the filters and be able to interpret magnehelic readings to cubic feet per minute (CPM).
 - b. An affixed label, clearly marked and conspicuous, showing the most recent installation date and hour reading of the primary internal HEPA filter.
 - c. A clock to record the unit's operation time.
 - d. Automatic shut off for filter failure or absence.
 - e. Audible alarm for unit shutdown.
 - f. Amber flashing warning light for filter loading.
 - g. The unit must be equipped with a safety system that prevents it from being operated with the HEPA filter in an improper orientation.
 - h. All flexible ducting, vent tubing, adapter plates and other equipment used for the passage of filtered air shall be undamaged, uncontaminated, and free of air leaks at all points.
3. Pre-filters shall be changed frequently during the abatement.
4. All HEPA units shall exhaust to the outside of the building.
5. Air movement shall flow uninterrupted from outside the work area through the Decontamination Unit into the work area. There shall be no other openings for air to enter the containment unless approved by the ENGINEER in writing.
6. HEPA filtration units shall be placed as far as possible from the air intake to the containment to prevent short cycling of fresh air.
7. This containment, along with the decontamination chamber, shall constitute the critical containment of the work area from the surrounding areas. All openings to this critical containment are to be sealed except where air must enter the work site due to the use of exhaust equipment.
8. Unless approved by the ENGINEER, air shall enter the critical containment only through the Decontamination Unit. A pressure differential meter will be installed and maintained. If pressure differential drops below -0.02 inches of water, stop work until proper negative pressure is restored.
9. Written modifications to these isolation and sealing methods, procedures, and design may be considered if all elements of proper and safe procedures to prevent contamination and exposure

can be demonstrated.

10. Written modifications to these specifications must be made to the ENGINEER for review before they can be used for work on this project.

D. ACM Removal

1. Asbestos removal will not begin until the ENGINEER has given authorization to proceed. This authorization will be given after the removal area has passed a visual inspection by the ENGINEER based on the criteria presented herein. The ENGINEER reserves the right to inspect the work area prior to start of abatement. The ENGINEER also reserves the right to inspect the work area at any time and to order the CONTRACTOR to stop work.
2. All ACM shall be removed utilizing full containment and negative air filtration (as appropriate).
3. All ACMs shall be sufficiently saturated/wetted to reduce fiber release so that the airborne fiber concentration does not exceed the established OSHA Permissible Exposure Limits (PEL's).
4. Dry removal will not be permitted at any time during this project.
5. All ACM shall be carefully removed and placed into double 6-mil polyethylene bags or fiber drums for disposal. All bags, containers or wrapped materials transported out of the work area shall be labeled with preprinted labels required by Federal EPA, OSHA and the Department of Transportation regulations. The name of the waste generator (Owner) and the project location address shall also be placed on each bag/drum.
6. Fine cleaning of residual asbestos-containing material shall consist of carefully scraping or brushing the material from surfaces. The recommended method for brushing a substrate after gross removal has taken place is to use a nylon brush. Wetting of the substrate shall also occur while this brushing is performed, since the chance of airborne fiber generation during fine cleaning still exists.
7. Clean-up activities shall include, but not be limited to, wet-wiping and vacuuming surfaces with a HEPA equipped vacuum. Work may continue only after the source of contamination is identified, corrected, and proper cleaning activities are implemented.
8. After brushing and scraping, surfaces shall be free of visible debris and fibers. A final wipe-down of the substrate with wet, lint-free cloths shall take place in order to ensure proper cleaning. All surfaces including floors, walls, and ceilings shall also be HEPA vacuumed clean.
9. All visible ACM is to be removed by the CONTRACTOR before encapsulation procedures are allowed to begin. The ENGINEER will conduct an inspection of the work area prior to giving approval to begin encapsulation of the work area. The removal substrate must be clean and bare, and the entire work area must be free and clear of any suspect material for the CONTRACTOR to pass this visual inspection and begin encapsulation.

E. Encapsulation Procedures

1. The polyethylene barriers shall be cleaned of gross contamination before a lockdown sealant can be applied to the substrate.
2. After the substrate has been cleaned and all polyethylene barriers of the work area are cleaned of visible debris, the CONTRACTOR shall request a visual inspection of the work area by the Engineer.

3. Workers performing lockdown must wear disposable protective clothing and respirators suitable for asbestos. The encapsulation process shall not be treated any differently from the removal process in this respect.
4. All surfaces from which ACMs have been removed shall be encapsulated. A minimum of one coat of lockdown encapsulant will be applied to both the substrate and the polyethylene sheeting serving as the containment barrier. If the lockdown material is being applied to irregular, grooved, or corrugated surfaces, it shall be administered from the opposing side, or at a right angle to the direction of the previous application.
5. The encapsulant shall be left to dry before the commencement of final air testing. After final clearance and inspection criteria have been met, the CONTRACTOR shall begin final take-down procedures.

F. Removal of Critical Barriers

1. No critical barrier shall be taken down until the final visual inspection and final clearance air tests are found to be below 0.010 fibers/cc by TEM or PCM (where applicable).
2. After a successful final visual inspection, encapsulation, and a successful final air test, the CONTRACTOR shall conduct the post abatement takedown.
3. All encapsulated polyethylene sheeting removed during takedown/used in the construction of the Decontamination Unit and Containment Area shall be bagged and disposed of as asbestos contaminated waste.
4. Areas exposed during this process shall be examined for traces of suspect material.
5. If any suspect material is found, it must be cleaned up by HEPA vacuuming and wet cleaning, and a coat of encapsulant shall be applied to the affected areas. Based on the amount of suspect material found, the Owner's Project Monitor and/or representative may request the use of misters in the surrounding area.
6. The CONTRACTOR will then implement the use of misters as a precautionary measure.

3.03 DISPOSAL OF ASBESTOS WASTE

- A. All waste removal procedures shall be conducted in accordance with local, state and federal regulations.
- B. The CONTRACTOR shall provide proof that disposal sites for all waste materials have current and valid permits to accept specific wastes at the time of the pre-construction meeting.
- C. Receipts shall be obtained by the CONTRACTOR from the disposal/recycling site(s), and submitted to the Engineer upon request for final payment.
- D. Warning labels having permanent, waterproof print and adhesive shall be affixed to all asbestos bags, trucks, drums (lids and sides), and other containers used to store and/or transport asbestos-containing material. Labels must be conspicuous and legible and contain the following warning:

CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

- E. The CONTRACTOR shall be responsible for all necessary precautions to prevent pollution by spilling

during the performance of services and shall assume full responsibility for all CONTRACTOR-caused spills, which shall be cleaned up at the CONTRACTOR'S expense.

- F. Temporary storage of asbestos waste on-site (inside) will be allowed in designated non-work areas only.

3.04 HOUSEKEEPING

- A. Throughout the work period, the CONTRACTOR shall maintain the building and site in a standard of cleanliness as specified throughout these specifications.
 - 1. Contaminated disposable clothing, respirator filters, and other debris shall be bagged and sealed at the end of each workday.
 - 2. All asbestos generated by either removal or repair shall be bagged immediately and not be allowed to be left exposed at the end of each workday.
 - 3. Respirators shall be thoroughly cleaned at the end of each workday and stored for the next days use.
 - 4. The CONTRACTOR shall retain all stored items in an orderly arrangement allowing maximum access, not impeding traffic, and providing the required protection materials.
 - 5. The CONTRACTOR shall not allow the accumulation of scrap, debris, waste material, and other items not required for completion of the work.
 - 6. The CONTRACTOR shall provide adequate storage for all items awaiting removal from the job site, observing all requirements for fire protection and protection of the environment.
 - 7. Daily, and more often if necessary, the CONTRACTOR shall inspect the work areas and adjoining spaces, and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.
 - 8. The CONTRACTOR shall maintain the site in a neat and orderly condition at all times.

3.05 QUALITY CONTROL

- A. Many references to Owner may in fact be managed by the ENGINEER in lieu of the Owner, at the Owner's request, and the CONTRACTOR is required to regard the requests and interpretations of the ENGINEER as having full force unless expressly informed otherwise by the Owner.
- B. Clearance Air Monitoring
 - 1. NOTE: Encapsulation on all surfaces (horizontal & vertical) must be dry prior to final air sampling.
 - 2. The air clearance acceptance criteria for this project is <0.010 fibers per cubic centimeter of air (f/cc) by Phase Contrast Microscopy (PCM) using the NIOSH 7400 Method for containments/asbestos abatement less than 1,500 SF/600 LF, otherwise, Transmission Electron Microscopy (TEM) air testing using the AHERA (40 CFR Part 763, Appendix A, Subpart E) Method will be utilized.
 - 3. A sufficient number of samples to reliably characterize the workplace air quality will be taken. Air will be agitated by means of a small leaf blower prior to the test and kept agitated by means of a small electric fan. The results of all samples must comply with the regulations set forth in

this specification. Failure to meet the specified criteria will require the CONTRACTOR to reclean the designated work site and then the ENGINEER to repeat the final air clearance testing. All repeat air testing shall be the CONTRACTOR'S financial responsibility. Cleaning and testing will be repeated until the specified criteria are met.

3.06 PERSONAL PROTECTION

A. Respirators and Protective Clothing

1. Protective Clothing

- a. Personal protection, in the form of disposable Tyvek suits, and NIOSH approved respirators, are required for mechanics, CONTRACTOR supervision, Owner, ENGINEER, and visitors at the work site during the set-up, removal, and cleaning operations.
- b. The CONTRACTOR shall provide all this protective equipment for workers, Owner, ENGINEER, and authorized personnel to access this work site.
- c. Each worker shall be supplied with a minimum of two complete disposable uniforms every day.
- d. Removal workers shall not be limited to two uniforms, and the CONTRACTOR will be required to supply additional uniforms as is necessary. Under no circumstances will anyone entering the removal area be allowed to reuse a contaminated uniform.
- e. Work clothes shall consist of disposable full body suits, head covers, gloves, footwear, and eye protection. Street clothes are forbidden in the work area at all times, even under protective suits.

2. Respiratory Protection

- a. The CONTRACTOR shall supply workers and supervisory personnel with NIOSH approved protective respirators and HEPA filters.
- b. Appropriate respirator selection shall be determined by the daily personal samples being taken and strictly follow the guidelines set forth in the OSHA respiratory program 29 CFR 1910.134 and the Connecticut CTDPH Regulations 453 CMR 6.00. The respirators shall be sanitized and maintained according to the manufacturer's specifications. Appropriate respirators shall be selected using the information provided in OSHA Title 29 CFR Part 1910.1926 Final Rules. This determination has been made for this project. The CONTRACTOR shall utilize full-face PAPR respirators equipped with HEPA filters for all work. Disposable respirators shall not be considered acceptable in any circumstance.
- c. The CONTRACTOR will maintain on site a sufficient supply of disposable HEPA filters to allow workers and supervisory personnel to change contaminated filters at least three (3) times daily. The CONTRACTOR is solely responsible for means and methods used and for compliance with applicable regulations.
- d. Respirators shall be individually assigned to removal workers for their exclusive use.
- e. All respiratory protection shall be provided to workers in accordance with the written submitted respiratory protection program, which includes all items in OSHA 29 CFR 1910.134 (b) (1-11). A copy of this program shall be kept at the work site, and shall be posted in the Clean Room of the Decontamination Unit.
- f. Workers must perform negative and positive pressure fit tests each a time a respirator is put on, whenever the respirator design permits.
- g. Workers shall be given a qualitative fit test in accordance with procedures detailed in the OSHA 29 CFR 1910.1025, Appendix D, Qualitative Fit Test Protocols, for all respirators to be used on this abatement project. An appropriately administered quantitative fit test may be substituted for the qualitative fit test.
- h. Upon leaving the active work area, the pre-filter shall be discarded, cartridges

removed, and respirators cleaned in disinfectant solution and clean water rinse. Clean respirators shall be stored in plastic bags when not in use. The CONTRACTOR shall inspect respirators daily for broken, missing, or damaged parts.

3. Personal Sampling

- a. The CONTRACTOR shall provide daily personal sampling to check personal asbestos exposure levels for the purpose of establishing respiratory protection needs.
- b. Samples shall be taken for the duration of the work shift or for eight hours, whichever is less.
- c. Personal samples need not be taken every day after the first day if working conditions remain consistent, but must be taken every time there is a change in the removal operation, either in terms of the location or the type of work, or during any changes in personnel. Sampling will be to determine eight-hour Time Weighted Averages (TWA). The CONTRACTOR is responsible for personal sampling as outlined in OSHA Standard 1926.1101.
- d. Sampling personnel shall be proficient in the taking of asbestos air samples as prescribed by NIOSH 7400, and must be supervised by an individual who has completed the NIOSH 582, or equivalent, training course.
- e. Asbestos air sampling results shall be available for posting at the job site in written form no more than twenty-four (24) hours after the completion of a sampling cycle. The document shall list each sample's result, sampling time and date, individual monitored, flow rate, sampling duration, microscope field area, number of fibers per fields counted, cassette size, and analyst's name and company. Air sample analysis results will be reported in fibers per cubic centimeter.

END OF SECTION

SECTION 024118 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.
4. Demolition of removal of below-grade construction.
5. Disconnecting capping or sealing, and removing site utilities where indicated on the drawings.
6. Salvaging items for reuse by Owner.
7. Hazardous materials abatement as specified in the following sections:
 - a. McMahon – 020800 – Asbestos Abatement.

B. Related Requirements:

1. Section 015639 "Temporary Tree and Plant Protection" for temporary protection of existing trees and plants that are affected by selective demolition.
2. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade improvements not part of selective demolition.

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged by the Owner.
- B. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

1.3 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, commemorative trees, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1.4 MEETINGS

- A. Predemolition Conference: Conduct conference at the Project site.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.6 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.7 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.8 FIELD CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- B. Hazardous Materials: May be present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials was prepared by SLR , 45 Glastonbury Blvd., 1st Floor, Glastonbury, CT 06033, telephone 860-400-5680. and is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 1. Hazard Materials Survey, McMahon Wintonbury Library, 1015 Blue Hills Ave., Bloomfield, CT 06002, Prepared for the Town of Bloomfield, April 15, 2002, by SLR.
 2. Phase I Environmental Site Assessment, 1015 Blue Hills Avenue, Bloomfield, CT Prepared for the Town of Bloomfield, April, 2022, by SLR.
 3. Phase II Environmental Site Investigation, 1015 Blue Hills Avenue, Bloomfield, CT Prepared for the Town of Bloomfield, June, 2022, by SLR.
 4. Fig. 3 Aerial Map, Proposed Phase II Soil Samples, Phase I Environmental Site Assessment, Town of Bloomfield, P. Faith McMahon Library, 1015 Blue Hills Avenue, Bloomfield, CT.

- C. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- D. Storage or sale of removed items or materials on-site is not permitted.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

3.2 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off utilities with utility companies.
 - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain fire watch during and for at least a period required by the Fire Marshal after flame-cutting operations.
 - 6. Maintain adequate ventilation when using cutting torches.
 - 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 - 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

10. Dispose of demolished items and materials promptly.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area.
5. Protect items from damage during transport and storage.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements of "Construction Waste Management and Disposal" specified elsewhere in the Project Manual.

B. Burning: Do not burn demolished materials.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024118

SECTION 033000 - 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. Foundation walls.
 - 3. Slabs-on-grade.
 - 4. Concrete toppings.
- B. Related Sections:
 - 1. Division 03 Section "Architectural Concrete" for general building applications of specially finished formed concrete.
 - 2. Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.
 - 3. Division 32 Section "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 SUBMITTALS

- B. Product Data: For each type of product indicated.
- C. Shop Drawings
 - 1. Submit shop drawings of all members to be furnished. Detail drawings of the members and their connections shall follow standard practice as set forth in the AISC "Manual of Structural Steel Detailing" (Second Edition). In particular, welding shall be shown, using standard AWS welding symbols. Show on detail drawings the paint to be used.

2. Shop drawings will not be accepted for review by the Engineer unless there is substantial evidence that the General Contractor or Construction Manager on the project has reviewed the submittal for compliance with the contract documents and has addressed questions to be responded to by the Contractor. All coordination items with other trades and submittals are to be performed and the submittal marked accordingly before submission. Failure to provide the above will result in the submittal being returned and not reviewed.
3. Contractor shall perform review and schedule shop drawing submittals to permit a minimum of 15 calendar days for review by the Engineer. Shop Drawings will be returned to the Architect for their required review and processing.
4. Shop drawings will not be reviewed unless accompanied by erection drawings which locates and identifies the members. Copies or reproductions of contract drawings will not be accepted or reviewed as shop drawings.
5. Shop drawings shall be submitted in the form of an electronic file (PDF).
6. The following is the definitions for the Shop Drawing stamp disposition:

No Exceptions Taken - Re-submission is not required unless document is revised.

Make Corrections Noted - If checked, fabrication may be undertaken. Contractor is responsible for making noted corrections. Re-submission of record copies are required.

Revise and Resubmit - If checked, fabrication may not be undertaken. Resubmit corrected copies for final review, with all changes clouded.

Rejected - Resubmit for review.

Reviewed – Reviewed for general compliance with the structural Contract Documents. Proprietary items or items designed by Others are reviewed only and shall not be approved by MHAI. Resubmission is not required.

Corrections or comments made on shop drawings during this review do not relieve the Contractor from compliance with the requirements of the project drawings and specifications. This check is only for the review of general conformance with the information given in the Contract Documents. The Contractor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes, techniques and sequence of construction, coordinating his work with that of other trades, and performing his work in accordance with OSHA requirements and other sections of the Project Specifications.

- D. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- E. 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.

- 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. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Steel reinforcement and accessories.
 - 4. Fiber reinforcement.
 - 5. Waterstops.
 - 6. Curing compounds.
 - 7. Floor and slab treatments.
 - 8. Bonding agents.
 - 9. Adhesives.
 - 10. Vapor retarders.
 - 11. Semi-rigid joint filler.
 - 12. Repair materials.
- H. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Aggregates.
- I. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- J. Field quality-control reports.
- K. Minutes of pre-installation conference.
- L. CT HPB documentation:
 - 1. For all installed products and materials of the Section, submit the following information:
 - a. Cost breakdowns for the materials included in the Contractor or subcontractor's work. Cost breakdowns shall include total installed cost and material-only cost.
 - b. The percentages (by weight) of post-consumer and/or pre-consumer recycled content in the supplied product(s).
 - c. Indication of location (city, state) of the manufacturing location of the supplied product(s) and the distance from the project site.
 - d. Indication of location (city, state) of the extraction, harvest or recovery location of the raw materials used to manufacture the supplied product(s) and the distance from the project site.
 - 2. For all field-applied adhesives, sealants, paints and coatings relating to work of this Section, indicate the Volatile Organic Compound (VOC) content in grams/liter and whether the product meets the requirements of the California Department of Health Services (CDHS) Standard Practice for the Testing of Volatile Organic Emissions from Various

Sources Using Small Scale Environmental Chambers, including 2004 Addenda.

3. Provided cut sheets with the Contractor's or subcontractor's stamp, confirming that the submitted products are the products installed in the Project.

1.6 QUALITY ASSURANCE

- A. **Installer Qualifications:** A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. **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."
- C. **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 conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 2. 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.
- D. **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.
- 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. **Concrete Testing Service:** Owner will engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- G. **Preinstallation Conference:** Conduct conference at Project site.
 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.

- c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor.
 - e. Special concrete finish subcontractor.
- 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

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.
 - 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 - c. Structural 1, B-B or better; mill oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- 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. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- D. 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.

- E. 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: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 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, deformed bars, assembled with clips.
- D. Deformed-Steel Wire: ASTM A 496/A 496M.
- E. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.
- F. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884/A 884M, Class A coated, Type 1, plain steel.

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. Epoxy-Coated Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, ASTM A 775/A 775M epoxy coated.
- 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.
 - 3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150 Type I/II, gray
- B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source[with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials].
 - 1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. 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. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.6 WATERSTOPS

- A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch (19 by 25 mm).
 - 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. Carlisle Coatings & Waterproofing, Inc.; MiraSTOP.
 - b. CETCO; Volclay Waterstop-RX.
 - c. Concrete Sealants Inc.; Conseal CS-231.
 - d. Greenstreak; Swellstop.
 - e. Henry Company, Sealants Division; Hydro-Flex.
 - f. JP Specialties, Inc.; Earth Shield Type 20.

2.7 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A. 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. Carlisle Coatings & Waterproofing, Inc.; Blackline 400.
 - b. Fortifiber Building Systems Group; Moistop Ultra 15.
 - c. Grace Construction Products, W. R. Grace & Co.; Florprufe 120.
 - d. Raven Industries Inc.; Vapor Block 15.
 - e. Stego Industries, LLC; Stego Wrap 15 mil Class A.

2.8 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.
- B. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Euco Chemical Co.; Euco Diamond Hard
 - 2. Dayton Superior Corporation; Day-Chem Sure Hard.
 - 3. BASF Chemical Company; Kure-N-Harden.

2.9 CURING MATERIALS

- A. 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.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.

2.10 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- D. 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.

2.11 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 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 at 28 days when tested according to ASTM C 109/C 109M.

2.12 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: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 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 high-range water-reducing or plasticizing 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, and concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings and foundation walls: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 4500 psi at 28 days.
 2. Maximum Water-Cementitious Materials Ratio: 0.45.
 3. Slump Limit: 4 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
 4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
- B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 3500 psi at 28 days.
 2. Water/ Cement ratio not to exceed 0.50.
 3. Slump Limit: 4 inches, plus or minus 1 inch.
 4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.14 FABRICATING REINFORCEMENT

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

2.15 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete per ASTM C 94 and ASTM C 1116, 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.

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 for smooth-formed finished surfaces.
 2. Class B, 1/4 inch 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. Do not 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 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.

- 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 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.5 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.
- 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.

3.6 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 30 feet maximum. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- 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 depth of concrete thickness slabs for typical slabs and a maximum of 1" for with embedded piping for radiant heat:
1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch 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 or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 Section "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 diamond dowel and support assemblies at joints where indicated.
- 3.7 WATERSTOPS
- A. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.
- 3.8 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. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. 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 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.
- E. 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.
- F. 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.
- G. 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.

3.9 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, to receive a rubbed finish.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
- D. 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.

3.10 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, 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 in one direction.
 1. Apply scratch finish to surfaces indicated and to receive concrete floor toppings.

- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening 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):
 - 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 typical slabs-on-grade.
 - 3. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch.
- 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.

3.11 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: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.12 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 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.

3.13 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
 - 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.

2. Do not apply to concrete that is less than seven days' old.
 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

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: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:
1. Steel reinforcement placement.
 2. Verification of use of required design mixture.
 3. Concrete placement, including conveying and depositing.

4. Curing procedures and maintenance of curing temperature.
- 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.
 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.
 - 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.
 3. 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.
 4. 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.
 5. 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.
 6. 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.
 7. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
 8. 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.
 9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 10. 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).

11. 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.
 12. 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.
 13. 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.
 14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 15. 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.

3.17 PROTECTION OF LIQUID FLOOR TREATMENTS

- A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 033000

SECTION 051200 – 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 Sections:

- 1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
 - 2. Division 05 Section "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
 - 3. Division 05 Section "Steel Decking" for field installation of shear connectors through deck.
 - 4. Division 05 Section "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications and other metal items not defined as structural steel.
 - 5. Division 05 Section "Metal Stairs."

1.4 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.5 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering design by a qualified professional engineer licensed in the State of Connecticut, 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 ASD; data are given at service-load level.

- B. Moment Connections: Type FR, fully restrained and designed by a qualified professional engineer licensed in the State of Connecticut.
- C. Brace Frame Connections: Design for loading given on the drawings. Connections shall be designed by a qualified professional engineer licensed in the State of Connecticut.

1.6 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 pretensioned and slip-critical high-strength bolted connections.
 - 5. Identify members and connections of the seismic-load-resisting system.
 - 6. For structural-steel connections indicated to comply with design loads, include structural design data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 7. Submit shop drawings of all members to be furnished. Detail drawings of the members and their connections shall follow standard practice as set forth in the AISC "Manual of Structural Steel Detailing" (Second Edition). In particular, welding shall be shown, using standard AWS welding symbols. Show on detail drawings the paint to be used.
 - 8. Shop drawings will not be accepted for review by the Engineer unless there is substantial evidence that the General Contractor or Construction manager on the project has reviewed the submittal for compliance with the contract documents and has addressed questions to be responded to by the Contractor. All coordination items with other trades and submittals are to be performed and the submittal marked accordingly before submission. Failure to provide the above will result in the submittal being returned and not reviewed.
 - 9. Contractor shall perform review and schedule shop drawing submittals to permit a minimum of 15 calendar days for review by the Engineer. Shop Drawings will be returned to the Architect for their required review and processing.
 - 10. Shop drawings will not be reviewed unless accompanied by erection drawings which locates and identifies the members. Copies or reproductions of contract drawings will not be accepted or reviewed as shop drawings.

11. Shop drawings shall be submitted in the form of 1 reproducible plus 2 prints. Electronic submittals will be acceptable.
12. The following is the definitions for the Shop Drawing stamp disposition:

No Exceptions Taken - Re-submission is not required unless document is revised.

Make Corrections Noted - If checked, fabrication may be undertaken. Contractor is responsible for making noted corrections. Re-submission of record copies are required.

Revise and Resubmit - If checked, fabrication may not be undertaken. Resubmit corrected copies for final review, with all changes clouded.

Rejected - Resubmit for review.

Corrections or comments made on shop drawings during this review do not relieve the Contractor from compliance with the requirements of the project drawings and specifications. This check is only for the review of general conformance with the information given in the Contract Documents. The Contractor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes, techniques and sequence of construction, coordinating his work with that of other trades, and performing his work in accordance with OSHA requirements and other sections of the Project Specifications.

- 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. Qualification Data: For qualified Installer and fabricator. Welding certificates.
- E. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- F. Mill test reports for structural steel, including chemical and physical properties.
- G. 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.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE.
- C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P2.
- D. 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. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
- E. 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.

1.9 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' 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.
- C. Tolerances: Structural steel fabricator shall coordinate with the requirements for tolerances as required by the selected building finish systems, and to construct to those tolerances if they are stricter than the AISC standards.

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 35 percent.
- B. W-Shapes: ASTM A 992.
- C. Channels, Angles: ASTM A 36.
- D. Plate and Bar: ASTM A 36.
- E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- F. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
 - 1. Finish: Black except where indicated to be galvanized.
- G. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.
- H. Steel Forgings: ASTM A 668/A 668M.
- I. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436 , Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.
- B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, 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, compressible-washer type with plain finish.
 - C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436 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 finish.
 - D. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
 - E. Unheaded Anchor Rods: ASTM F 1554, Grade 36
 1. Configuration: Straight.
 2. Nuts: ASTM A 563 heavy-hex carbon steel.
 3. Plate Washers: ASTM A 36 carbon steel.
 4. Washers: ASTM F 436, Type 1, hardened carbon steel.
 5. Finish: Plain
 - F. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
 1. Nuts: ASTM A 563 heavy-hex carbon steel.
 2. Plate Washers: ASTM A 36 carbon steel.
 3. Washers: ASTM F 436, Type 1, hardened carbon steel.
 4. Finish: Plain or Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
 - G. Threaded Rods: ASTM A 36.
 1. Nuts: ASTM A 563 heavy-hex carbon steel.
 2. Washers: ASTM A 36/A 36M carbon steel.
 3. Finish: Plain.
 - H. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.
 - I. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.
- 2.3 PRIMER
- A. Primer: Comply with Division 09 painting Sections and Division 09 Section "High-Performance Coatings."
 - B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
 - C. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

2.4 GROUT

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

2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "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, 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."
- 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. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural steel. Straighten as required to provide uniform, square, and true members in completed wall framing.
- H. Welded Door Frames: Build up welded door frames attached to structural steel. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches (250 mm) o.c. unless otherwise indicated.
- I. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members..
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.

2. Baseplate 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.

2.6 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: Slip critical.
- 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 will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 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 to be high-strength bolted with slip-critical connections.
 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 1. SSPC-SP 2, "Hand Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils (0.038 mm).

2.8 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 will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
 - 2. Galvanize lintels shelf angles and welded door frames attached to structural-steel frame and located in exterior walls.

2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
 - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected 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 will not be accepted.
 - 3. Ultrasonic Inspection: ASTM E 164.
 - 4. Radiographic Inspection: ASTM E 94.
- E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - 1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with 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 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 Bearing 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 baseplate.
 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 to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges." Level and plumb individual members of structure within specified AISC tolerances, unless stricter tolerances are otherwise required by finish building systems being provided on the project. Contractor is responsible to coordinate all construction tolerances, and to construct to the tolerances as required with all the selected building finish systems supported by or adjacent to the structural steel.
- 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 will be 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 unless approved by Engineer. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- 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 or Slip critical.
- 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. Comply with AISC 303 and AISC 360 for 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 will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
 - 1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.

- D. In addition to visual inspection, test and inspect field-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 on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup Painting: Cleaning and touchup painting are specified in Division 09 painting Sections.

END OF SECTION 051200

SECTION 051250 -ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes requirements regarding the appearance and surface preparation of Architecturally Exposed Structural Steel. (AESS). Refer to division 5 section 'Structural Steel' for all other requirements regarding steel work not included in this section. This section applies to any members noted on Architectural and Structural drawings as AESS.[and in the areas defined as AESS below]
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section "Quality Control" for independent testing agency procedures and administrative requirements.
 - 2. Division 5 Section "Structural Steel"
 - 3. Division 5 Section "Metal Decking" for erection requirements relating to exposed steel decking and its connections
 - 4. Division 5 Section "Metal Fabrications" for loose steel bearing plates and miscellaneous steel framing.
 - 5. Division 9 Section "Painting" for finish coat requirements and coordination with primer and surface preparation specified in this section.

1.3 SUBMITTALS

- A. General: Submit each item below per the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of product specified.
- C. Shop Drawings
 - 1. Submit shop drawings of all members to be furnished. Detail drawings of the members and their connections shall follow standard practice as set forth in the AISC "Manual of Structural Steel Detailing" (Second Edition). In particular, welding shall be shown, using standard AWS welding symbols. Show on detail drawings the paint to be used.

2. Shop drawings will not be accepted for review by the Engineer unless there is substantial evidence that the General Contractor or Construction Manager on the project has reviewed the submittal for compliance with the contract documents and has addressed questions to be responded to by the Contractor. All coordination items with other trades and submittals are to be performed and the submittal marked accordingly before submission. Failure to provide the above will result in the submittal being returned and not reviewed.
3. Contractor shall perform review and schedule shop drawing submittals to permit a minimum of 15 calendar days for review by the Engineer. Shop Drawings will be returned to the Architect for their required review and processing.
4. Shop drawings will not be reviewed unless accompanied by erection drawings which locates and identifies the members. Copies or reproductions of contract drawings will not be accepted or reviewed as shop drawings.
5. Shop drawings shall be submitted in the form of an electronic file (PDF) plus 1 print.
6. The following is the definitions for the Shop Drawing stamp disposition:

No Exceptions Taken - Re-submission is not required unless document is revised.

Make Corrections Noted - If checked, fabrication may be undertaken. Contractor is responsible for making noted corrections. Re-submission of record copies are required.

Revise and Resubmit - If checked, fabrication may not be undertaken. Resubmit corrected copies for final review, with all changes clouded.

Rejected - Resubmit for review.

Reviewed – Reviewed for general compliance with the structural Contract Documents. Proprietary items or items designed by Others are reviewed only and shall not be approved by MHAI. Resubmission is not required.

Corrections or comments made on shop drawings during this review do not relieve the Contractor from compliance with the requirements of the project drawings and specifications. This check is only for the review of general conformance with the information given in the Contract Documents. The Contractor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes, techniques and sequence of construction, coordinating his work with that of other trades, and performing his work in accordance with OSHA requirements and other sections of the Project Specifications.

- D. Qualification data for firms and persons specified in the ‘Quality Assurance’ Article to demonstrate their capabilities and experience. Include lists of completed projects names and address, names and addresses of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: In addition to those qualifications listed in Division 5 Section 'Structural Steel', engage a firm experienced in fabricating AESS similar to that indicated for this Project with a record of successful in-service performance, as well as sufficient production capacity to fabricate AESS without delaying the Work.
- B. Erector Qualifications: In addition to those qualifications listed in Division 5 Section 'Structural Steel', engage an experienced Erector who has completed AESS work similar in material, design, and extent to that indicted for this Project and with a record of successful in-service performance.
- C. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC "Code of Standard Practice," latest edition, Section 10 as amended herein.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver AESS to Project site in such quantities and at such times to ensure continuity of installation.
- B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. Use special care in handling to prevent twisting or warping of AESS members.
- C. Erect pre-painted finish pieces using padded slings or other methods such that they are not damaged. Provide padding as required to protect while rigging and aligning member's frames. Weld tabs for temporary bracing and safety cabling only at points concealed from view in the completed structure or where approved by the Architect during the pre-installation meeting. Methods of removing temporary erection devices and finishing the AESS members shall be approved by the Architect prior to erection.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Where AESS is indicated to fit against walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.

1.7 COORDINATION

- A. Coordinate installation of anchors for AESS members that connect to the work of other trades. Furnish setting drawings, templates, and directions for installing anchors, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to the project site in time for installation. [Anchorage concepts shall be as indicated on drawings and approved on final shop drawings.]

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Meet requirements Division 5 Section 'Structural Steel' as amended below.
- B. High-Strength Bolts, Nuts, and Washers: Per section 05120 heavy hex heads and nuts Provide rounded bolt heads with twist off bolts. Provide standard carbon steel Mechanically galvanized finish.

2.2 PRIMERS

- A. Compatibility: The General Contractor shall submit all components/procedures of the paint system for AESS as a single coordinated submittal. As a minimum identify required surface preparation, primer, intermediate coat (if applicable) and finish coat. All of the items shall be coordinated with the finish coat specified in division 9.
- A. Primer: Fast curing, universal modified alkyd, rust inhibiting shop coat with good resistance to normal atmospheric corrosion. Primer shall comply with all federal standards for VOC, lead and chromate levels

2.3 FABRICATION

- A. Fabricate and assemble AESS in the shop to the greatest extent possible. Locate field joints in AESS assemblies at concealed locations or as approved by the Architect. Detail AESS assemblies to minimize field handling and expedite erection.
- B. Fabricate AESS with exposed surfaces smooth, square and of surface quality consistent with the approved mock up. Use special care in handling and shipping of AESS both before and after shop painting.
- C. In addition to special care used to handle and fabricate AESS, employ the following fabrication techniques.
 - 1. Fabrication Tolerance: Fabricate steel to one half the normal tolerance as specified in the Code of Standard Practice section 10.
 - 2. Welds ground smooth: Fabricator shall grind welds of AESS smooth. For groove welds, the weld shall be made flush to the surfaces each side and be within + 1/16", - 0" of plate thickness.
 - 3. Contouring and blending of welds: Where fillet welds are indicated to be ground contoured, or blended, oversize welds as required and grind to provide a smooth transition and match profile on approved mock-up.
 - 4. Continuous Welds: Where welding is noted on the drawings, provide continuous welds of a uniform size and profile.
 - 5. Minimize Weld Show Through: At locations where welding on the far side of an exposed connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.]

6. Coping and Blocking Tolerance: Maintain a uniform gap of $1/8" \pm 1/32$ at all copes and blocks].
7. Joint Gap Tolerance: Maintain a uniform gap of $1/8" \pm 1/32$
8. Piece Marks Hidden: Fabricate such that piece marks are fully hidden in the final structure or made with such media to permit full removal after erection.]
10. Mill Mark Removal: Fabricator shall deliver steel with no mill marks (stenciled, stamped, raised etc) in exposed locations. Mill marks shall be omitted by cutting of mill material to appropriate lengths where possible. Where not possible, the fabricator may fill and/or grind to a surface finish consistent with the approved mock up.]
11. Grinding of sheared edges: Fabricator shall grind all edges of sheared, punched or flame cut steel to match approved mockup.]
12. Rolled Members: Member specified to be rolled to a final curved shape shall be fully shaped in the shop and tied during shipping to prevent stress relieving. Distortion of the web or stem and of outstanding flanges or legs of angles shall be visibly acceptable to the Architect from a distance of 20 feet under any lighting condition determined by the Architect. Tolerances for the vertical and horizontal walls of rectangular HSS members after rolling shall be the specified dimension $\pm 1/2"$.
13. Seal Welds: Seal weld open ends of round and rectangular hollow structural section with $3/8"$ closure plates. Provide continuous, sealed welds at angle to gusset plate connections and similar locations where AESS is exposed to weather.

2.4 SHOP CONNECTIONS

- A. Bolted Connections: Make in accordance with Section 05120. Provide bolt type and finish as noted herein and align bolt heads as indicated on the approved shop erection drawings.
- B. Weld Connections: Comply with AWS D1.1 and Section 05120. Appearance and quality of welds shall be consistent with the mock up. Assemble and weld built-up sections by methods that will maintain alignment of members without warp exceeding the tolerance of this section.

2.5 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.
 2. Surfaces to be field welded.
 3. Surfaces to be high-strength bolted with slip-critical connections, if primer does not meet the specified AISC slip coefficient.

- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare surfaces according to SSPC Specifications as follows:
 - 1. SSPC-SP 3 "Power Tool Cleaning.
 - 2. SSPC-SP 6 "Commercial Blast Cleaning" at all columns exposed to view in finished architecture.
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions to provide a dry film thickness of not less than 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop primer to surfaces that are inaccessible after assembly or erection.

2.6 GALVANIZING

- A. Hot-Dip Galvanized Finish: Refer to section 050513 for Color Galv requirements. Fabricate such that all connections of assemblies are made in the field with bolted connections. Provide galvanized finish on members and assemblies within the range of color and surface textures presented in the mock ups.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. The erector shall check all AECS members upon delivery for twist, kinks, gouges or other imperfections which may result in rejection of the appearance of the member. Coordinate remedial action with fabricator prior to erecting steel.

3.2 PREPARATION

- A. Provide connections for temporary shoring, bracing and supports only where noted on the approved shop drawings. Temporary connections not shown shall be made at locations not exposed to view in the final structure or as approved by the Architect. Handle, lift and align pieces using padded slings and/or other protection required to maintain the appearance of the AECS through the process of erection.

3.3 ERECTION

- A. Set AECS accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.
- B. In addition to the special care used to handle and erect AECS, employ the following erection techniques:

1. AESS Erection Tolerances: Erection Tolerances shall meet the requirements of chapter 10 of the AISC "Code of Standard Practice".
 2. Welds ground smooth: Erector shall grind welds smooth in the connections of AESS members. For groove welds, the weld shall be made flush to the surfaces each side and be within + 1/16", -0" of plate thickness.
 3. Contouring and blending of welds: Where fillet welds are indicated to be ground contoured, or blended, oversize welds as required and grind to provide a smooth transition and match profile on approved mock-up].
 4. Continuous Welds: Where noted on the drawings, provide continuous welds of a uniform size and profile.]
 5. Minimize Weld Show Through: At locations where welding on the far side of an exposed connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.
 6. Bolt Head Orientation: All bolt heads shall be oriented as indicated on the contract documents. Where bolt head alignment is specified, the orientation shall be noted for each connection on the erection drawings. Where not noted, the bolt heads in a given connection shall be oriented to one side.
 7. Removal of field connection aids: Run out tabs, erection bolts and other steel members added to connections to allow for alignment, fit-up, and welding in the field shall be removed from the structure. Field groove welds shall be selected to eliminate the need for backing bars or to permit their removal after welding. Welds at run out tabs shall be removed to match adjacent surfaces and ground smooth. Holes for erection bolts shall be plug welded and ground smooth.
 8. Filling of weld access holes: Where holes must be cut in the web at the intersection with flanges on W shapes and structural tees to permit field welding of the flanges, they shall be filled. Filling shall be executed with proper procedures to minimize restraint and address thermal stresses in group 4 and 5 shapes.
- C. Field Welding: Weld profile, quality, and finish shall be consistent with mock-ups approved prior to fabrication.
- D. Splice members only where indicated.
- E. Obtain permission for any torch cutting or field fabrication from the Architect. Finish sections thermally cut during erection to a surface appearance consistent with the mock up.
- F. Do not enlarge unfair holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts. Replace connection plates that are misaligned where holes cannot be aligned with acceptable final appearance.

3.4 FIELD CONNECTIONS

- A. Bolted Connections: Install bolts of the specified type and finish in accordance with Division 5 section "Structural Steel".
- B. Welded Connections:
 - 1. Comply with AWS D1.1 for procedures, and appearance. Refer to Division 5 section "Structural Steel" for other requirements.
 - 2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.
 - 3. Verify that weld sizes, fabrication sequence, and equipment used for AESS will limit distortions to allowable tolerances.
 - 4. Obtain Architects approval for appearance of welds in repaired or field modified work.

3.5 FIELD QUALITY CONTROL

- A. Structural requirements: The Owner will engage an independent testing and inspecting agency to perform field inspections and tests and to prepare test reports. Refer to Division 5 section "Structural Steel" for detailed bolt and weld testing requirements.
- B. AESS acceptance: The Architect shall observe the AESS steel in place and determine acceptability based on the mockup. The Testing Agency shall have no responsibility for enforcing the requirements of this section.

3.6 ADJUSTING AND CLEANING

- A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint shall be completed to blend with the adjacent surfaces of AESS. Such touch up work shall be done in accordance with manufacturer's instructions as specified in Division 9, Section "Painting."
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

END OF SECTION 051250

SECTION 053100 - 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. This Section includes the following:
 - 1. Roof deck
 - 2. Acoustic roof deck ceiling system
- B. Related Sections include the following:
 - 1. Division 03 Section "Cast-in-Place Concrete" for concrete fill.
 - 2. Division 05 Section "Structural Steel Framing" for shop- and field-welded shear connectors.
 - 3. Division 05 Section "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
 - 4. Division 09 painting Sections for repair painting of primed deck.

1.3 SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.
 - 1. Submit shop drawings of all members to be furnished. Detail drawings of the members and their connections shall follow standard practice as set forth in the AISC "Manual of Structural Steel Detailing" (Second Edition). In particular, welding shall be shown, using standard AWS welding symbols. Show on detail drawings the paint to be used.
 - 2. Shop drawings will not be accepted for review by the Engineer unless there is substantial evidence that the General Contractor or Construction manager on the project has reviewed the submittal for compliance with the contract documents and has addressed questions to be responded to by the Contractor. All coordination items with other trades and submittals are to be performed and the submittal marked accordingly before submission. Failure to provide the above will result in the submittal being returned and not reviewed.

3. Contractor shall perform review and schedule shop drawing submittals to permit a minimum of 15 calendar days for review by the Engineer. Shop Drawings will be returned to the Architect for their required review and processing.
4. Shop drawings will not be reviewed unless accompanied by erection drawings which locates and identifies the members. Copies or reproductions of contract drawings will not be accepted or reviewed as shop drawings.
5. Shop drawings shall be submitted in the form of 1 reproducible plus 2 prints.
6. The following is the definitions for the Shop Drawing stamp disposition:

No Exceptions Taken - Re-submission is not required unless document is revised.

Make Corrections Noted - If checked, fabrication may be undertaken. Contractor is responsible for making noted corrections. Re-submission of record copies are required.

Revise and Resubmit - If checked, fabrication may not be undertaken. Resubmit corrected copies for final review, with all changes clouded.

Rejected - Resubmit for review.

Corrections or comments made on shop drawings during this review do not relieve the Contractor from compliance with the requirements of the project drawings and specifications. This check is only for the review of general conformance with the information given in the Contract Documents. The Contractor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes, techniques and sequence of construction, coordinating his work with that of other trades, and performing his work in accordance with OSHA requirements and other sections of the Project Specifications.

- C. Product Certificates: For each type of steel deck, signed by product manufacturer.
- D. Welding certificates.
- E. Field quality-control test and inspection reports.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
 1. Power-actuated mechanical fasteners.
- G. Research/Evaluation Reports: For steel deck.

1.5 QUALITY ASSURANCE

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

- C. 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."
- D. FMG Listing: Provide steel roof deck evaluated by FMG and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

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.

1.7 COORDINATION

- A. Coordinate installation of sound-absorbing insulation strips in topside ribs of acoustical deck with roofing installation specified in Division 07 to ensure protection of insulation strips against damage from effects of weather and other causes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Steel Deck:
 - a. Canam Steel Corp.; The Canam Manac Group.
 - b. Consolidated Systems, Inc.
 - c. Epic Metals Corporation.
 - d. New Millennium Building Systems, LLC.
 - e. Nucor Corp.; Vulcraft Division.

2.2 ROOF DECK

- A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:

1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade , G60 zinc coating.
2. Deck Profile: As indicated.
3. Profile Depth: As indicated.
4. Design Uncoated-Steel Thickness: As indicated.
5. Span Condition: Triple span or more.
6. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.4 ROOF DECK CEILING SYSTEMS

A. Factory installed acoustical galvanized Roof Deck. Roof panels shall have the following :

1. Continuous dovetail –shaped ribs spaced 8” on center and formed to the following nominal dimensions: 2” deep, $\frac{3}{4}$ ” rib opening at bottom, 3” rib width at top.
2. Cold-formed sheets conforming to ASTM-A-653, grade 40, or equal, having a minimum yield strength of 40ksi.
3. Acoustical Roof Deck panels shall be fabricated with perforations in the bottom flange areas between the dovetail-shaped ribs.
4. Prior to forming, steel sheets shall have received a hot-dip protective coating of zinc conforming to ASTM-A-924, Class G60. Galvanized sheets shall be chemically cleaned and pre-treated followed by oven-cured epoxy primer and a second coat of oven-cured polyester prime paint in the manufacturer’s standard off white color. Provide a plastic removable sheet to the bottom surface of the panels to protect paint finish during manufacturing, shipping and handling.

2.5 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. 30 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. 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] [sloped] recessed pans of 1-1/2-inch (38-mm) minimum depth. For drains, cut holes in the field.
- I. Flat Sump Plate: 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. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.
- K. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.
- L. Acoustical elements shall be factory installed above the perforated holes in the bottom flat area between the dovetail-shaped ribs to provide NRC rating of 0.95. To facilitate field painting of the perforated surfaces, the sound absorbing elements shall be supported above the surface. Sound absorbing elements and spacers shall be furnished under the specification section for installation by the roofing contractor.

2.6 ACOUSTICAL ROOF DECK

- M. Acoustical Steel Roof Deck: Model ER3.5A from Epic Metals or equivalent. Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
 - 1. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Gray.
 - 2. Deck Profile: As indicated on plan.
 - 3. Profile Depth: As indicated.
 - 4. Design Uncoated-Steel Thickness: As indicated.
 - 5. Span Condition: Triple span or more.
 - 6. Side Laps: Overlapped.
 - 7. Acoustical Perforations: Deck units with manufacturer's standard acoustical perforations.
 - 8. Sound-Absorbing Insulation: Manufacturer's standard premolded roll or strip of glass or mineral fiber.
 - 9. Acoustical Performance: NRC 0.95, tested according to ASTM C 423.

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. All components of the ER3.5A Acoustical Roof Deck Ceiling System shall be protected from significant damage during shipment and handling. If storage at the jobsite is required, bundles or packages of these materials shall be elevated above the ground, sloped to provide drainage, and protected from the elements with a ventilated waterproof covering.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, 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 pneumatic fasteners, and as follows:
 - 1. Fastener: HILTI X-ENP-19-L15 or equal.
 - 2. Fastener Spacing: Fasteners edge and interior ribs of deck units with a minimum of two fasteners per deck unit at each support. Space fasteners as indicated on drawing S6-03.

- 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, and as follows:
 - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
 - 1. End Joints: Lapped 2 inches minimum
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches (305 mm) apart with at least one fastener at each corner.
 - 1. Install reinforcing channels or zees in ribs to span between supports and mechanically fasten.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. mechanically fasten 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.
- G. Sound-Absorbing Insulation: Installation into topside ribs of deck as specified by manufacturer.

3.4 ROOF DECK CEILING SYSTEMS

- A. Bundles or packages of Acoustical Roof Deck System components shall be located on supporting members in such a manner that overloading of any individual members does not occur.
- B. Before being permanently fastened, Acoustical Roof Deck panels shall be placed with ends accurately aligned and adequately bearing on supporting members. Proper coverage of the Acoustical Roof Deck panels shall be maintained. Care must be taken by the erector to maintain uniform spacing of the bottom rib opening (equal to the openings in the profiled sheet) at the sidelaps. Consistent coverage shall be maintained so that panels located in adjacent bays will be properly aligned.
- C. Field cutting of the Acoustical Roof Deck panels shall be performed in a neat and precise manner. Only those openings shown on the structural drawings shall be cut. Other openings shall be approved by the structural engineer and cut by those requiring the opening.
- D. Acoustical Roof Deck panels shall be fastened to all supporting members with pneumatic fasteners.

- E. Sidelaps of Acoustical Roof Deck panels shall be fastened by screws at a spacing of 36" on center or less as indicated on the manufacturer's erection drawings. Sides of Acoustical Roof Deck panels that are located at perimeter edges of the building shall be fastened to supporting members at a spacing of 36" on center or less as indicated on the S6.02 drawing.
- G. Sump pans, ridge, valley, transition, eave plates, and supplied reinforcement for small openings shall be fastened as indicated on the manufacturer's erection drawings.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- 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.

3.7 REPAIRS AND 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. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.
- C. Construction loads that could damage the ER3.5A Acoustical Roof Deck such as heavy concentrated loads and impact loads shall be avoided. Planking shall be used in all high traffic areas.
- D. Prior to the placement of the sound absorbing elements, the top surface of the Acoustical Roof Deck shall be cleaned of all debris, grease, oil and other foreign substances. Cleaning the bottom surface of the Acoustical Roof Deck for field painting shall be the responsibility of the painting contractor.
- E. Galvanized coatings that are significantly damaged shall be repaired. Appropriate galvanized repair paint shall be used, and the paint manufacturer's application instructions shall be followed.
- F. Sound absorbing elements shall be dry before installation of the elements or overlying roof materials.

END OF SECTION 053100

SECTION 054000 – COLD-FORMED METAL FRAMING

PART 1 - GENERAL

- A. SECTION INCLUDES
- B. This Section includes the following:
 - 1. Exterior framing
 - 2. Auditorium interior framing

1.2 RELATED REQUIREMENTS

- A. Related Documents: General provisions of the Contract, including General and Supplementary Conditions and other Division 5 Specifications, apply to this Section.
- B. The General Conditions state that the Contract Documents are complementary. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the intent of this Section.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated in the General Notes.
 - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/360 for non-masonry veneer and 1/720 for masonry veneer of the wall height.
 - b. Auditorium Framing: Horizontal deflection of 1/240.
 - 3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
 - 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - a. Upward and downward movement of 1-1/2 inches.
- B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."
 - 1. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing - Header Design."

2. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

1.4 SUBMITTALS

- A. Product Data: For each type of cold-formed metal framing product and accessory indicated.
- B. Shop Drawings:
 1. Submit shop drawings of all members to be furnished. Detail drawings of the members and their connections shall follow standard practice as set forth in the AISC "Manual of Structural Steel Detailing" (Second Edition). In particular, welding shall be shown, using standard AWS welding symbols. Show on detail drawings the paint to be used.
 2. Shop drawings will not be accepted for review by the Engineer unless there is substantial evidence that the General Contractor or Construction manager on the project has reviewed the submittal for compliance with the contract documents and has addressed questions to be responded to by the Contractor. All coordination item with other trades and submittals are to be performed and the submittal marked accordingly before submission. Failure to provide the above will result in the submittal being returned and not reviewed.
 3. Contractor shall perform review and schedule shop drawing submittals to permit a minimum of 15 calendar days for review by the Engineer. Shop Drawings will be returned to the Architect for their required review and processing.
 4. Shop drawings will not be reviewed unless accompanied by erection drawings which locates and identifies the members. Copies or reproductions of contract drawings will not be accepted or reviewed as shop drawings.
 5. Shop drawings shall be submitted in the form of an electronic file (PDF).
 6. The following is the definitions for the Shop Drawing stamp disposition:
 - a. No Exceptions Taken - Re-submission is not required unless document is revised.
 - b. Make Corrections Noted - If checked, fabrication may be undertaken. Contractor is responsible for making noted corrections. Re-submission of record copies are required.
 - c. Revise and Resubmit - If checked, fabrication may not be undertaken. Resubmit corrected copies for final review, with all changes clouded.
 - d. Rejected - Resubmit for review.
 - e. Corrections or comments made on shop drawings during this review do not relieve the Contractor from compliance with the requirements of the project drawings and specifications. This check is only for the review of general conformance with the information given in the Contract Documents. The Contractor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes, techniques and sequence of construction, coordinating his work with that of other trades, and performing his work in accordance with OSHA requirements and other sections of the Project Specifications.

C. CT HPB documentation:

1. For all installed products and materials of the Section, submit the following information:
 - a. Cost breakdowns for the materials included in the Contractor or subcontractor's work. Cost breakdowns shall include total installed cost and material-only cost.
 - b. The percentages (by weight) of post-consumer and/or pre-consumer recycled content in the supplied product(s).
 - c. Indication of location (city, state) of the manufacturing location of the supplied product(s) and the distance from the project site.
 - d. Indication of location (city, state) of the extraction, harvest or recovery location of the raw materials used to manufacture the supplied product(s) and the distance from the project site.
2. For all field-applied adhesives, sealants, paints and coatings relating to work of this Section, indicate the Volatile Organic Compound (VOC) content in grams/liter and whether the product meets the requirements of the California Department of Health Services (CDHS) Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small Scale Environmental Chambers, including 2004 Addenda.
3. Provided cut sheets with the Contractor's or subcontractor's stamp, confirming that the submitted products are the products installed in the Project.

D. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:

1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

E. Research/Evaluation Reports: For cold-formed metal framing.

1.5 QUALITY ASSURANCE

- A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.

- D. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements and metallic-coating thickness.
- E. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- F. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- G. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
 - 1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Truss Design."
 - 2. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."
- H. Comply with AISI's "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."
- I. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2- PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:
 - 1. Clark Steel Framing.
 - 2. Dietrich Metal Framing; a Worthington Industries Company.
 - 3. Innovative Steel Systems.
 - 4. MarinoWare; a division of Ware Industries.
 - 5. Steel Construction Systems.

6. Steeler, Inc.
7. Super Stud Building Products, Inc.
8. United Metal Products, Inc.

2.2 MATERIALS

- A. Recycled Content: Provide cold-formed metal framing and misc metal accessories with post-consumer recycled content plus one-half of pre-consumer recycled content calculated by weight not less than 35 percent.
- B. Regional Materials: Provide cold-formed metal framing that is regionally manufactured within a 500 mile radius of the project site and that are made from regionally extracted, harvested, or recovered materials from a 500 mile radius of the project site.

For adhesives, sealants, paints and coatings used inside the weatherproofing system and applied on-site, provide products that comply with the VOC and chemical component limitations as defined in Section 01 35 20 13 – LEED Requirements Summary including, but not limited to the following:

1. Sealants: 250g/l VOC (includes grout)
 2. Metal Primers: 50 g/L VOC
 2. Anti-Corrosion Metal Primer: 250 g/L VOC (galvanizing repair paint)
- C. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
 1. Grade: As required by structural performance.
 2. Coating: G60.
 - D. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
 1. 5

2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 1. Minimum Base-Metal Thickness: 0.0428.
 2. Flange Width: 1-5/8 inches.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 1. Minimum Base-Metal Thickness: Matching steel studs.
 2. Flange Width: 1-1/4 inches.

- C. Vertical Deflection Clips: Manufacturer's standard bypass or head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dietrich Metal Framing; a Worthington Industries Company.
 - b. MarinoWare, a division of Ware Industries.
 - c. SCAFCO Corporation
 - d. The Steel Network, Inc.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Minimum Base-Metal Thickness: 0.0428 inch.
 - 3. Flange Width: 1 inch plus the design gap for 1-story structures and 1 inch plus twice the design gap for other applications.
- E. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.

2.4 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 - 1. Supplementary framing.
 - 2. Bracing, bridging, and solid blocking.
 - 3. Web stiffeners.
 - 4. Anchor clips.
 - 5. End clips.
 - 6. Foundation clips.
 - 7. Gusset plates.
 - 8. Stud kickers, knee braces, and girts.
 - 9. Hole reinforcing plates.
 - 10. Backer plates.

2.5 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. 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.
- C. 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.
- D. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

2.6 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.
- B. Shims: Load bearing, high-density multimonomer plastic, nonleaching.
- C. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.7 FABRICATION

- A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
 - 4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.

- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.
- B. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

- A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

- D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
- H. Install insulation, specified in Division 07 Section "Thermal 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.
- I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
- J. 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 and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: 16 inches.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single-leg deflection tracks and anchor to building structure.
 - 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 - 3. Connect vertical deflection clips to infill studs and anchor to building structure.
 - 4. Connect drift clips to cold formed metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - a. Install solid blocking at centers indicated on Shop Drawings.
 - 2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
- F. 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 wall-framing system.

3.5 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace work where test results indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 REPAIRS AND PROTECTION

- A. 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.

- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 074200 – EXTERIOR WALL CLADDING

PART 1 - GENERAL

A.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Sustainable Design Intent: Comply with certain prerequisites and credits needed to achieve sustainable design, measured and documented according to the LEED Green Building Rating System, of the United States Green Building Council (LEED v4 BD + C).
 - 1. Reference Section 018113 “Sustainable Design Requirements” for targeted strategies for certification level and certification requirements.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Composite wood veneer exterior wall cladding.
 - 2. Framing system.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include data on physical characteristics, durability, fade resistance, and flame-resistance characteristics.
- B. Samples for Initial Selection: Submit two complete sets of color swatches representing manufacturer’s full range of colors, grains and patterns. Submit samples of supporting system.
- C. Maintenance Data: Include in maintenance manuals.
- D. Design Drawings: Submit shop drawings showing layout, profiles, and product components, including anchorage, accessories, and finish colors.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide cladding and framing system with the following fire-test-response characteristics as determined by testing identical products applied with identical adhesives to substrates per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Surface-Burning Characteristics: As follows, per ASTM E 84:

- a. Flame-Spread Index: 25 or less.
- b. Smoke-Developed Index: 450 or less.

1.5 DELIVERY

- A. Deliver materials to the site in Manufacturer's original, unopened packaging, with labels.

1.6 PANEL STORAGE

- A. Place material in a climate-controlled enclosed space. Follow manufacturer's guidelines for storage of material.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install cladding in wet or adverse conditions that would void the manufacturer's warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in Part 2 "Cladding".

2.2 CLADDING

- A. Wood Exterior Clapboard Rainscreen System:

- 1. Available Products:

- a. Parklex Prodema Naturaclad Siding System, metallic frame, with backing plate, concealed fasteners using two different slat dimensions, 190 mm and 290 mm.

- 4. Color: Pale.

2.3 ACCESSORIES

- A. Provide Manufacturers framing system.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, for compliance with requirements for levelness, wall plumbness, and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

A.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances that could impair wall paneling installation, including mold, mildew, oil, grease, incompatible primers, dirt, and dust.

3.3 INSTALLATION

- A. General: Comply with wall cladding manufacturers' written installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

3.4 CLEANING

- A. Clean all surfaces of wall cladding.
- B. Use cleaning methods recommended in writing by manufacturer.
- C. Replace cladding that cannot be cleaned.

END OF SECTION 074200

SECTION 075323 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

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. Adhered EPDM membrane roofing system.
 - 2. Roof insulation.

- B. Related Sections:

- 1. Division 06 Section "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
 - 2. Division 07 Section "Preparation for Re-Roofing" for existing roof tear-off requirements.
 - 3. Division 07 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counterflashings.
 - 4. Division 07 Section "Joint Sealants" for joint sealants, joint fillers, and joint preparation.
 - 5. Division 22 Sections for roof drains.

1.3 DEFINITIONS

- A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.4 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
- C. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.

1. Wind Speed:
 - a. V ult: 135 MPH
 - b. V asd: 105 MPH

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
 1. Base flashings and membrane terminations.
 2. Tapered insulation, including slopes.
 3. Roof plan showing orientation of steel roof deck and orientation of membrane roofing and fastening spacings and patterns for mechanically fastened membrane roofing.
 4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
- C. Samples for Verification: For the following products, in manufacturer's standard sizes:
 1. Walkway pads or rolls.

1.6 INFORMATIONAL SUBMITTALS

- A. Manufacturer Certificate: Signed by roofing manufacturer certifying that membrane roofing system complies with requirements specified in "Performance Requirements" Article.
 1. Submit evidence of complying with performance requirements.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.
- C. Warranties: Sample of special warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For membrane roofing system to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for membrane roofing system identical to that used for this Project.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
- C. Source Limitations: Obtain components for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.

- D. Exterior Fire-Test Exposure: ASTM E 108, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.
- E. Preinstallation Roofing Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Construction Manager, Architect, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - 5. Review structural loading limitations of roof deck during and after roofing.
 - 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
 - 7. Review temporary protection requirements for roofing system during and after installation.
 - 8. Review roof observation and repair procedures after roofing installation.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.10 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.
 - 1. Special warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, roofing accessories, and other components of membrane roofing system.
 - 2. Warranty Period: 30 year NDL, non-prorated, with wind rider.
 - 3. Wind Speed: 80 MPH.
 - 4. Manufacturer's Roof Warranty is to be maintained by Roofing Installer.

PART 2 - PRODUCTS

2.1 EPDM MEMBRANE ROOFING

- A. EPDM: ASTM D 4637, Type I, non-reinforced, uniform, flexible EPDM sheet.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle SynTec Incorporated.
 - b. Firestone Building Products.
 - c. Johns Manville.
 - 2. Thickness: 90 mils, nominal.
 - 3. Exposed Face Color: Black.

2.2 AUXILIARY MEMBRANE ROOFING MATERIALS

- A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
 - 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
 - 2. Adhesives and sealants that are not on the exterior side of weather barrier 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."
- B. Sheet Flashing: 90-mil- thick EPDM, partially cured or cured, according to application.
- C. Bonding Adhesive: Manufacturer's standard.
- D. Seaming Material: Manufacturer's standard, synthetic-rubber polymer primer and 3-inch- wide minimum, butyl splice tape with release film.

- E. Lap Sealant: Manufacturer's standard, single-component sealant.
- F. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- G. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.
- H. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to roofing system manufacturer.
- I. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

2.3 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by EPDM membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
- C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches unless otherwise indicated.
- D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.4 INSULATION ACCESSORIES

- A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
- C. Cover Board: Manufacturers recommended board if required to achieve specified warrantee.

2.5 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick, and acceptable to membrane roofing system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - 1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
 - 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - 3. Verify that surface plane flatness and fastening of roof deck complies with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.3 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
 - 1. Where installing composite and non-composite insulation in two or more layers, install non-composite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.

- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
 - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- G. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck.
 - 1. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.4 ADHERED MEMBRANE ROOFING INSTALLATION

- A. Adhere membrane roofing over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll membrane roofing and allow to relax before installing.
- B. Start installation of membrane roofing in presence of membrane roofing system manufacturer's technical personnel.
- C. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Bonding Adhesive: Apply to substrate and underside of membrane roofing at rate required by manufacturer and allow to partially dry before installing membrane roofing. Do not apply to splice area of membrane roofing.
- E. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeters.
- F. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
- G. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement, and firmly roll side and end laps of overlapping membrane roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of membrane roofing terminations.
 - 1. Apply a continuous bead of in-seam sealant before closing splice if required by membrane roofing system manufacturer.
- H. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping membrane roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of membrane roofing terminations.

- I. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
- J. Spread sealant or mastic bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.
- K. Install membrane roofing and auxiliary materials to tie in to existing membrane roofing to maintain weather-tightness of transition.

3.5 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.6 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products in locations indicated. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.7 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- B. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.
- C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for

deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075323

SECTION 093013 - CERAMIC TILING

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.
- B. Sustainable Design Intent: Comply with certain prerequisites and credits needed to achieve sustainable design, measured and documented according to the LEED Green Building Rating System, of the United States Green Building Council (LEED v4 BD + C).

1.2 SUMMARY

- A. Section Includes:
 - 1. Ceramic mosaic tile.
 - 2. Porcelain tile.
 - 3. Glazed wall tile.
 - 4. Stone Thresholds.
 - 5. Waterproof membranes.
 - 6. Crack isolation membranes
 - 7. Metal Edge Strips.
- B. Related Requirements:
 - 1. Reference Section 018113 "Sustainable Design Requirements" for targeted strategies for certification level and certification requirements.
 - 2. Division 07 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
 - 3. Section 09 "Gypsum Board" for cementitious backer units.

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."
- C. Face Size: Actual tile size, excluding spacer lugs.
- D. Module Size: Actual tile size plus joint width indicated.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. **LEED BUILDING Submittals:**
 - 1. Product Data: For adhesives, indicating VOC content.
- C. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces. Provide details per TCNA Movement Joint Design Essentials, EJ171-09
- D. Samples for Initial Selection: For tile, grout, and accessories involving color selection.
- E. Samples for Verification:
 - 1. Full-size units of each type and composition of tile and for each color and finish required. For ceramic mosaic tile in color blend patterns, provide full sheets of each color blend.
 - 2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches but not fewer than four tiles. Use grout of type and in color or colors approved for completed Work.
 - 3. Full-size units of each type of trim and accessory for each color and finish required.
 - 4. Stone thresholds in 6-inch lengths
 - 5. Metal edge strips in 6-inch lengths.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Certificates: For each type of product.
- C. Product Test Reports: For tile-setting and -grouting products.
- D. Product Test Reports: For tile-setting and grout products

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer is a Five-Star member of the National Tile Contractors Association (NCTA) or a Trowel of Excellence member of the Tile Contractors' Association of America (TCAA).
2. Installer's supervisor for Project holds the International Masonry Institute's (IMI) Foreman Certification.
3. Installer employs only Ceramic Tile Education Foundation Certified (CTEF) Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers for Project.
4. Installer employs at least one installer for Project that has completed the Advanced Certification for Tile Installers (ACT) certification for installation of mud floors mud walls membranes gauged porcelain tile/gauged porcelain tile panels and slabs and large format tile.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of each type of floor tile installation.
2. Build mockup of each type of wall tile installation.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile..

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
 - 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
 - 2. Obtain waterproof membrane and crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
 - 1. Stone thresholds.
 - 2. Waterproof membrane.
 - 3. Crack isolation membrane.
 - 4. Cementitious backer units.
 - 5. Metal edge strips

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
 - 1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.3 TILE PRODUCTS

A. CERAMINC TILE TYPE-: Glazed ceramic tile. (**CT-1**) @ Toilet Rm Wet Walls.

1. Basis-of-Design Product: Daltile- Color Wheel Mosaic Tile - Herringbone
2. Module Size: Module Size: 1 by 3 inches (9" x 12" sheet)
3. Thickness: 1/4 inch
4. Face: Plain, Semi-Gloss Finish
5. Surface: Smooth without abrasive admixture.
6. Tile Color: As selected by Architect from Groups 1, 2 & 3.
7. Grout Color: As selected by Architect from manufacturer's full range.
8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile.

B. CERAMINC TILE TYPE -: Glazed ceramic mosaic tile. (**CT-2**) @ Kitchen Wall

1. Basis-of-Design Product: Daltile- Color Wheel Classic, Tile -
2. Module Size: 3 by 6 inches
3. Thickness: 5/16 inch
4. Face: Plain, Semi-Gloss Finish
5. Surface: Smooth without abrasive admixture.
6. Tile Color: As selected by Architect from Groups 1, 2 & 3.
7. Grout Color: As selected by Architect from manufacturer's full range.
8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile.

C. PORCELAIN TILE TYPE (**PT-1-**) @Toilet Rms & Border for Vestibules: Porcelain Tile – Wall Base & Floor Tile

1. Basis-of-Design Product: Daltile – Fabric Art
2. Description: Rectified porcelain tile, printed
3. Module Size: 12 inches by 24 inches
4. Module Size: Cove Base 6" x 12"
5. Thickness: 5/16"
6. Tile Color: As selected by Architect from manufacturer's full range.
7. Grout Color: As selected by Architect from manufacturer's full range.
8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile.
9. Transition Strip: Subject to compliance with requirements, provide the following product, or an approved equal.
 - a. Manufacturer: Schluter
 - b. Product: Jolly for top exposed edge of wall base
 - c. Finish: AE Anodized Aluminum

D. CERAMINC TILE TYPE-: (**CT-3**) @ Custodial Closet, Floor & Walls/Base.

1. Basis-of-Design Product: Daltile- Keystone Porcelain Mosaics
2. Module Size: 2 by 4 inches, straight joint @ floor
3. Module Size: 1 by 2 inches, straight joint @ walls @ Custodial
4. Module Size: Base 2 by 2 inches, built-up-base.
5. Thickness: 1/4 inch
6. Face: Plain, Matte Finish
7. Surface: Smooth without abrasive admixture.
8. Tile Color: As selected by Architect from Groups 1, 2 & 3.
9. Grout Color: As selected by Architect from manufacturer's full range
10. Special Attention to vertical grout line alignment in accordance with architect's detail.
11. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile.

2.4 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
 1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.
- B. Marble Thresholds: ASTM C503/C503M, with a minimum abrasion resistance of [10] [12] according to ASTM C1353 and with honed finish.
 1. Description: Uniform, fine to medium grained stone with veining to match Architect sample.

2.5 WATERPROOF MEMBRANES

- A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Waterproof Membrane, Fabric-Reinforced, Fluid-Applied: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Custom Building Products; Trowel & Seal Waterproofing and Anti-Fracture Membrane.
 - b. LATICRETE International Inc.; Laticrete 9235 Waterproof Membrane.
 - c. MAPEI Corporation; Mapelastic 400.
 - d. Summitville Tiles, Inc.; S-9000.

2.6 CRACK ISOLATION MEMBRANE FOR THIN SET PORCELAIN TILE INSTALLATIONS

- A. Basis of Design Product: Subject to compliance with requirements provide Schuler DITRA or equal product from another manufacturer.
 - 1. Material: 1/8" thick polyethylene with a grid structure of square cutback cavities, laminated to an anchoring fleece.
 - 2. Function: Uncoupling, waterproofing, vapor management, support/load distribution.

2.7 SETTING AND GROUTING MATERIALS

- A. Manufacturers:
 - 1. Custom Building Products.
 - 2. LATICRETE International Inc.
 - 3. MAPEI Corporation.
 - 4. Summitville Tiles, Inc.
- B. Portland Cement Mortar (mortar bed at walls) Installation Materials: ANSI A108.1A (wet-set method) and as specified below:
 - 1. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.
- C. Latex-Portland Cement Mortar (floor mortar and wall bond coat): ANSI A118.4, consisting of the following:
 - 1. Prepackaged dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive.
 - a. For wall applications, provide nonsagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.
- D. Standard Sanded Cement Grout for joints 1/8" and wider: ANSI A118.6, color as selected from manufacturer's full range.
- E. Standard Unsanded Cement Grout for joints less than 1/8": ANSI A118.6, color as selected from manufacturer's full range.
- F. Polymer Modified Tile Grout: ANSI A118.7, color as selected from manufacturer's full range.
 - 1. Acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to pre-packaged dry-grout mix.
 - a. Unsanded grout mixture for joints 1/8" and narrower.
 - b. Sanded grout mixture for joints 1/8" and wider.
- G. Epoxy Based Tile Grout: ANSI 118.3, color as selected from manufacturer's full range.
 - 1. Basis of Design Product: LATICRETE Spectralock Grout.

2.8 ELASTOMERIC SEALANTS

- A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 7 Section "Joint Sealants."
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.

2.9 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
 - B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless-steel, ASTM A 666, 300 Series exposed-edge material.
 - C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
 - D. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints that does not change color or appearance of grout.
 - 1. Products:
 - a. Custom Building Products; Grout Sealer.
 - b. MAPEI Corporation; KER 003, Silicone Spray Sealer for Cementitious Tile Grout.
 - c. Laticrete, Grout Sealer.
 - d. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
 - E. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints that does not change color or appearance of grout.
 - 1. Products:
 - a. Custom Building Products; Grout Sealer.
 - b. MAPEI Corporation; KER 003, Silicone Spray Sealer for Cementitious Tile Grout.
 - c. Laticrete, Grout Sealer.
 - d. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
 - F. Movement Joint for Porcelain Tile: Schluter Dilex-AKWS. Match height of porcelain tile.
- ## 2.10 MIXING MORTARS AND GROUT
- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with bonded mortar bed or thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.
- B. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- C. At toilet rooms, shower rooms and any other room with a floor drain, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- D. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from

other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

- E. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, pre-coat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 INSTALLATION OF CERAMIC TILE

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors in wet areas.
 - b. Tile floors composed of tiles 8 by 8 inches or larger..
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
- F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 - 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Ceramic Mosaic Tile: 1/16 inch
 - 2. Glazed Wall Tile: 1/16 inch

3. Porcelain Tile: 1/8 inch

- H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
 - 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- I. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
 - 1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).
 - 2. Do not extend waterproofing or crack isolation membrane under thresholds set in latex-portland cement mortar. Fill joints between such thresholds and adjoining tile set on waterproofing or crack isolation membrane with elastomeric sealant.
- J. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.
- K. Grout Sealer: Apply grout sealer to cementitious grout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer that has gotten on tile faces by wiping with soft cloth.

3.4 INSTALLATION OF TILE BACKING PANELS

- A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.[**Use modified dry-set mortar for bonding material unless otherwise directed in manufacturer's written instructions.**]

3.5 INSTALLATION OF WATERPROOF MEMBRANES

- A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use modified dry-set mortar for bonding material unless otherwise directed in manufacturer's written instructions.
- B. Allow waterproof membrane to cure and verify by testing that it is watertight before installing tile or setting materials over it.

3.6 WATERPROOFING INSTALLATION

- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.
- B. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.7 CRACK ISOLATION MEMBRANE INSTALLATION

- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.
- B. Do not install tile or setting materials over crack isolation membrane until membrane has cured

3.8 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.9 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.10 INTERIOR TILE INSTALLATION SCHEDULE

- A. Ceramic Tile Floor Installation for new slab on grade concrete:
 - 1. Installation Method TCNA F113-09.
 - 2. Grout: Provide epoxy-based tile grout..
- B. Ceramic Tile Floor Installation for concrete slabs above grade:
 - 1. Installation Method TCNA F122-09.
 - 2. Grout: Provide polymer modified tile grout.
- C. Ceramic and Porcelain Tile Wall Installation for masonry walls:

1. Installation Method W211-09.
 2. Grout: Polymer Modified Tile Grout.
- D. Ceramic and Porcelain Tile Wall Installation for metal stud walls:
1. Installation Method TCNA W244C-09.
- E. Grout: Polymer Modified Tile Grout

END OF SECTION 093013

SECTION 095426 - SUSPENDED WOOD CEILINGS

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.
- B. Sustainable Design Intent: Comply with certain prerequisites and credits needed to achieve sustainable design, measured and documented according to the LEED Green Building Rating System, of the United States Green Building Council (LEED v4 BD + C).
- C. Division 09 Section “Sound Absorbing Wall Units” for Solid Wood Acoustic Grille Panels.

1.2 SUMMARY

- A. Section Includes:
 - 1. Solid-wood, linear-panel ceilings.

1.3 DEFINITIONS

- A. NRC: Noise Reduction Coefficient.

1.4 COORDINATION

- A. Coordinate layout and installation of wood ceilings and suspension systems with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.
 - 1. <Insert participant requirements>.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
- C. Sustainable Design Submittals:
 - 1. Recycled Content: Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.

2. Regional Materials: Manufacture products within 100 miles (160 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles (160 km) of Project site.
 3. Certified Wood: Certify wood products as "FSC Pure"[or "FSC Mixed Credit"] in accordance with FSC STD-01-001 and FSC STD-40-004.
 4. Product Data: For adhesives, indicating VOC content.
 5. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
 6. Composite Wood Products: Verify products are made using ultra-low-emitting formaldehyde resins, as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products," or are made with no added formaldehyde.
 7. Laboratory Test Reports: For wall materials, indicating compliance with requirements for low-emitting materials.
- D. Shop Drawings: For suspended wood ceilings.
1. Include reflected ceiling plans, sections, and details, drawn to scale, showing the following:
 - a. Wood ceiling patterns and joints.
 - b. Ceiling suspension members.
 - c. Method of attaching hangers to building structure and locations of cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
 - d. Ceiling-mounted items including, but not limited to, light fixtures, diffusers, grilles, speakers, sprinklers, and access panels.
 - e. Ceiling perimeter and penetrations through ceiling; trim and moldings.
- E. Samples: For each exposed product and for each type, color, and finish specified, 12 inches (305 mm) long by 12 inches (305 mm) wide or full width in size.
- F. Samples for Initial Selection: For units with factory-applied colors and finishes.
1. Include Samples of accessories involving color and finish selections.
- G. Samples for Verification: For the following products:
1. Wood Ceilings: 12-inch- (305-mm-) long by 12-inch- (305-mm-) wide or full-width Samples of each type, color, and finish.
 2. Suspension-System Members: 12-inch- (305-mm-) long Sample of each type.
 3. Exposed Molding and Trim: 12-inch- (305-mm-) long Samples of each type, color, and finish.
 4. Filler Strips: 12-inch- (305-mm-) long Samples of each type, color, and finish.
 5. Sound Absorbers: 12 inches (305 mm) long by full width.
- H. Delegated Design Submittal: For design of[**seismic restraints and**] attachment devices.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Product Test Reports: For each suspended wood ceiling, for tests performed by a qualified testing agency.
- C. Evaluation Reports: For suspended-wood-ceiling framing systems.
- D. Field quality-control reports.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.9 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Suspended-Wood-Ceiling Components: Quantity of each wood-ceiling unit, suspension-system component, accessory, and exposed molding and trim equal to 2 percent of quantity installed.

1.10 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Accredited by National Voluntary Laboratory Accreditation Program for testing indicated.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Build mockup of each type of suspended wood ceiling as shown on Drawings.
 - a. Demonstrate treatment of exposed field cuts.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- C. Certified Wood: Provide an invoice including vendor's chain-of-custody number, product cost, and entity being invoiced.
- D. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Deliver ceiling components and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they are protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
 - 1. Store materials flat and level, raised from the floor.
- B. Handle ceiling components and accessories in a manner that prevents damage.

1.12 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install interior ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
 - 1. Store and acclimatize wood products in the spaces where they will be installed for a minimum of 72 hours immediately before ceiling installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. **Delegated Design:** Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements" to design **[seismic restraints and]**attachment devices.
- B. Seismic Criteria: Provide suspended wood ceilings designed and installed to withstand the effects of earthquake motions in accordance with ASCE/SEI 7 and requirements of authorities having jurisdiction.
- C. **Certified Wood:** Certify wood products as "FSC Pure"[or "FSC Mixed Credit"] in accordance with FSC STD-01-001 and FSC STD-40-004.
- D. **Adhesives:** Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- E. **Recycled Content of Steel Products:** Postconsumer recycled content plus one-half of preconsumer recycled content not less than **20** percent.

2.2 SOLID-WOOD, LINEAR-PANEL CEILING

- A. Linear Ceiling Panels: Manufacturer's standard panelized wood slat/ wood blade system consisting of wood slats oriented at 90 degrees to the mounting surface with PET felt backer.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Linea Ceilings and Wall Systems, Linea Grille Ceiling Installation Type with Linea PET Felt Backer; or a comparable product by one of the following
 - a. Acoustical Panel Systems (APS, Inc.).
 - b. Conwed Wall Panels
 - c. Armstrong World Industries, Inc.
 2. Solid Wood Species: Maple.
 3. Blade Size: 1" w x 1 ½" d.
 4. Blade Spacing: 2" o.c between long edges of blades.
 5. Panel Size: 12" w x 6'-0" l (Nominal).
 6. Edge Profile: Square
 7. Finish: Factory finished smooth in clear sheen interior grade.
 8. Cross members: Manufacturer's standard; Typical ½" x 1 ¼" at 12" o.c. factory-attached.
 9. Backer: Linea PET Backer, semi-rigid, lightweight and sound absorbing; 100% non-woven polyester; Class A Fire-rated (ASTM 84); 12mm (or 24mm??)
 10. Acoustical Performance: **NRC 0.9?**
 11. Location: Community Room 104, As indicated in drawings
 12. Panel Attachment: Provide [manufacturer's standard metal spring clips] [black, zinc-aluminum coated steel sheet metal screws recommended in manufacturer's written installation instructions through factory pre-drilled holes in backing boards] <Insert requirements> for attaching panels to grid suspension system, spaced to support ceiling and in accordance with manufacturer's written installation instructions.
 13. Factory Finish: applied on every wood surface.
 - a. Surface-Burning Characteristics: Provide [**manufacturer's standard**] intumescent finish system with the following characteristics when tested in accordance with ASTM E84:
 - 1) Flame-Spread Index: 25 or less.
 - 2) Smoke-Developed Index: 450 or less.
 - b. Backing Board Gloss and Color: **Flat black**.
- B. Linear-Ceiling-Panel Accessories: Linear-ceiling-panel manufacturer's accessories required to provide a complete installation of ceiling in accordance with manufacturer's written installation instructions.
1. Acoustic Felt: Linea PET Felt Backer, semi-rigid, lightweight and sound absorbing; 100% non-woven polyester; Class A Fire-rated (ASTM 84); 12mm (or 24mm??) with flame-spread index of 25 or less and smoke-developed index of [50] <Insert value> or less as determined by testing in accordance with ASTM E84.
 - a. NRC: **0.9?** when tested in accordance with ASTM C423.
 2. End Caps: Manufacturer's standard units for exposed field-cut edges; solid wood finished to match planks.
 3. Wood Trim: As indicated on the Drawings; manufacturers standard solid wood finished to match planks; with trim connectors recommended in writing by ceiling and suspension-system manufacturers.
 4. Accessories: Include other additional accessories as indicated in drawings and recommended by manufacturer.

- C. Grid Suspension System: ASTM C635/C635M; recommended in writing by ceiling and suspension-system manufacturers for applications indicated; main- and cross-runner system complete with suspension-system components required to support ceiling units and other ceiling-supported construction.
1. Material: [ASTM A653/A653M, hot-dip galvanized, cold-rolled sheet steel, **G60 (Z180)** coating designation] [ASTM A653/A653M, hot-dip galvanized, cold-rolled sheet steel, **G60 (Z180)** coating designation with **ASTM B209 (ASTM B209M)** aluminum cap] <Insert requirements>.
 2. Structural Classification: Heavy-duty system.
 3. Face Width: [**15/16 inch (24 mm)**] <Insert dimension>.
 4. Finish: [**Flat black**] <Insert requirements>.

2.3 SUSPENSION-SYSTEM HANGERS, BRACES, AND TIES

- A. Attachment Devices: Size for 5 times the design load indicated in ASTM C635/C635M, Table 1, Direct Hung, unless otherwise indicated.
1. Cast-in-Place and Postinstalled Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 5 times that imposed by ceiling construction as determined by testing in accordance with ASTM E488/E488M or ASTM E1512, as applicable, conducted by a qualified testing and inspecting agency.
 - a. Type: [**Cast-in-place**] [**Postinstalled expansion**] [**Postinstalled bonded**] anchors.
 - b. Corrosion Protection:
 - 1) Carbon-steel components zinc plated to comply with ASTM B633, Class Fe/Zn 5 (0.005 mm) for Class SC service condition (mild).
 - 2) Stainless steel components complying with ASTM F593 and ASTM F594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchors.
 - 3) Components fabricated from nickel-copper-alloy rods complying with ASTM B164 for UNS No. N04400 alloy.
 2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to [**10**] <Insert safety factor> times that imposed by ceiling construction as determined by testing in accordance with ASTM E1190 conducted by a qualified testing and inspecting agency.
- B. Wire Hangers, Braces, and Ties: Provide wire complying with the following requirements:
1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
 2. Stainless Steel Wire: ASTM A580/A580M, Type 304, nonmagnetic.
 3. Nickel-Copper-Alloy Wire: ASTM B164 nickel-copper alloy UNS No. N04400.
 4. Size: Select wire diameter so its stress at 3 times the hanger design load indicated in ASTM C635/C635M, Table 1, Direct Hung is less than yield stress of wire, but provide not less than [**0.106-inch- (2.7-mm-)**] [**0.135-inch- (3.4-mm-)**] <Insert dimension> diameter wire.

- C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- E. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed from 0.04-inch- (1.0-mm-) thick, galvanized-steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameter bolts.
- F. Seismic Stabilizer Bars: Grid-suspension-system manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- G. Seismic Struts: Suspension-system manufacturer's standard compression struts designed to accommodate seismic forces.
- H. Exterior Bracing: Cold-rolled steel channels and angles, hot-dip galvanized to comply with ASTM A653/A653M, G60 (Z180) coating designation; size and profile as required to withstand wind load.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing and substrates to which suspended wood ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage, and with requirements for installation tolerances and other conditions affecting performance of suspended wood ceilings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of suspended wood ceilings.
 - 1. Balance border widths at opposite edges of each ceiling.
 - 2. Avoid using less-than-half-width units.

3.3 INSTALLATION

- A. Comply with ASTM C636/C636M and seismic requirement indicated, in accordance with manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns in **3 inches (76 mm)**. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate to which hangers are attached and for type of hanger involved.
 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that does not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts[, **power-actuated fasteners,**] or postinstalled mechanical or adhesive anchors that extend through forms into concrete.
 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 8. Do not attach hangers to steel deck tabs.
 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 10. Space hangers not more than **48 inches (1219 mm)** o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than **8 inches (203 mm)** from ends of each member.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns in **1-1/2 inches (38 mm)**. Suspend bracing from building's structural members as required for hangers and without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim at perimeter of ceiling area and where necessary to conceal edges and ends of wood units.
1. Screw-attach metal moldings to substrate at intervals of not more than **16 inches (406 mm)** o.c. and not more than **3 inches (76 mm)** from ends, leveling with ceiling suspension system to a tolerance of **1/8 inch in 12 feet (3 mm in 3.7 m)**. Miter corners accurately and connect securely.
 2. Do not use exposed fasteners on moldings and trim.
- E. Grid Suspension Systems: Space main beams at **48 inches (1219 mm)** o.c.
1. Install cross tees to form [**modules sized in accordance with manufacturer's written installation instructions**] [**24- by 48-inch (610- by 1219-mm) modules**] [**24-inch (610-mm) square modules**]
 2. Remove and replace dented, bent, or kinked members.
- F. Linear-Carrier Suspension Systems: Install carriers at no more than [**24 inches (610 mm)**] <**Insert dimension**> o.c. aligned and securely interlocked with one another.

1. Install stabilizer channels, tees, and bars at regular intervals to stabilize carriers and at light fixtures, air-distribution equipment, access doors, and other equipment; spaced as standard with manufacturer for use indicated.
 2. Remove and replace dented, bent, or kinked members.
- G. Install wood components and accessories in accordance with manufacturer's written instructions and to accommodate natural expansion and contraction of wood products resulting from fluctuations in humidity.
- H. Cut wood components for accurate fit at borders and at interruptions and penetrations by other work through ceilings.
1. Stiffen edges of cut wood components as required to eliminate variations in flatness.
- I. Treat field-cut edges of wood components in accordance with manufacturer's written recommendations; finish exposed field cuts to match factory finish.
1. Solid-Wood Planks: Use solid-wood end caps to conceal exposed field-cut edges.
- J. Install wood components in coordination with suspension system and moldings and trim.
1. Install wood components in patterns indicated on Drawings
- Retain paragraph below if required for ceilings that do not allow access to the plenum above after ceilings are installed or revise to suit Project.
- K. Install field-constructed access panels in locations indicated on Drawings.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: **[Owner will engage]** **[Engage]** a qualified special inspector to perform the following special inspections:
1. Suspended ceiling system.
 2. Hangers, anchors, and fasteners.
- B. Testing Agency: **[Owner will engage]** **[Engage]** a qualified testing agency to perform tests and inspections.
- C. Tests and Inspections: Testing and inspecting of completed installations of ceiling hangers, anchors, and fasteners shall take place in successive stages, in test areas and using methods as follows. Do not proceed with installations of ceiling hangers for the next area until test results for previously completed installations show compliance with requirements.
1. Test Areas: Test installation of ceiling suspension systems on each floor when installation has reached 20 percent completion but before wood ceilings have been installed.
 - a. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for **200 lbf (890 N)** of tension; it will also select one of every two

postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf (1957 N) of tension.

- b. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- D. Ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.5 CLEANING

- A. Clean exposed surfaces of ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented units.

END OF SECTION 095426

SECTION 095446 - FABRIC-WRAPPED CEILING PANELS

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.
- B. Sustainable Design Intent: Comply with certain prerequisites and credits needed to achieve sustainable design, measured and documented according to the LEED Green Building Rating System, of the United States Green Building Council (LEED v4 BD + C).

1.2 SUMMARY

- A. Section includes shop-fabricated, fabric-wrapped ceiling panels.
- B. Related Requirements:
 - 1. Division 09 Section "Acoustical Panel Ceilings" for acoustical ceiling panels supported by exposed suspension system and tested for noise reduction.
 - 2. Division 09 Section "Sound Absorbing Wall Units" for fabric-wrapped sound absorbing wall panels tested for noise reduction.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include **fabric facing**, panel edge, core material, and mounting indicated.
- B. Sustainable Design Submittals:
 - 1. Recycled Content: Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.
 - 2. Regional Materials: Manufacture products within 100 miles (160 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles (160 km) of Project site.
 - 3. Certified Wood: Certify wood products as "FSC Pure"[or "FSC Mixed Credit"] in accordance with FSC STD-01-001 and FSC STD-40-004.
 - 4. Product Data: For adhesives, indicating VOC content.

5. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
 6. Composite Wood Products: Verify products are made using ultra-low-emitting formaldehyde resins, as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products," or are made with no added formaldehyde.
 7. Laboratory Test Reports: For ceiling products, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For panel assembly and installation.
1. Include reflected ceiling plans, elevations, sections, and mounting devices and details.
 2. Include details at joints and corners; and details at ceiling intersections and intersections with walls. Indicate panel edge profile and core materials.
 3. Include direction of fabric weave and pattern matching.
- D. Samples for Initial Selection: For each type of fabric facing.
1. Include Samples of hardware and accessories involving color or finish selection.
- E. Samples for Verification: For the following products:
1. Fabric: Full-width by approximately **36-inch- (900-mm-)** long Sample, but not smaller than required to show complete pattern repeat, from dye lot to be used for the Work, and with specified treatments applied. Mark top and face of fabric.
 2. Panel Edge: 12-inch- (300-mm-) long Sample(s) showing each edge profile, corner, and finish.
 3. Core Material: 12-inch- (300-mm-) square Sample at corner.
 4. Mounting Devices: Full-size Samples.
 5. Assembled Panels: Approximately 36 by 36 inches (900 by 900 mm), including joints and mounting methods.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Electrical outlets.
 2. Suspended ceiling components above ceiling panels.
 3. Structural members to which suspension devices will be attached.
 4. Items penetrating or covered by panels including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Alarms.
 - e. Sprinklers.
 - f. Access panels.

5. Show operation of hinged and sliding components covered by or adjacent to panels.
- B. Product Certificates: For each type of panel.
- C. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of panel to include in maintenance manuals. Include fabric manufacturer's written cleaning and stain-removal instructions.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Fabric: For each fabric, color, and pattern installed, furnish length equal to **10** percent of amount installed, but no fewer than 10 sq. yd. (9 sq. m), full width of bolt.
 2. Mounting Devices: Full-size units equal to 5 percent of amount installed, but no fewer than five devices.

1.8 QUALITY ASSURANCE

- A. [<Double click to insert sustainable design text for manufacturer qualifications.>](#)
- B. [<Double click to insert sustainable design text for vendor qualifications.>](#)
- C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials, fabrication, and installation.
 1. Build mockup of typical ceiling area[**as shown on Drawings**] [**96 inches (2400 mm) wide by full width of ceiling**] **<Insert dimensions>.[Include intersection of wall and ceiling, corners, and perimeters.]**
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with fabric and panel manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and panels in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install panels until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Lighting: Do not install fabric-wrapped ceiling panels until a permanent level of lighting is provided on surfaces to receive the panels.
- C. Air-Quality Limitations: Protect panels from exposure to airborne odors, such as tobacco smoke, and install panels under conditions free from odor contamination of ambient air.
- D. Field Measurements: Verify panel locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace panels and components that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Fabric sagging, distorting, or releasing from panel edge.
 - b. Warping of core.
 - 2. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain fabric-wrapped ceiling panels and fabric-wrapped sound absorption wall units specified in Section 098433 from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Verify ceiling products comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Fire-Test-Response Characteristics: Panels shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Surface-Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 286.

2.3 FABRIC-WRAPPED CEILING PANELS

- A. Fabric-Wrapped Ceiling Panel **<Insert drawing designation>**: Manufacturer's standard panel construction consisting of facing material applied directly over face and edges of panels to provide full finished edge, fully tailored corners.
1. **Manufacturers:** Basis-of Design Product: Subject to compliance with requirements, provide products by Conwed Respond A Direct-Attach Ceiling Panels, or one of the following:
 - a. Acoustical Panel Systems (APS, Inc.).
 - b. Armstrong Ceiling & Wall Solutions.
 - c. Decoustics; CertainTeed Architectural Products; a Saint Gobain company.
 2. Panel Shape: As indicated on Drawings.
 3. Mounting: **Rotofast Snap-on Anchors?**
 4. Core: Composite Core Construction of dimensionally stable rigid fiberglass.
 5. Fiberglass Density: 6-7 pcf.
 6. Recycled Content: For Fiberglass, 52 percent pre-consumer and 5 percent post consumer recycled content.
 7. Edge Construction: Manufacturer's standard .
 8. Edge Profile: Custom profile as indicated on Drawings.
 9. Corner Detail in Elevation: as indicated on Drawings with continuous edge profile indicated.
 10. Reveals between Panels: **[Recessed] [Flush] [Projecting] reveals [as selected by Architect from manufacturer's full range] [as indicated on Drawings] <Insert requirement>**.
 11. Facing Material: Fabric, As selected from manufacturer's full range of fabric options.
 12. Nominal Core Thickness: 1-1/2 inches (38 mm).
 13. Panel Width: As indicated on Drawings.
 14. Panel Height: As indicated on Drawings >.

2.4 MATERIALS

- A. **Composite Wood Products:** Verify products are made using ultra-low-emitting formaldehyde resins, as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products," or are made with no added formaldehyde.

- B. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than **<Insert value>** percent.
- C. <Double click to insert sustainable design text for regional materials.>
- D. <Double click to insert sustainable design text for certified wood.>
- E. Core Materials:[**Manufacturer's standard.**]
 - 1. Glass-Fiber Board: ASTM C612, of type standard with manufacturer; nominal density of 6 to 7 lb/cu. ft., unfaced, and dimensionally stable, molded rigid board; and with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
 - 2. Glass-Fiber Blanket: ASTM C553, ASTM C612, or ASTM C665; of type standard with manufacturer; nominal density of **[3 to 4 lb/cu. ft. (48 to 64 kg/cu. m)]**; flexible; and with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
 - 3. Mineral-Fiber Board: Maximum flame-spread and smoke-developed indexes of 25 and 10, respectively; minimum density of **[13-lb/cu. ft. (208-kg/cu. m)] [20-lb/cu. ft. (320-kg/cu. m)]**.
 - 4. Cementitious-Fiber Board: Density of not less than **[20 lb/cu. ft. (320 kg/cu. m)]** **<Insert value>**.
 - 5. Medium-Density Fiberboard: Panels complying with ANSI A208.2, **[grade to suit performance requirements] [Grade 130] <Insert grade>**.
 - a. Fire-retardant panels made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less when tested according to ASTM E84 or UL 723.
 - 6. Particleboard: Panels complying with ANSI A208.1, **[grade to suit performance requirements] [Grade M-2] <Insert grade>**.
 - a. Fire-retardant panels made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less when tested according to ASTM E84 or UL 723.
 - 7. Core Overlay: Flame-retardant, compressible, fiberfill, polyester batting.
 - 8. Wood and Plywood: Manufacturer's standard plywood or clear, vertical grain, straight, kiln-dried hardwood.
 - a. Fire-retardant treated by pressure process with a flame spread index of 25 or less when tested according to ASTM E84 or UL 723, 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) Treated material shall have a moisture content of 28 percent or less when tested according to ASTM D3201/D3201M at 92 percent relative humidity.
 - 2) Kiln-dry material after treatment to 19 percent or less for lumber and 15 percent or less for plywood.

- F. Facing Material: Fabric from same dye lot; color and pattern as selected by Architect from manufacturer's full range.
1. Manufacturer: TBD
 2. Product Line/Pattern: <Insert product name or designation>.
 3. Pattern Repeat: <Insert requirement>.
 4. Style Number: <Insert number>.
 5. Color: <Insert name or number, or both>.
 6. Fiber Content: [100] <Insert number> percent [woven polyester] [nonwoven polyester] [polyolefin] [vinyl] <Insert fiber requirement>.
 7. Width: [54 inches (1371 mm)] [66 inches (1676 mm)] <Insert dimension>.
 8. Source: <Insert fabric-vendor's name>.
 9. Applied Treatments: [Stain resistance] [flame-retardant] [acrylic backing, single coat] [acrylic backing, double coat] [latex backing] [foam backing] [and] [knit backing] <Insert treatment>.
 10. Light Reflectance: Average value not less than [0.75] <Insert value> when tested according to ASTM E1477.
 11. Lining Material: [Manufacturer's standard fabric for each use indicated] <Insert material designation>.
- G. Mounting Devices: Concealed on back of panel, recommended by manufacturer to support weight of panel.

2.5 FABRICATION

- A. Standard Construction: Use manufacturer's standard construction except as otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.
- B. Measure each area and establish layout of panels and joints of [**uniform size with balanced borders at opposite edges**] [**sizes indicated on Drawings**] within a given area.
- C. Edge Hardening: For [**glass-fiber board**] [**and**] [**mineral-fiber board**] cores, chemically harden core edges and areas of core where mounting devices are attached.
- D. Core Overlay: Evenly stretched over core face and edges and securely attached to core; free from puckers, ripples, wrinkles, or sags.
- E. Facing Material and Lining Material: Apply fabric fully covering visible surfaces of panel; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.
1. Square Corners: Tailor corners.[**Heat seal vinyl fabric seams at corners.**]
 2. Radius and Other Nonsquare Corners: Attach material so there are no seams or gathering of material.
 3. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches adjacent panels.
- F. Dimensional Tolerances of Finished Panels: Plus or minus **1/16 inch (1.6 mm)** for the following:

1. Thickness.
2. Edge straightness.
3. Overall length and width.
4. Squareness from corner to corner.
5. Chords, radii, and diameters.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fabric, fabricated panels, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting panel performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install panels in locations indicated. Unless otherwise indicated, install units with edges in alignment with walls and other panels, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with panel manufacturer's written instructions for installation of panels using type of mounting devices indicated. Mount panels securely to supporting substrate.
- C. Align fabric pattern and grain[**with adjacent panels**] [**as shown on Drawings**].

3.3 INSTALLATION TOLERANCES

- A. Variation from Alignment with Surfaces: Plus or minus 1/16 inch (1.6 mm) in 48 inches (1200 mm), noncumulative.
- B. Variation from Level or Slope: Plus or minus 1/16 inch (1.6 mm).
- C. Variation of Joint Width: Not more than [1/16 inch (1.6 mm)] [1/32 inch (0.79 mm)] <Insert dimension> wide from [hairline] [reveal line] in 48 inches (1200 mm), noncumulative.

3.4 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 095446

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

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.
- B. Sustainable Design Intent: Comply with certain prerequisites and credits needed to achieve sustainable design, measured and documented according to the LEED Green Building Rating System, of the United States Green Building Council (LEED v4 BD + C).

1.2 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
 - 2. Resilient stair accessories.
 - 3. Resilient molding accessories.
- B. Related Sections:
 - 1. Reference Section 018113 "Sustainable Design Requirements" for targeted strategies for certification level and certification requirements.
 - 2. Division 09 Section "Resilient Tile Flooring" for resilient floor tile.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED BUILDING Submittals:
 - 1. Product Data: For adhesives, indicating VOC content
 - 2. Environmental Product Declaration: For each product.
 - 3. Health Product Declaration: For each product.
 - 4. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
- C. Samples for Initial Selection: For each type of product indicated.
- D. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.5 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 60 deg F or more than 90 deg F, in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 90 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

1.6 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 5 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

- A. Resilient Base:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.
 - a. Johnsonite
 - b. Mannington.
 - c. Roppe Corporation, USA.
- B. Resilient Base Standard: ASTM F 1861.
 - 1. Material Requirement: Type TP (rubber, thermoplastic).

2. Manufacturing Method: Group I (solid, homogeneous) .
 3. Style: Cove (base with toe) at resilient flooring, straight (flat or toeless) at carpet.
- C. Minimum Thickness: 0.125 inch.
- D. Height: 4 inches.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Preformed.
- G. Inside Corners: Job formed or preformed.
- H. Finish: As selected by Architect from manufacturer's full range.
- I. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 RESILIENT STAIR ACCESSORIES

- A. Resilient Stair Treads:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Johnsonite.
 - b. Mannington.
 - c. Roppe Corporation, USA.
- B. Resilient Stair Treads Standard: ASTM F 2169.
1. Material Requirement: Type TP (rubber, thermoplastic).
 2. Surface Design:
 - a. Class: Pattern Hammered
 3. Manufacturing Method: Group 1, tread with embedded abrasive strips.
- C. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees.
- D. Visually Impaired Tread: Provide a solid color rubber insert at the leading 2 inches of the tread nosing, with visual contrast of dark-on-light or light-on dark from the remainder of the tread.
- E. Thickness: 1/4 inch and tapered to back edge.
- F. Size: Lengths and depths to fit each stair tread in one piece.
- G. Risers: Smooth, flat, toeless, height and length to cover risers; produced by same manufacturer as treads and recommended by manufacturer for installation with tread.

1. Thickness: 0.125

H. Landing Tile: Matching Treads; produced by same manufacturer as treads and recommended by manufacture for installation with treads.

I. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 RESILIENT MOLDING ACCESSORIES

A. Resilient Molding Accessories:

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. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
- b. Flexco, Inc.
- c. R.C.A. Rubber Company (The).
- d. Roppe Corporation, USA.

B. Description: Carpet edge for glue-down applications, reducer strip for resilient floor covering, and joiner for tile and carpet.

C. Material: Rubber.

D. Profile and Dimensions: As indicated.

E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.4 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

C. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Resilient Stair Treads and Accessories: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
 - 4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lbs of water/1000 sq.ft. in 24 hours.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until they are same temperature as the space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.

- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Job-Formed Corners:
 - 1. Inside Corners: Use straight pieces of maximum lengths possible.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Stair Accessories:
 - 1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
 - 2. Tightly adhere to substrates throughout length of each piece.
 - 3. For treads installed as separate, equal-length units, install to produce a flush joint between units.
- C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet and resilient floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products until Substantial Completion.

END OF SECTION 096513

SECTION 096519 - RESILIENT FLOORING

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.
- B. **Sustainable Design Intent: Comply with certain prerequisites and credits needed to achieve sustainable design, measured and documented according to the LEED Green Building Rating System, of the United States Green Building Council (LEED v4 BD + C).**

1.2 SUMMARY

- A. Section Includes:
 - 1. Rubber floor tile.
 - 2. Resilient Vinyl Sheet Flooring/Tile – Homogeneous
- B. Related Sections:
 - 1. **Reference Section 018113 “Sustainable Design Requirements” for targeted strategies for certification level and certification requirements.**
 - 2. Division 09 Section "Resilient Base and Accessories" for stair treads, resilient base, reducer strips, and other accessories installed with resilient floor coverings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. **LEED BUILDING Submittals:**
 - 1. Product Data: For adhesives, indicating VOC content.
 - 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
 - 3. Product Data: For chemical-bonding compounds, indicating VOC content.
 - 4. Laboratory Test Reports: For chemical-bonding compounds, indicating compliance with requirements for low-emitting materials.
 - 5. Verify flooring products comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 - 6. Laboratory Test Reports: For flooring products, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 1. Show details of special patterns.

- D. Samples for Initial Selection: For each type of floor tile indicated.
- E. Samples for Verification: Full-size units of each color and pattern of floor tile required.
- F. Welded-Seam Samples: For seamless-installation technique indicated and for each resilient sheet flooring product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to a rigid backing and prepared by Installer for this Project.
- G. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MATERIALS MAINTENANCE SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

- A. Substrate Conditions: Use the methods described below to determine the dryness as required ensuring initial and long-term success.
 - 1. ASTM F2170-02 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
 - a. General Contractor to be responsible for conducting of testing and submitting test results

- b. The relative humidity measured from the center of the concrete slab should not exceed 85%. If the test results exceed the limitations, the installation must not proceed until the problem has been corrected.
 2. ASTM F1869-98 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride:
 - a. This test method covers the quantitative determination of the rate of moisture vapor emitted from below-grade, on-grade, and above-grade (suspended) concrete floors.
 - b. General Contractor to be responsible for conducting of testing and submitting test results
 - c. The moisture vapor emissions rate should not exceed 8.0 lbs per 1,000 square feet within a 24-hour period. If the test results exceed the limitations, the installation must not proceed until the problem has been corrected.
 - B. The Floorcovering Contractor shall verify in writing to the Owner, a minimum of thirty (30) days prior to scheduled resilient Floorcovering installation, the following substrate conditions:
 1. Relative Humidity in Concrete Slabs: As tested following ASTM F2170 –02 requirements
 2. Moisture Vapor Emitted: as tested with a calcium chloride test kit, per ASTM F1869-89 requirements.
 3. Alkalinity: Maximum pH of 11
 - C. Environmental Requirements/Conditions: In accordance with manufacturer’s recommendations. Areas to receive flooring shall be clean, fully enclosed, weather tight with the permanent HVAC set at a uniform temperature of at least 68 degrees F (20 degrees C). The flooring material should be conditioned in the same manner.
 - D. Temperature Requirements: Maintain air temperature in spaces where products will be installed for time period before, during, and after installation as recommended by manufacturer.
 1. Temperature Conditions: 68 degrees F (20 degrees C) for 72 hours prior to and during and for not less than 48 hours after installation.
 - E. Close spaces to traffic during resilient flooring installation and for time period after installation recommended in writing by the manufacturer.
 - F. Install resilient flooring material and accessories after other finishing operations, including painting, have been completed.
 - G. Where demountable partitions and other items are indicated for installation on top of sheet resilient flooring material, install flooring material before these items are installed.
 - H. Where rolling loads and heavy-weight items are specified, allow at least a minimum of 72 hours, or per manufacturer’s instructions, after completion of flooring installation prior to applying any such load to flooring.
- 1.10 WARRANTY
- A. Manufacturer’s Warranty: Submit manufacturers standard warranty document.

1. Warranty Period for Rubber: Five (5) year limited warranty commencing on Date of Substantial completion.
2. Warranty Period for Solid Vinyl Sheet & Tile: Twenty (20) year limited warranty commencing on Date of Substantial completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 RESILIENT LINOLEUM MODULAR TILE FLOORING (LNT)

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include but are not limited to, the following:
 1. Basis of Design is Forbo Flooring Systems Marmoleum Modular with TopShield 2; Alternatives will be considered provided they meet or exceed the specification criteria contained herein.
- B. Description: Homogeneous linoleum tile made primarily of natural materials consisting of linseed oil, wood flour, and rosin binders, mixed and calendared onto a polyester backing to ensure optimum dimensional stability. Pattern and color shall extend throughout total thickness of material
- C. Pattern: As indicated in drawings.
- D. Sizes: 9.8" x 9.8" (25cm x 25cm)] [9.8" x 19.69" (25cm x 50cm)] [19.69" x 19.69" (50cm x 50cm)
- E. Gauge: 2.5mm (1/10")
- F. Backing: Polyester
- G. Color: As selected by Architect from full range of industry colors. 3 colors
- H. Adhesive: Shall meet or exceed the VOC limits of South Coast Air Quality Management District Rule #1168.
 1. Forbo T 940 adhesive
 1. Fully warranted, when used in conjunction with Forbo Marmoleum, to withstand concrete moisture vapor emissions up to 5 pounds per 1,000 sq. ft. in 24 hours and Relative Humidity up to 75% and meets or exceed the VOC limits of South Coast Air Quality Management District Rule #1168

- I. Linoleum Modular Flooring Meets or exceeds ASTM F2195 for Linoleum Tile Flooring Type 1, Static Load Limit 1500 pounds per square inch (per ASTM F970), ASTM E-682/NFPA 258—450 or less. ASTM E-648/NFPA 253—Class 1.
- J. Regulatory Requirements:
 - 1. Fire Performance Characteristics: Provide resilient linoleum sheet flooring with the following fire performance characteristics as determined by testing products in accordance with the latest version of ASTM method indicated below by a certified testing laboratory or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - a. Critical Radiant Flux: Class 1 Rating per NFPA 253 (ASTM E 648) (0.45 watts/cm² or greater).
 - b. Smoke Density: Less than 450 per NFPA 258 (ASTM E 662).

2.2 RUBBER FLOOR TILE

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified:
 - 1. Allstate Rubber Corp.; Stoler Industries
 - 2. Johnsonite.
 - 3. Mannington
 - 4. Roppe Corporation, USA.
- B. Tile Standard: ASTM F 1344, Class I-A, homogeneous rubber tile, solid color.
- C. Hardness: Grade 1, minimum hardness of 85, measured using Shore, Type A durometer according to ASTM D 2240.
- D. Wearing Surface: Molded pattern.
 - 1. Molded-Pattern Figure: Hammered
 - 2. Slip Resistance: Static Coefficient Test D-2047-93, results in compliance with ANSI A137.1 for types, compositions, and other characteristics indicated.
- E. Thickness: 0.125 inch.
- F. Size: Manufacturer's Full Range.
- G. Seaming Method: Manufacturers Standard.
- H. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
- C. Seamless Installation: Accessories
 - 1. Heat Welding Bead: Manufacturer's product for heat welding seams.
 - a. Colors: Match floor tile
- D. Transition Strip: Subject to compliance with requirements, provide the following product, or an approved equal:
 - 1. Manufacturer: Schluter
 - a. Product: VINPRO-S
 - b. Finish: Aluminum

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - 4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.

- a. Perform Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of **3 lb of water/1000 sq. ft.** in 24 hours.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are same temperature as space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.
- F. Existing Building Substrate Preparation: The Contractor recognizes that much of the work occurs in existing construction on concrete floors that may require more extensive surface preparation.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles square with room axis. in accordance to floor pattern dwgs
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - ~~1.~~ Lay tiles with grain direction in accordance to floor pattern dwgs.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. **Sustainable Design Intent: Comply with certain prerequisites and credits needed to achieve sustainable design, measured and documented according to the LEED Green Building Rating System, of the United States Green Building Council (LEED v4 BD + C).**

1.2 SUMMARY

- A. Section includes:
 - 1. Modular carpet tile.
- B. Related Requirements:
 - 1. **Reference Section 018113 "Sustainable Design Requirements" for targeted strategies for certification level and certification requirements.**
 - 2. Section 096513 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Include manufacturer's written installation recommendations for each type of substrate.
- B. **LEED BUILDING Submittals:**
 - 1. Verify adhesives have a VOC content of **[50]** g/L or less.
 - 2. Product Data: For adhesives, indicating VOC content.
 - 3. Product data for recycled content, indicating postconsumer and pre-consumer recycled content and cost.
 - 4. Provide materials ingredients reporting documentation for permanently installed materials. Accepted reporting documents include Health Product Declarations (HPD's), Cradle to Cradle certificates, and Living Building Challenge Declare labels.
 - 5. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.

6. Verify flooring products comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
7. Laboratory Test Reports: For flooring products, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For carpet tile installation, plans showing the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Carpet tile type, color, and dye lot.
3. Type of subfloor.
4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

D. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.

E. Product schedule: For carpet tile. Use same designations indicated on Drawings.

F. Sustainable Product Certification: Provide ANSI/NSF 140 certification for carpet products.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is recommended by the carpet manufacturer. And who is certified by the International Certified Floorcovering Installers Association. Flooring contractor to be a specialty contractor normally engaged in this type of work and shall have three (3) years minimum documented experience in commercial installation of similar flooring materials and participation in manufacturer's environmental program involving responsible flooring removal, recycling and installation
- B. Single Source Responsibility: Obtain product from single source.
- C. Carpet Fire-Test-Response Characteristics: Provide carpet with the following fire -test-response characteristics as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable o authorities having jurisdiction.
 1. Critical Radiant Flux Classification: Class 1, not less than 0.45 W/sq.cm.per ASTM E-648
 2. Smoke Density: 450 or less.
- D. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 1. Build mockups at locations and in sizes shown on Drawings.
 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI's "CRI Carpet Installation Standard."

1.9 FIELD CONDITIONS

- A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.10 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 2. Failures include, but are not limited to, the following:
 - a. More than 10 percent edge raveling, snags, and runs.
 - b. Dimensional instability.
 - c. Excess static discharge.
 - d. Loss of tuft-bind strength.
 - e. Loss of face fiber.
 - f. Delamination.
 3. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Basis of Design Product: CPT-1 (Field Color) Subject to compliance with requirements, provide Shaw Contract, Color at Work II Collection, Chromatone Tile 5T444, as detailed on drawings, or comparable product approved by architect.:
1. Colors: 2 colors as selected by Architect from manufacturer's full range
 2. Pattern: As selected by Architect from manufacturer's full range
 3. Construction: Multi-Level Pattern Loop
 4. Fiber Type: Ecosolution Q 100 Nylon
 5. Dye Method: 100% Solution Dyed
 6. Gauge: 1/12 in
 7. Backing: Primary – Synthetic; Secondary: Ecoworx Tile
 8. Size 18" x 36"
 9. Protective Treatments: SSP Shaw Soil Protection
 10. Appearance Retention Rating: For Heavy Traffic.
- B. Basis of Design Product: CPT-2, CPT-3 and CPT-4 (Accent Colors) Subject to compliance with requirements, provide Shaw Contract, Color at Work II Collection, Saturate Tile 5T109, as detailed on drawings, or comparable product approved by architect.:
1. Colors: 3 colors as selected by Architect from manufacturer's full range
 2. Pattern: As selected by Architect from manufacturer's full range
 3. Construction: Multi-Level Pattern Loop
 4. Fiber Type: Ecosolution Q 100 Nylon
 5. Dye Method: 100% Solution Dyed
 6. Gauge: 1/12 in
 7. Backing: Primary – Synthetic; Secondary: Ecoworx Tile
 8. Size: 9" x 36"
 9. Protective Treatments: SSP Shaw Soil Protection
 10. Appearance Retention Rating: For Heavy Traffic.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Manufacturer's water-resistant, mildew-resistant, non-staining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.
- C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
- B. Examine carpet tile for type, color, pattern, and potential defects.
- C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits
 - 1. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. per 24 hrs and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lbs of water/1000 sq. ft. in 24 hours.
 - b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 - c. Alkalinity: pH 9.0 per ASTM-F710
 - d. Where moisture or alkalinity test exceed the above, follow Manufacturer's recommendation for mitigating moisture prior to application of adhesives.
 - e. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing and unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI's "Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers. Note: Failure to remove or seal old cut back adhesive may cause installation failure, shifting, buckling or edge curling.
- D. Metal Substrates: Clean grease, oil, soil and rust, and prime if recommended in writing by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.
- F. All materials, including adhesives, are to be delivered to the site of installation at a minimum of 48 hours prior to the start of installation and stored in a clean and dry room that measures above 65°F and below 95°F and measures between 10% and 65% relative humidity (RH). To maintain temperature and relative humidity, permanent heating and air conditioning systems (HVAC) must be in operation. Place pallets of textile composite flooring modules on a flat surface (do not double stack pallets). After work is completed, the ambient room temperature should remain at 65°F and relative humidity between 10% and 65% for 48 hours. These materials and related adhesives shall be protected from the direct flow of heat from heating fixtures and appliances such as hot-air registers, radiators, or other. Site conditions shall include those specified in the flooring manufacturer's installation instructions and shall also include sufficient heat, light and power required for effective and efficient working condition.
- G. Once the temperature and relative humidity in area for installation have been stabilized, loose lay the modules within the installation area and allow them to precondition for 48 hours prior to installation. Module installation shall not commence until painting and finishing work is complete and ceiling and overhead work is tested, approved and completed. Traffic shall be closed during the installation of the textile composite flooring products. Verify concrete slabs are dry per the standards for bond and moisture tests listed in the manufacturer's installation instructions.

3.3 INSTALLATION

- A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.

- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns indicated on Drawings.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, non-staining marking device.
- H. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI's "Carpet Installation Standard," Section 20, "Protecting Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 097200 – COMPOSITE WOOD INTERIOR WALL PANELING

PART 1 - GENERAL

A.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Sustainable Design Intent: Comply with certain prerequisites and credits needed to achieve sustainable design, measured and documented according to the LEED Green Building Rating System, of the United States Green Building Council (LEED v4 BD + C).
 - 1. Reference Section 018113 “Sustainable Design Requirements” for targeted strategies for certification level and certification requirements.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Composite wood wall paneling.
 - 2. Framing system.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include data on physical characteristics, durability, fade resistance, and flame-resistance characteristics.
- B. Samples for Initial Selection: For each type of paneling indicated.
- C. Maintenance Data: Include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide wall panels and framing system with the following fire-test-response characteristics as determined by testing identical products applied with identical adhesives to substrates per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Surface-Burning Characteristics: As follows, per ASTM E 84:
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install paneling until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in Part 2 "Paneling".

2.2 PANELING

- A. Composite Wood:

- 1. Available Products:

- a. Parklex Prodema Naturaclad System, metallic frame, with backing plate, concealed fasteners using slat dimensions, 190 mm.

- 4. Color: Beech.

2.3 ACCESSORIES

- A. Provide Manufacturers framing system.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, for compliance with requirements for levelness, wall plumbness, and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.

- B. Clean substrates of substances that could impair wall paneling installation, including mold, mildew, oil, grease, incompatible primers, dirt, and dust.
- C. Acclimatize wall paneling materials by removing them from packaging in the installation areas not less than 24 hours before installation.

3.3 INSTALLATION

- A. General: Comply with wall paneling manufacturers' written installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

3.4 CLEANING

- A. Clean all surfaces of the wall paneling.
- B. Use cleaning methods recommended in writing by manufacturer.
- C. Replace panels that cannot be cleaned.

END OF SECTION 097200

SECTION 098433 - SOUND-ABSORBING WALL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. Sustainable Design Intent: Comply with certain prerequisites and credits needed to achieve sustainable design, measured and documented according to the LEED Green Building Rating System, of the United States Green Building Council (LEED v4 BD + C).
- C. Division 09 Section “Acoustical Panel Ceilings” for acoustical ceiling panels supported by exposed suspension system and tested for noise reduction.

1.2 SUMMARY

- A. Section includes shop-fabricated, acoustical panel units tested for acoustical performance, including the following:
 - 1. Field-painted Sound-absorbing wall panels.
 - 2. Fabric wrapped Sound-absorbing wall panels.
 - 3. Solid Wood Acoustic Grille Panels.
- B. Related Requirements:
 - 1. Reference Section 018113 “Sustainable Design Requirements” for targeted strategies for certification level and certification requirements.
 - 2. Division 09 Section "Acoustical Panel Ceilings" for acoustical ceiling panels supported by exposed suspension system and tested for noise reduction.

1.3 DEFINITIONS

- A. NRC: Noise Reduction Coefficient.
- B. SAA: Sound Absorption Average.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include panel edge, core material, and mounting indicated.

B. Sustainable Design Submittals:

1. Recycled Content: Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.
2. Regional Materials: Manufacture products within 100 miles (160 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles (160 km) of Project site.
3. Certified Wood: Certify wood products as "FSC Pure"[or "FSC Mixed Credit"] in accordance with FSC STD-01-001 and FSC STD-40-004.
4. Product Data: For adhesives, indicating VOC content.
5. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
6. Composite Wood Products: Verify products are made using ultra-low-emitting formaldehyde resins, as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products," or are made with no added formaldehyde.
7. Laboratory Test Reports: For wall materials, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For unit assembly and installation.

1. Include plans, elevations, sections, and mounting devices and details.
2. Include details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge profile and core materials.
3. Include details at cutouts and penetrations for other work.

D. Samples for Verification: For the following products:

1. Panel Edge: 12-inch- (300-mm-) long Sample(s) showing each edge profile, corner, and finish.
2. Core Material: 12-inch- (300-mm-) square Sample at corner.
3. Mounting Devices: Full-size Samples.
4. Assembled Panels: Approximately 36 by 36 inches (900 by 900 mm), including joints and mounting methods.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Elevations and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Electrical outlets, switches, and thermostats.
2. Items penetrating or covered by units including the following:
 - a. Lighting fixtures.

- b. Air outlets and inlets.
- c. Speakers.
- d. Alarms.
- e. Sprinklers.
- f. Access panels.

3. Show operation of hinged and sliding components covered by or adjacent to units.

- B. Product Certificates: For each type of unit.
- C. Sample Warranty: For manufacturer's special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of unit to include in maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials from same production run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fabric: For each fabric, color, and pattern installed, provide length equal to 10 percent of amount installed, but no fewer than 10 sq. yd., full width of bolt.
 - 2. Mounting Devices: Full-size units equal to 5 percent of amount installed, but no fewer than five devices, including unopened adhesives.

1.9 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- C. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.
- D. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials, fabrication, and installation.
 - 1. Build mockup of typical wall area 48 inches wide by full height.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Comply with fabric and unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.11 FIELD CONDITIONS

- A. Environmental Limitations: Do not install units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Lighting: Do not install units until a permanent level of lighting is provided on surfaces to receive the units.
- C. Air-Quality Limitations: Protect units from exposure to airborne odors, such as tobacco smoke, and install units under conditions free from odor contamination of ambient air.
- D. Field Measurements: Verify unit locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

1.12 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace units and components that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to the following:
 - a. Acoustical performance.
 - b. Fabric sagging, distorting, or releasing from panel edge.
 - c. Warping of core.
 - 2. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Verify wall materials comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

- B. Fire-Test-Response Characteristics: Units shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
1. Surface-Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: **[450]** or less.
 2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.
- C. **Certified Wood**: Provide an invoice including vendor's chain-of-custody number, product cost, and entity being invoiced.
1. A vendor that is certified for chain of custody by an FSC-accredited certification body.
 2. Certify wood products as "FSC Pure"[or **"FSC Mixed Credit"**] in accordance with FSC STD-01-001 and FSC STD-40-004.

Retain "Vendor Qualifications" Paragraph below if required for

2.2 SOUND-ABSORBING WALL UNITS

- A. Sound-Absorbing Wall Panel Panels (AWP-1). As indicated in drawings. Back-mounted, edge-reinforced, impact-resistant fixed, wall panel with glass fiber core. Basis of design - Conwed Designscape; an Owens Corning company, Maumee, OH. Conwed Wall Technology, Product: Respond-Hi Series or comparable product.: Manufacturer's standard panel construction consisting of facing material laminated to front face, edges, and back edge border of core.
1. Alternative Manufacturers: Alternatives will be considered provided they meet or exceed the specification criteria contained herein.
 - a. Acoustical Surfaces, Inc.
 - b. Armstrong World Industries, Lancaster, PA.
 - c. Sound Seal Inc.
 - d. Kinetic Noise Control Inc.
 2. Panel Shape: As indicated on Drawings.
 3. Mounting: Panel Z Clip to Z Bar
 4. Core: Glass-fiber board.
 - a. Core construction: Composite core of dimensionally stable rigid fiberglass.
 - b. Core density 6 to 7 lb/cu ft.
 5. Edge Construction: Manufacturer's standard chemically hardened core with no frame.
 6. Edge Profile: Square.
 7. Corner Detail: Square to form continuous profile to match edge detail.

8. Reveals between Panels: As indicated on Drawings.
 9. Facing Sheet and Material: Impact resistant, acoustically transparent, perforated rigid copolymer face-sheet and tackable fabric finish material; Basis of Design: Guilford Maine – FR701 2100 or approved equal.
 10. Color: As selected from manufacturers full range.
 11. Acoustical Performance: Sound absorption NRC of 1.00 per ASTM E 795.
 12. Nominal Overall Panel Thickness: 2 1/16 inches.
 13. Panel Width: As indicated on Drawings.
 14. Panel Height: As indicated on Drawings, mounting height as indicated on drawings.
 15. Location: As indicated in drawings.
- B. Sound-Absorbing Wall Panel (AWP-2): Manufacturer's standard panel construction consisting of facing material laminated to front face, edges, and back edge border of core.
1. Source Limitations: Obtain wall units specified in this Section and ceiling units specified in Section 095446 Fabric-wrapped Ceiling Panels from single source from single manufacturer.
 2. Basis-of-Design Product: Subject to compliance with requirements, provide Conwed Foundations Wall Panels or a comparable product by one of the following:
 - a. Acoustical Panel Systems (APS, Inc.).
 - b. Acoustical Solutions, Inc.
 - c. Armstrong World Industries, Inc.
 3. Mounting: Back mounted with manufacturer's standard metal clips or bar hangers, secured to substrate.
 4. Core: Manufacturer's standard Glass-fiber board, laminated with 1/8 inch thick, 16-20 pcf molded glass fiber.
 5. Edge Construction: Manufacturer's standard chemically hardened core with no frame.
 6. Edge Profile: Square.
 7. Reveals between Panels: Flush reveals.
 8. Finish: Acoustically transparent fiberglass mat, applied directly over face and edges of acoustical panels to provide full finished edge.
 9. Finish Type and Color: Soft Texture finish, white, field-painted to match color of walls.
 10. Acoustical Performance: Sound absorption NRC of 1.10 according to ASTM C 423 (Type D5 Mounting).
 11. Panel Thickness: 2-1/8 inch.
 12. Panel Width: As indicated on Drawings.
 13. Location: As indicated in drawings.
- C. Sound-Absorbing Wall Panel (AWP-3): Manufacturer's standard panelized wood slat/ wood blade system consisting of wood slats oriented at 90 degrees to the mounting surface with PET backer.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Linea Ceilings and Wall Systems, Linea Grille Wall Installation Type with Linea PET Felt Backer; or a comparable product by one of the following
 - a. Acoustical Panel Systems (APS, Inc.).
 - b. Conwed Wall Panels
 - c. Armstrong World Industries, Inc.
 2. Solid Wood Species: Maple.

3. Blade Size: 1" w x 1 ½" d.
4. Blade Spacing: 2" o.c between long edges of blades.
5. Panel Size: 12" w x 6'-0" l (Nominal).
6. Edge Profile: Square
7. Mounting: Panels hung on furring strips with low profile aluminum Z-Clips.
8. Finish: Factory finished smooth in clear sheen interior grade.
9. Cross members: Manufacturer's standard; Typical ½" x 1 ¼" at 12" o.c. factory-attached.
10. Backer: Linea PET Felt Backer, semi-rigid, lightweight and sound absorbing; 100% non-woven polyester; Class A Fire-rated (ASTM 84); 12mm (or 24mm??)
11. Acoustical Performance: **NRC 0.9?**
12. Location: Adult A101, As indicated in drawings.

2.3 MATERIALS

- A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.
- B. Regional Materials: Manufacture products within **100 miles (160 km)** of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within **100 miles (160 km)** of Project site.
- C. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.
- D. Core Materials: Manufacturer's standard.
 1. Glass-Fiber Board: ASTM C 612; of type standard with manufacturer; nominal density of **6 to 7 lb/cu. ft. (96 to 112 kg/cu. m)**, unfaced, and dimensionally stable, molded rigid board; and with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
 2. MDF or Particle Board composite: ¾" thick, Class A firerated with high recycled content.
- E. Mounting Devices: Concealed on back of unit, recommended by manufacturer to support weight of unit, and as follows:
 1. Splines: Manufacturer's standard concealed metal or plastic splines that engage the kerfed edges of the unit, with other moldings and trim for interior corners, exterior corners, and exposed edges, with factory-applied finish on exposed items.
 2. Adhesives shall have a VOC content of 70 g/L or less.
 3. Adhesive Tape Strips: Manufacturer's standard 1/16-inch- (1.6-mm-) thick, double-sided foam tape.
 4. Metal Clips or Bar Hangers: Manufacturer's standard two-part metal "Z" clips, with one part of each clip mechanically attached to back of unit and the other part to substrate, designed to permit unit removal.

2.4 FABRICATION

- A. Standard Construction: Use manufacturer's standard construction unless otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.
- B. Edge Hardening: For glass-fiber board cores, chemically harden core edges and areas of core where mounting devices are attached.
- C. Core-Face Layer: Evenly stretched over core face and edges and securely attached to core; free from puckers, ripples, wrinkles, or sags.
- D. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.
 - 1. Square Corners: Tailor corners.
 - 2. Radius and Other Nonsquare Corners: Attach facing material so there are no seams or gathering of material.
 - 3. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches in adjacent units.
- E. Dimensional Tolerances of Finished Units: In accordance with CISCA dimensional tolerances, plus or minus 1/16 inch (1.6 mm) for the following:
 - 1. Thickness.
 - 2. Edge straightness.
 - 3. Overall length and width.
 - 4. Squareness from corner to corner.
 - 5. Chords, radii, and diameters.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fabric, fabricated units, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting unit performance.
- B. Verify wet work such as plastering and concrete is complete and dry. Verify building is enclosed and under standard occupancy conditions (60-85 degrees F and not more than 70 percent relative humidity) prior to start of installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Commencement of installation constitutes Installer's acceptance of surfaces and conditions.

3.2 INSTALLATION

- A. Install units in locations indicated. Unless otherwise indicated, install units with vertical surfaces and edges plumb, top edges level and in alignment with other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.
- C. Align fabric pattern and grain with adjacent units.

3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb and Level: Plus or minus 1/16 inch (1.6 mm) in 48 inches (1200 mm), noncumulative.
- B. Variation of Joint Width: Not more than 1/16-inch (1.6-mm) variation from reveal line in 48 inches (1200 mm), noncumulative.

3.4 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 098433

SECTION 099120 - PAINTING (PROFESSIONAL LINE PRODUCTS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.
 - 1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface. If a color is not indicated, Architect will select colors. The painter should assume that different items will be different colors, e.g. exposed metal deck and exposed structural steel. Also, the painter should assume each space will have one accent wall that is a different color from the other walls.
 - 1. Painting includes field painting of all exposed bare and covered pipes, hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
 - 1. Prefinished items include the following factory-finished components:
 - a. Architectural woodwork.
 - b. Metal toilet enclosures.
 - c. Metal lockers.
 - d. Elevator entrance doors and frames.
 - e. Finished mechanical and electrical equipment.
 - f. Light fixtures.
 - 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
 - a. Foundation spaces.
 - b. Furred areas.
 - c. Ceiling plenums, unless visible from below.
 - d. Utility tunnels.

- e. Pipe spaces.
 - f. Duct shafts.
3. Finished metal surfaces, with the exception of piping, conduit, and exposed metal deck, include the following:
- a. Aluminum.
 - b. Stainless steel.
 - c. Chromium plate.
 - d. Copper and copper alloys.
 - e. Bronze and brass.
 - f. Zinc coated steel (galvanized).
4. Operating parts include moving parts of operating equipment and the following:
- a. Valve and damper operators.
 - b. Linkages.
 - c. Sensing devices.
 - d. Motor and fan shafts.
5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
- D. Related Sections include the following:
- 1. Division 32 Section "Asphalt Paving" for traffic-marking paint.
 - 2. Division 5 Section "Structural Steel" for shop priming structural steel.
 - 3. Division 5 Section "Metal Fabrications" for shop priming ferrous metal.
 - 4. Division 8 Section "Custom Steel Doors and Frames" for factory priming steel doors and frames.
 - 5. Division 9 Section "Gypsum Board Assemblies" for surface preparation of gypsum board.

1.3 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
- 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
 - 2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
 - 3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
 - 4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.4 SUBMITTALS

- A. Product Data: For each paint system indicated. Include block fillers and primers.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
- B. Samples for Initial Selection: For each type of finish-coat material indicated.
1. After color selection, Architect will furnish color chips for surfaces to be coated.
- C. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
 2. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.
- C. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.
1. Architect will select one room or surface to represent surfaces and conditions for application of each type of coating and substrate.
 - a. Wall Surfaces: Provide samples on at least 100 sq. ft.
 - b. Small Areas and Items: Architect will designate items or areas required.
 2. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface.
 - a. After finishes are accepted, Architect will use the room or surface to evaluate coating systems of a similar nature.
 3. Final approval of colors will be from benchmark samples.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
 - 1. Product name or title of material.
 - 2. Product description (generic classification or binder type).
 - 3. Manufacturer's stock number and date of manufacture.
 - 4. Contents by volume, for pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.
 - 8. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.7 PROJECT CONDITIONS

- A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.
- B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.
- C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.8 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.
 - 1. Quantity: Furnish Owner with extra paint materials in quantities indicated below:
 - a. Exterior, Semigloss Acrylic Enamel: One gal. of each color applied.
 - b. Interior, Flat Acrylic Paint: One gal. of each color applied.
 - c. Interior, Low-Luster Acrylic Finish: One gal. of each color applied.
 - d. Interior, Semigloss Acrylic Enamel: Two gal. of each color applied.
 - e. Interior, Gloss Acrylic Enamel: One gal. of each color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: The schedule of paint types names the products of Sherwin-Williams as the standard of quality.
- B. Manufacturers' Names: Provide products from one of the following manufacturers:
 - 1. Benjamin Moore & Co. (Benjamin Moore).
 - 2. Akzo Nobel Paints, LLC (Glidden Professional).
 - 3. PPG Industries, Inc. (Pittsburgh Paints).
 - 4. Sherwin-Williams Co. (Sherwin-Williams).

2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
 - 1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.
- C. Colors: Match Architect's samples.

2.3 CONCRETE UNIT MASONRY BLOCK FILLERS

- A. Concrete Unit Masonry Block Filler: Factory-formulated high-performance latex block fillers.
 - 1. Sherwin-Williams; PrepRite Interior/Exterior Block Filler B25W25: Applied at a dry film thickness of not less than 8.0 mils.

2.4 EXTERIOR PRIMERS

- A. Exterior Ferrous-Metal Primer: Factory-formulated rust-inhibitive metal primer for exterior application.
 - 1. Sherwin-Williams; Kem Kromik Universal Metal Primer B50NZ6/B50WZ1: Applied at a dry film thickness of not less than 3.0 mils.

2.5 INTERIOR PRIMERS

- A. Interior Concrete and Masonry Primer: Factory-formulated alkali-resistant acrylic-latex interior primer for interior application.
 - 1. Sherwin-Williams; PrepRite Masonry Primer B28W300: Applied at a dry film thickness of not less than 3.0 mils.
- B. Interior Gypsum Board Primer: Factory-formulated latex-based primer for interior application.
 - 1. Sherwin-Williams; PrepRite 200 Latex Wall Primer B28W200 Series: Applied at a dry film thickness of not less than 1.6 mils.
- C. Interior Ferrous-Metal Primer: Factory-formulated quick-drying rust-inhibitive alkyd-based metal primer.
 - 1. Sherwin-Williams; Kem Kromik Universal Metal Primer B50Z Series: Applied at a dry film thickness of not less than 3.0 mils.
- D. Interior Non-Ferrous Metal Primer: Factory-formulated quick-drying alkyd-based metal primer.
 - 1. Sherwin-Williams; Kem-Flash 500: Applied at a dry film thickness of not less than 1.5 mils.

2.6 EXTERIOR FINISH COATS

- A. Exterior Semi-Gloss Acrylic Enamel: Factory-formulated semigloss alkyd enamel for exterior application.
 - 1. Sherwin-Williams; A-100 Semi-Gloss A82 Series: Applied at a dry film thickness of not less than 1.3 mils.
- B. Exterior Flat Acrylic Enamel: Factory-formulated flat acrylic-emulsion latex paint for exterior application.
 - 1. Sherwin-Williams; A-100 Flat A6 Series: Applied at a dry film thickness of not less than 1.2 mils.

2.7 INTERIOR FINISH COATS

- A. Interior Flat Acrylic Paint: Factory-formulated flat acrylic-emulsion latex paint for interior application.
 - 1. Sherwin-Williams; ProMar 200 Interior Latex Flat Wall Paint B30W200 Series: Applied at a dry film thickness of not less than 1.4 mils.
- B. Interior Low-Luster Acrylic Enamel: Factory-formulated eggshell acrylic-latex interior enamel.
 - 1. Sherwin-Williams; ProMar 200 Interior Latex Egg-Shell Enamel B20-2200 Series: Applied at a dry film thickness of not less than 1.6 mils.
- C. Interior Satin Polyurethane: Factory formulated satin super-hydrophobic polyurethane anti-graffiti coating.
 - 1. Sherwin-Williams; 2K Waterbased Urethane Anti-Graffiti Coating: Applied at a dry film thickness of not less than 2.0 mils.
- D. Interior Semigloss Acrylic Enamel: Factory-formulated semigloss acrylic-latex enamel for interior application.

1. Sherwin-Williams; ProMar 200 Interior Latex Semi-Gloss Enamel B31-2200 Series:
Applied at a dry film thickness of not less than 1.5 mils.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.
 1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.

3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.
 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
 1. Provide barrier coats over incompatible primers or remove and reprime.
 2. Cementitious Materials: Prepare concrete and concrete unit masonry surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
 - a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.

- b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
- 3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
 - a. Clean steel surfaces as recommended by paint system manufacturer and according to SSPC-SP 3.
 - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 - c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.
- D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
 - 1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 - 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 - 3. Use only thinners approved by paint manufacturer and only within recommended limits.
- E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
 - 1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
 - 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 - 3. Provide finish coats that are compatible with primers used.
 - 4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, ceilings, and similar components are in place. Extend coatings in these areas, as required, so that no unfinished surfaces are visible and to maintain system integrity and provide desired protection.
 - 5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.

7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
 9. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 2. Omit primer over metal surfaces that have been shop primed and touchup painted.
 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
 2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.
- E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.
- F. Mechanical items to be painted include, but are not limited to, the following:
1. Uninsulated and insulated metal piping.
 2. Uninsulated plastic piping.
 3. Pipe hangers and supports.
 4. Tanks that do not have factory-applied final finishes.
 5. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
 6. Duct, equipment, and pipe insulation having "all-service jacket" or other paintable jacket material.
 7. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

- G. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- H. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- I. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- J. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
 - 1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.5 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
 - 1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.6 EXTERIOR PAINT SCHEDULE

- A. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.
 - 1. Semi-Gloss Alkyd-Enamel Finish: Two finish coats over a rust-inhibitive primer.
 - a. Primer: Exterior ferrous-metal primer.
 - b. Finish Coats: Exterior full-gloss alkyd enamel.

3.7 INTERIOR PAINT SCHEDULE

- A. Concrete Unit Masonry: Provide the following finish systems over interior concrete masonry:

1. Interior Semi-Gloss Acrylic-Enamel Finish: Two finish coats over a block filler.
 - a. Block Filler: Concrete unit masonry block filler.
 - b. Finish Coats: Interior semi-gloss acrylic enamel.
- B. Ground Faced Concrete Unit Masonry: Provide the following finish at all ground faced CMU:
 1. Interior Satin Polyurethane Finish: One finish coat.
- C. Gypsum Board: Provide the following finish systems over interior gypsum board ceilings (except Toilet Room ceilings) and soffits:
 1. Flat Acrylic Finish: Two finish coats over a primer.
 - a. Primer: Interior gypsum board primer.
 - b. Finish Coats: Interior flat acrylic paint.
- D. Gypsum Board: Provide the following finish systems over gypsum board ceilings in Toilet Rooms, and gypsum board walls;
 1. Low-Luster Acrylic-Enamel Finish: Two finish coats over a primer.
 - a. Primer: Interior gypsum board primer.
 - b. Finish Coats: Interior low-luster acrylic enamel.
- E. Ferrous and Non-Ferrous Metal: Provide the following finish systems over non-ferrous metal:
 1. Alkyd-Enamel Finish: Two finish coats over a primer.
 - a. Primer: Interior non-ferrous-metal primer.
 - b. Finish Coats: Interior semigloss.

END OF SECTION 099120

SECTION 101100 - VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. Sustainable Design Intent: Comply with certain prerequisites and credits needed to achieve sustainable design, measured and documented according to the LEED Green Building Rating System, of the United States Green Building Council (LEED v4 BD + C).
 - 1. Reference Section 018113 “Sustainable Design Requirements” for targeted strategies for certification level and certification requirements.

1.2 SUMMARY

- A. Section Includes:
 - 1. Visual display board assemblies – Tackboards.

1.3 ACTION SUBMITTALS

- A. Product Data:
 - 1. Visual display board assemblies.
- B. Product Data Submittals: For each product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, and accessories for visual display units.
- C. Sustainable Design Submittals:
 - 1. Recycled Content: Recycled Content: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 20 percent.
 - 2. Product Data: For installation adhesives, indicating VOC content.
 - 3. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.
 - 4. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.
- D. Shop Drawings: For visual display units.
 - 1. Include plans, elevations, sections, details, and attachment to other work.

2. Show locations of panel joints. Show locations of field-assembled joints for factory-fabricated units too large to ship in one piece.
 3. Include sections of typical trim members.
- E. Samples for Initial Selection: For each type of visual display unit indicated, for units with factory-applied color finishes, and as follows:
1. Samples of facings for each visual display panel type, indicating color and texture.
 2. Actual factory-finish color samples, applied to Substrate.
 3. Include accessory Samples to verify color selected.
- F. Samples for Verification: For each type of visual display unit indicated.
1. Visual Display Panel: Not less than 8-1/2 by 11 inches (215 by 280 mm), with facing, core, and backing indicated for final Work. Include one panel for each type, color, and texture required.
 2. Trim: 6-inch- (150-mm-) long sections of each trim profile.
 3. Accessories: Full-size Sample of each type of accessory.
- G. Product Schedule: For visual display units. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each visual display unit, for tests performed by manufacturer and witnessed by a qualified testing agency for surface burning characteristics.
- C. Sample Warranties: For manufacturer's special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For visual display units to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-fabricated visual display units completely assembled in one piece. If dimensions exceed maximum manufactured unit size, or if unit size is impracticable to ship in one piece, provide two or more pieces with joints in locations indicated on approved Shop Drawings.

1.8 FIELD CONDITIONS

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

1.9 WARRANTY

- A. One Year

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.

2.2 VISUAL DISPLAY BOARD ASSEMBLIES

- A. Visual Display Board Assemblies:
 - 1. Basis of Design Product: Subject to compliance with requirements, provide Connect by Claridge, Concept Series in Calyx cork, or provide products by one of the following manufacturers:
 - a. Egan Visual.
 - b. Peter Pepper Products, Inc.
 - c. PolyVision Corporation.
 - d. Ghent; a GMi Company.
- B. Visual Display Board Assembly: Factory fabricated.
 - 1. Assembly: Tackboard.
 - 2. Corners: Manufacturer's standard Eased Edge.
 - 3. Width: 8 feet
 - 4. Height: 4 feet
 - 5. Total Quantity: 6
 - 6. Mounting Method: Direct to wall.
- C. Aluminum Frames and Trim: Fabricated from 1/8" thick, extruded aluminum in manufacturer's standard size and shape. 5/16" w with eased edge.
 - 1. Field-Applied Trim: Manufacturer's standard.
 - 2. Aluminum Finish: Satin Anodized in standard or optional powder coat.

- a. Color: As selected by Architect from full range of manufacturer's standard or optional colors.
- 3. Aluminum Trim: Factory applied in manufacturer's standard finish.

2.3 MATERIALS

- A. Natural-Cork Sheet: Seamless, single-layer, compressed fine-grain cork sheet; bulletin board quality; face sanded for natural finish.
- B. Composite Wood Products: Verify products are made using ultra-low-emitting formaldehyde resins, as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products," or are made with no added formaldehyde.
- C. Hardboard: ANSI A135.4, tempered.
- D. Particleboard: ANSI A208.1, Grade M-1.
- E. MDF: ANSI A208.2, Grade 130.
- F. Fiberboard: ASTM C208 cellulosic fiber insulating board.
- G. Extruded Aluminum: **ASTM B221** (**ASTM B221M**), Alloy 6063.
- H. Adhesives for Field Application: Mildew-resistant, nonstaining adhesive for use with specific type of panels, sheets, or assemblies; and for substrate application; as recommended in writing by visual display unit manufacturer.
 - 1. Verify adhesives have a VOC content of [50] **<Insert value>** g/L or less.
 - 2. Verify adhesive complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- I. Primer/Sealer: Mildew-resistant primer/sealer complying with requirements in **Section 099123 "Interior Painting"** and recommended in writing by visual display unit manufacturer for intended substrate.

2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA AMP 500 for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
- B. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.
- C. Baked-Enamel or Powder-Coat Finish: AAMA 2603, except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.
- B. Examine walls and partitions for proper preparation and backing for visual display units.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances, such as dirt, mold, and mildew, that could impair the performance of and affect the smooth, finished surfaces of visual display boards.
- C. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display units and wall surfaces.
- D. Prime wall surfaces indicated to receive direct-applied visual display assemblies and as recommended in writing by primer/sealer manufacturer and visual display unit manufacturer.

3.3 INSTALLATION

- A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- B. Factory-Fabricated Visual Display Board Assemblies:
 - 1. Adhere to wall surfaces with **egg-size** adhesive gobs at 16 inches (400 mm) o.c., horizontally and vertically.

2. Attach concealed clips, hangers, and grounds to wall surfaces and to visual display board assemblies with fasteners at not more than 16 inches (400 mm) o.c. Secure tops and bottoms of boards to walls.
- C. Visual Display Board Assembly Mounting Heights: Install visual display units at mounting heights indicated on Drawings, or if not indicated, at heights indicated below.
 1. Mounting Height: 36 inches above finished floor.
 2. Adjust panels to operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.4 CLEANING AND PROTECTION

- A. Clean visual display units in accordance with manufacturer's written instructions. Attach one removable cleaning instructions label to visual display unit in each room.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.
- C. Cover and protect visual display units after installation and cleaning.

END OF SECTION 101100

SECTION 101401 – SITE SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section “Summary”, Paragraph 1.1A, entitled “Related Documents.”

1.2 SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication and installation details for signs and posts.

1.3 SUMMARY

- A. This Section includes the following:

- 1. 'Stop' signs
- 2. 'Do not enter' signs
- 3. 'One-Way' signs
- 4. 'Lane Use' signs
- 5. 'Keep Right' signs
- 6. 'Accessible Parking' signs
- 7. 'Van Accessible' signs
- 8. 'School Crossing' signs
- 9. 'Student Pick-Up and Drop-Off Only' signs
- 10. 'Visitor and Student Pick-Up Drop-Off' signs
- 11. 'No Parking Here to Corner' signs
- 12. 'Bus Lane School Buses Only' signs
- 13. 'Staff Parking' signs
- 14. 'Staff Parking/Pickup and Drop-Off' signs
- 15. 'No Parking – Emergency Access Only' signs
- 16. All sign posts and mounting hardware

1.4 DEFINITIONS

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with applicable provisions of the Standard Specifications Form 818.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. 'Stop' Signs: Shall conform to State of Connecticut Department of Transportation "Specifications for Roads, Bridges, Facilities and Incidental Construction" 2020 edition and latest supplements, Form 818 Article M.18.09.2.
- B. 'Do Not Enter' Signs: Shall conform to State of Connecticut Department of Transportation "Specifications for Roads, Bridges, Facilities and Incidental Construction" 2020 edition and latest supplements, Form 818 Article M.18.09.2.
- C. 'One-Way' Signs, 'Lane Use' Signs, 'Keep Right' Signs, 'Accessible Parking' Signs, 'Van Accessible' Signs, 'School Crossing' Signs, 'Student Pick-Up and Drop-Off Only' Signs, 'Visitor and Student Pick-Up Drop-Off' Signs, 'No Parking Here to Corner' Signs, 'Bus Lane School Buses Only' Signs, 'Staff Parking' Signs, 'Staff Parking / Pick-Up and Drop-Off' Signs. All signs shall conform to State of Connecticut Department of Transportation "Specifications for Roads, Bridges, Facilities and Incidental Construction" 2020 edition and latest supplements, Form 818 Article M.18.09.1.
- D. Manual on Uniform Traffic Control Devices (MUTCD).
- E. Metal Sign Posts: Shall conform to State of Connecticut Department of Transportation "Specifications for Roads, Bridges, Facilities and Incidental Construction" 2020 edition and latest supplements, Form 818 Article M.18.14.
- F. Square Metal Sign Posts: Shall be as indicated on the Contract Drawings.
- G. Sign Mounting Bolts: Shall conform to State of Connecticut Department of Transportation "Specifications for Roads, Bridges, Facilities and Incidental Construction" 2020 edition and latest supplements, Form 818 Article M.18.15.
- H. Sign Post Foundations: Shall be as indicated on the Contract Drawings and in conformance with Section 32 32 13 "Cast-In-Place Concrete".

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate signs and accessories where indicated on plans and complying with the State of Connecticut Department of Transportation "Specifications for Roads, Bridges, Facilities and Incidental Construction" 2020 edition and latest supplements, Form 818 Sections 12.07 and 12.08.
- B. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance. Contractor is responsible to verify sign locations do not impact underground utilities including irrigation lines.
- C. Install square posts as indicated on the Contract Drawings and per the manufacturer's recommendations.
- D. Sign Posts with Concrete Foundation: Drill holes in firm, undisturbed or compacted soil to the dimensions indicated on the Contract Drawings. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Place concrete around posts in a continuous pour. Trowel finish around post. Slope to direct water away from posts.

END OF SECTION 101401

SECTION 102113.19 - PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 Sustainable Design Intent: Comply with certain prerequisites and credits needed to achieve sustainable design, measured and documented according to the LEED Green Building Rating System, of the United States Green Building Council (LEED v4 BD + C).

1.3 SUMMARY

A. Section Includes:

- 1. Solid-plastic toilet compartments configured as toilet enclosures and urinal screens.

B. Related Requirements:

- 1. Reference Section 018113 "Sustainable Design Requirements" for targeted strategies for certification level and certification requirements.
- 2. Section 055000 "Metal Fabrications" for supports that attach ceiling-hung compartments and floor-and-ceiling-anchored compartments. to overhead structural system.
- 3. Section 061000 "Rough Carpentry" for blocking overhead support of floor-and-ceiling-anchored compartments.
- 4. Section 102800 "Toilet, Bath, and Laundry Accessories" for accessories mounted on toilet compartments.

1.4 COORDINATION

- A. Coordinate requirements for overhead supports, blocking, reinforcing, and other supports concealed within wall and ceiling to ensure that toilet compartments can be supported and installed as indicated.

1.5 ACTION SUBMITTALS

A. Product Data:

- 1. Solid-plastic toilet compartments:
 - a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet enclosures and urinal screens.

B. LEED Building Submittals:

1. Regional Materials: Manufacture products within 100 miles (160 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles (160 km) of Project site.
2. Recycled Content: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 20 percent.

C. Shop Drawings:

1. Include plans, elevations, sections, details, and attachment details.
2. Show locations of cutouts for compartment-mounted toilet accessories.
3. Show locations of centerlines of toilet fixtures.
4. Show locations of floor drains.
5. Show support or bracing locations.
6. Show locations of reinforcements for compartment-mounted grab bars.

D. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of toilet compartment.

1. Include Samples of hardware and accessories involving material and color selection.

E. Samples for Verification: Actual sample of finished products for each type of toilet compartment, hardware, and accessory indicated for Work.

1. Each type of material, color, and finish required for toilet compartments, Samples of same thickness and material indicated for Work.
2. Each type of hardware and accessory.
3. Size: Manufacturer's standard sizes unless otherwise indicated:

F. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.

G. Delegated Design Submittals: For grab bars mounted on toilet compartment panels, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Include structural design calculations indicating compliance with specified structural-performance requirements.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of toilet compartment.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For toilet compartments.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements, and coordinate before fabrication.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain plastic toilet compartments from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 75 or less.
 - 2. Smoke-Developed Index: 450 or less.
- B. Structural Performance: Where grab bars are mounted on toilet compartments, design panels to comply with the following requirements:
 - 1. Panels are able to withstand a concentrated load on grab bar of at least **250 lbf (1112 N)** applied at any direction and at any point, without deformation of panel.
- C. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Building and Facilities" ICC A117.1 for toilet compartments designated as accessible.

2.3 SOLID-PLASTIC TOILET COMPARTMENTS <Insert drawing designation>

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AJW Architectural Products.
 - 2. Bradley Corporation.
 - 3. Scranton Products
- B. Toilet-Enclosure Style: Floor and ceiling anchored
- C. Urinal-Screen Style: Wall hung Construction: matching panel construction.
- D. Door, Panel, Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch (25 mm) thick, seamless, with eased edges, no-sightline system, and with homogenous color and pattern throughout thickness of material.
 - 1. Integral Hinges: Configure doors and pilasters to receive integral hinges.

2. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum or stainless-steel strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.
 3. Color and Pattern: One color and pattern in each room as selected by Architect from manufacturer's full range. Entrance-Screen Construction: Matching panel construction
- E. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design aluminum or stainless steel.
- F. Brackets (Fittings):
1. Stirrup Type: Ear or U-brackets, aluminum or stainless steel.
 2. Full-Height (Continuous) Type: Manufacturer's standard design; aluminum or stainless steel.
- G. Overhead Cross Bracing for Ceiling-Hung Units: As recommended by manufacturer and fabricated from solid plastic.

2.4 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's heavy-duty operating hardware and accessories.
1. Hinges: Hinges: Manufacturer's minimum ~~0.062-inch-~~ (1.59-mm-) thick stainless-steel paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees, allowing emergency access by lifting door. Mount with through-bolts.
 2. Latch and Keeper: Manufacturer's heavy-duty surface-mounted cast-stainless-steel latch unit designed to resist damage due to slamming, with combination rubber-faced door strike and keeper, and with provision for emergency access. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Mount with through-bolts
 3. Coat Hook: Coat Hook: Manufacturer's heavy-duty combination cast-stainless-steel hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories. Mount with through-bolts.
 4. Door Bumper: Manufacturer's heavy-duty rubber-tipped cast-stainless-steel bumper at out-swinging doors. Mount with through-bolts.
 5. Door Pull: Manufacturer's heavy-duty cast-stainless-steel pull for out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible. Mount with through-bolts.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with anti-grip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel compatible with related materials.

2.5 MATERIALS

- A. Aluminum Castings: ASTM B26/B26M.
- B. Aluminum Extrusions: ~~ASTM B221~~ (ASTM B221M).
- C. Brass Castings: ASTM B 584
- D. Brass Extrusions: ASTM B 455
- E. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.
- F. Stainless Steel Castings: ASTM A743/A743M.
- G. Zamac: ASTM B86, commercial zinc-alloy die castings.

2.6 FABRICATION

- A. Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Floor-and-Ceiling-Anchored Units: Manufacturer's standard corrosion-resistant anchoring assemblies at pilasters and walls, with leveling adjustment nuts at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.
- C. Door Size and Swings: Unless otherwise indicated, provide ~~24-inch-~~ (610-mm-) wide, in swinging doors for standard toilet enclosures and ~~36-inch-~~ (914-mm-) wide, out swinging doors with a minimum ~~32-inch-~~ (813-mm-) wide, clear opening for toilet enclosures designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
 - 1. Confirm location and adequacy of blocking and supports required for installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels or Screens: 1/2 inch (13 mm).
 - b. Panels or Screens and Walls: 1 inch (25 mm).
 - 2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel.
 - a. Locate wall brackets, so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
 - 3. Full-Height (Continuous) Brackets: Secure panels or screens to walls and to pilasters with full-height brackets.
 - a. Locate bracket fasteners, so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Floor-and-Ceiling-Anchored Units: Secure pilasters to supporting construction and level, plumb, and tighten. Hang doors and adjust, so doors are level and aligned with panels, when doors are in closed position.
- C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware in accordance with hardware manufacturer's written instructions for proper operation. Set hinges on in swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out swinging doors to return doors to fully closed position.

END OF SECTION 102113.19

SECTION 102800 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Toilet accessories.

1.3 SUBMITTALS

- A. Product Data: For each product indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Products: The design for toilet and bath accessories described in Part 2 are based on products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
 - 1. Toilet and Bath Accessories:
 - a. A & J Washroom Accessories, Inc.
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment, Inc.
 - d. Bradley Corporation.
 - e. McKinney/Parker Washroom Accessories Corp.

2.2 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, No. 4 finish (satin), 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

- C. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.
- D. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

2.3 TOILET AND BATH ACCESSORIES

- A. Surface Mounted Paper Towel Dispenser: Children and Staff Toilets
 - 1. Basis of Design Product: Bobrick B-3942 Semi-Recessed Convertible Towel/Waste Receptacle.
 - 2. Mounting: Semi-recessed.
- B. Toilet Tissue Dispenser:
 - 1. Public toilets: Double-Roll, locking
 - a. Basis of Design Product: Bobrick B-3588 Multi-roll tissue dispenser
 - b. Mounting: surface
 - 2. Staff Toilets: Single Roll
 - a. Basis of Design Product: Bobrick B-9543 Single roll dispenser
 - b. Mounting: surface.
- C. Sanitary Napkin Disposal:
 - 1. Basis-of-Design Product: Bobrick; Model B-270
 - 2. Mounting: Surface Mounted.
 - 3. Capacity: 0.7 gal.
 - 4. Materials: 22 gage stainless steel.
- D. Grab Bar:
 - 1. Basis-of-Design Product: Bobrick; B-5507.99 Series.
 - 2. Material: Stainless steel, 18 gage.
 - 3. Mounting: Concealed.
 - 4. Gripping Surfaces: Slip-resistant texture.
 - 5. Outside Diameter: 1-1/4 inches.
- E. Soap Dispenser:
 - 1. Basis of Design Product: Bobrick B-2012
 - 2. Mounting: Surface
 - 3. Except at trough sink in gang toilets with built-in dispenser.
- F. Mirror with Frame:
 - 1. Manufacturers:
 - a. American Specialties
 - b. Bobrick
 - c. Bradley Corp.
 - 2. Material:
 - a. Stainless steel channel
 - b. ¼ inch float glass

3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
 4. Size: As indicated on Drawings.
- G. Electric Hand Dryer:
1. Basis of Design Product: Bobrick B-7128 QuietDry Series, TrimDry ADA Surface mounted hand dryer
 2. Mounting: Surface.
 - 3.
- H. Baby Changing Station:
1. Basis of Design Product: Koala Kare Model KB200-SS
 2. Mounting: Surface
- I. Utility Shelves (one per custodial room):
1. Basis-of-Design Product: Bobrick; B-239x34.
 2. Material: Stainless steel.
 3. Length: 34 inches.
 4. Shelf: 0.05-inch- thick stainless steel.
 5. Hooks: Four.
 6. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
1. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.
- B. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items. Remove temporary labels and protective coatings.

END OF SECTION 102800

SECTION 105113 - METAL LOCKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section
- B. **Sustainable Design Intent:** Comply with certain prerequisites and credits needed to achieve sustainable design, measured and documented according to the LEED Green Building Rating System, of the United States Green Building Council (LEED v4 BD + C).

1.2 SUMMARY

- A. Section Includes:
 - 1. Welded Lockers.
 - 2. **Sustainable Design Intent Reference Section 018113 “Sustainable Design Requirements” for targeted strategies for certification level and certification requirements.**

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker.
- B. **Sustainable Design Submittals:**
 - 1. **Product Data:** For recycled content, indicating postconsumer and pre-consumer recycled content and cost.
 - 2. **Recycled Content:** Postconsumer recycled content plus one-half of pre-consumer recycled content not less than **20** percent.
 - 3. **Environmental Product Declaration:** For each product.
 - 4. **Health Product Declaration:** For each product
 - 5. **Sourcing of Raw Materials:** Corporate sustainability report for each manufacturer
- C. Shop Drawings: For metal lockers.
 - 1. Include plans, elevations, sections, and attachment details, and attachments to other work.
 - 2. Indicate ADA locker location

- 3. Show locker trim and accessories.
- 4. Include locker identification system and numbering sequence
- D. Samples: For each color specified, in manufacturer's standard size.
- E. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available.
- F. Samples for Verification: For the following products, in manufacturer's standard size:
 - 1. Lockers and equipment.
- G. Product Schedule: For lockers.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for their installation.
- B. Deliver master and control keys to Owner by registered mail or overnight package service.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions by field measurements before fabrication.

1.8 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Faulty operation of latches and other door hardware.
2. Damage from deliberate destruction and vandalism is excluded.
3. Warranty Period for Welded Metal Lockers: **Lifetime** from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain metal lockers and accessories from single source from single locker manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: For lockers comply with applicable provisions in the US Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.

2.3 WELDED LOCKERS

- A. Products: Subject to compliance with requirements, available product that may be incorporated into the Work Include, but are not limited to the following:
 1. Lyon Workspace Products.
 2. Republic Storage Products.
 3. ASI Storage Solutions.
- B. Locker Arrangement: Five Tier
 1. Location - Staff Lounge 116
 2. Qty: 2 - One Wide
- C. Locker Size: 15"W x 15"D x 66"H
- D. Doors: One piece; fabricated from 0.075-inch (1.90-mm) nominal-thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.
 1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches (381 mm) wide; welded to inner face of doors.
 2. Door Style: Vented panel as follows:
 - a. Louvered Vents: No fewer than 3 louver openings at each locker door.
- E. Body: Assembled by welding body components together. Fabricate from unperforated steel sheet with thicknesses as follows:

1. Tops, Bottoms, and Sides: 0.060-inch (1.52-mm) nominal thickness.
 2. Backs: 0.048-inch (1.21-mm) nominal thickness.
- F. Frames: Channel formed; fabricated from 0.060-inch (1.52-mm) nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.
1. Cross Frames between Tiers: Channel formed and fabricated from same material as main frames; welded to vertical main frames.
- G. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees; self-closing.
1. Hinges: Manufacturer's standard, steel, continuous or knuckle type.
- H. Projecting Door Handle and Latch: Finger-lift latch control designed for use with either built-in combination locks or padlocks; positive automatic latching, chromium plated; pry and vandal resistant.
- I. Recessed Door Handle and Latch: Stainless steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.
1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks or padlocks; positive automatic latching and pre-locking.
 - a. Latch Hooks: Equip doors 48 inches (1219 mm) and higher with three latch hooks and doors less than 48 inches (1219 mm) high with two latch hooks; fabricated from 0.120-inch (3.04-mm) nominal-thickness steel sheet; welded to full-height door strikes; with resilient silencer on each latch hook.
 - b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a pre-locking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.
- J. Locks: Built-in combination locks
- K. Identification Plates: Manufacturer's standard, etched, embossed, or stamped **aluminum** plates, with numbers and letters at least 3/8 inch (9 mm) high.
- L. Continuous Zee Base: 4" high fabricated from 0.075-inch (1.90-mm) nominal-thickness steel sheet.
- M. Continuous Flat Tops: Fabricated from 0.048-inch (1.21-mm) nominal-thickness steel sheet, with a pitch of approximately 20 degrees.
- N. Finished End Panels: Fabricated from 0.024-inch (0.61-mm) nominal-thickness steel sheet to cover unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of non-recessed metal lockers; finished to match lockers.

O. Materials:

1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.

P. Finish: Baked enamel or powder coat.

1. Color: As selected by Architect from manufacturer's full range

2.4 LOCKS

A. Built-in Combination Lock: Key-controlled, three-number dialing combination locks; capable of at least five combination changes made automatically with a control key.

1. Bolt Operation: Manually locking deadbolt or automatically locking spring bolt.

2.5 FABRICATION

A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.

1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.

B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments. Factory weld frame members of each metal locker together to form a rigid, one-piece assembly.

C. Equipment: Provide each locker with an identification plate.

D. Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds smooth and flush.

E. Continuous Base: Formed into channel or zee profile for stiffness, and fabricated in lengths as long as practical to enclose base and base ends of metal lockers; finished to match lockers

F. Continuous Flat Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.

G. Finished End Panels: Fabricated to conceal unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of non-recessed metal lockers; finished to match lockers.

2.6 ACCESSORIES

- A. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.
- B. Anchors: Material, type, and size required for secure anchorage to each substrate.
 - 1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls for corrosion resistance.
 - 2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and floors or support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install lockers level, plumb, and true; shim as required, using concealed shims.
 - 1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
 - 2. Anchor single rows of metal lockers to walls near top and bottom of lockers.
- B. Welded Lockers: Connect groups together with manufacturer's standard fasteners, with no exposed fasteners on face frames.
- C. Equipment:
 - 1. Attach hooks with at least two fasteners.
 - 2. Attach door locks on doors using security-type fasteners.
 - 3. Identification Plates: Identify metal lockers with identification indicated on Drawings.
 - a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
 - b. Attach plates to upper shelf of each open-front metal locker, centered, with a least two aluminum rivets.
- D. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
 - 1. Attach sloping-top units to metal lockers, with closures at exposed ends.

2. Attach boxed end panels using concealed fasteners to conceal exposed ends of non-recessed metal lockers.
3. Attach finished end panels using fasteners only at perimeter to conceal exposed ends of non-recessed metal lockers.

3.3 ADJUSTING

- A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding. Verify that integral locking devices operate properly.

3.4 PROTECTION

- A. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.
- B. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 105113

SECTION 113100 - RESIDENTIAL APPLIANCES

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. Refrigerator/Freezer:
 - a. Full Size: 1 required
 - 2. Microwave: 1 required
- B. Sustainable Design Intent: Comply with project requirements intended to achieve sustainable design, measured and documented according to the Connecticut High Performance Building Construction Standards (CTHPS) as outlined in the Checklist attached to Section 018113 - SUSTAINABLE DESIGN REQUIREMENTS.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, dimensions, furnished accessories, and finishes for each appliance.
- B. LEED BUILDING Submittals:
 - 1. Product Data: For appliances indicated, documentation that products are ENERGY STAR rated.
 - 2. For water-efficient clothes washer, documentation indicating modified energy factor and water factor.
- C. Product Schedule: For appliances. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified manufacturer.
- B. Product Certificates: For each type of appliance, from manufacturer.
- C. Field quality-control reports.
- D. Warranties: Sample of special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each residential appliance to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Maintains, within 50 miles of Project site, a service center capable of providing training, parts, and emergency maintenance repairs.
- B. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.
- C. Source Limitations: Obtain residential appliances from single source and each type of residential appliance from single manufacturer.
- D. Regulatory Requirements: Comply with the following:
 - 1. NFPA: Provide electrical appliances listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. ANSI: Provide gas-burning appliances that comply with ANSI Z21 Series standards.
- E. Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.7 WARRANTY

- A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Refrigerator/Freezer Icemaker, Sealed System: Full warranty including parts and labor for on-site service on the product.
 - 1. Warranty Period for Sealed Refrigeration System: Two years from date of Substantial Completion.
 - 2. Warranty Period for Other Components: Two years from date of Substantial Completion.
- C. Microwave Oven: Limited warranty, including parts and labor for first year and parts thereafter
 - 1. Warranty Period: Two years from date of Substantial Completion

PART 2 - PRODUCTS

2.1 REFRIGERATOR/FREEZERS

- A. Refrigerator/Freezer: Full Size One Door refrigerator with freezer drawer on bottom and complying with AHAM HRF-1.
 - 1. Basis-of-Design Product: GE Profile # GDE23GSHSS
 - 2. Type: Freestanding.
 - 3. Storage Capacity:
 - a. Refrigeration & Freezer: 23.2 cu ft (ref & freezer)
 - 4. Accessories:
 - a. Icemaker
 - 5. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.
 - 6. Front Panel(s): Stainless Steel
- B. Microwave Oven:
 - 1. Basis-of-Design Product: General Electric Model PEB7226SFSS
 - 2. Mounting: Wall cabinet and Countertop.
 - 3. Type: Conventional and Convection .
 - 4. Microwave Power Rating: 1100 W.
 - a. Convection Element Power Rating: 1000W.
 - 5. Controls: Digital panel controls and timer display

2.3 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, power connections, and other conditions affecting installation and performance of residential appliances.

- B. Examine roughing-in for piping systems to verify actual locations of piping connections before appliance installation.
- C. Examine walls, ceilings, and roofs for suitable conditions where overhead exhaust hoods will be installed.
- D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Comply with manufacturer's written instructions.
- B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.
- C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
- D. Utilities: Comply with plumbing and electrical requirements.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
 - 1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
 - 2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: After installation, start units to confirm proper operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
- C. An appliance will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 113100

SECTION 122413 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. Sustainable Design Intent: Comply with certain prerequisites and credits needed to achieve sustainable design, measured and documented according to the LEED Green Building Rating System, of the United States Green Building Council (LEED v4 BD + C).

1.2 SUMMARY

- A. Section Includes:
 - 1. Manually operated, single-roller shades.
 - 2. Manually operated, double-roller shades.
 - 3. Motor-operated, single-roller shades.
- B. Related Requirements:
 - 1. Reference Section 018113 "Sustainable Design Requirements" for targeted strategies for certification level and certification requirements.
 - 2. Section 061000 "Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.
 - 3. Section 079200 "Joint Sealants" for sealing the perimeters of installation accessories for light-blocking shades with a sealant.
 - 4. Section 084413: "Glazed Aluminum Curtain Walls" for coordination with curtain wall assemblies for blocking, installation of pockets, closures and related accessories.
 - 5. Section 092900: "Gypsum Board Assemblies" for coordination with gypsum board assemblies for blocking, installation of shade pockets, closures and related accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.
- B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.
 - 1. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.

C. Sustainable Design Submittals:

1. Recycled Content: Recycled Content: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 20 percent.
2. Cradle to Cradle Certification Requirements: Submit C2C products Innovations Institute Certificate where applicable.
3. VOC Submittal Requirements: The contractor or subcontractor shall submit the following VOC certification items
4. Material Safety Data Sheets (MSDS), for all applicable products. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted. If a MSDS does not include a product's VOC content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content).

D. Samples: For each exposed product and for each color and texture specified, 10 inches (250 mm) long.

E. Samples for Initial Selection: For each type and color of shadeband material.

1. Include Samples of accessories involving color selection.

F. Samples for Verification: For each type of roller shade.

1. Shadeband Material: Not less than 3 inches square. Mark interior face of material if applicable.
2. Roller Shade: Full-size operating unit, not less than 16 inches (400 mm) wide by 36 inches (900 mm) long for each type of roller shade indicated.
3. Installation Accessories: Full-size unit, not less than 10 inches (250 mm) long.

G. Product Schedule: For roller shades. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of shadeband material.

C. Product Test Reports: For each type of shadeband material.

1.5 CLOSEOUT SUBMITTALS

1. Operation and Maintenance Data: For roller shades to include in maintenance manuals.
2. Precautions about cleaning material and methods that could be detrimental to fabrics, finishes, and performance.
3. Operating hardware.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Roller Shades: Full-size units equal to 5 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than two units.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain roller shades from single source from single manufacturer.

- 2.2 MANUALLY OPERATED, SINGLE-ROLLER SHADES (AT ALL EXTERIOR WINDOWS WITH FOLLOWING EXCEPTIONS: VESTIBULES, ADULT 101, CAFÉ 103, COMMUNITY ROOM 104 AND CLERESTORY WINDOWS).
- A. Basis of Design Product: Subject to compliance with requirements, provide MechoShade Mecho/5 System or comparable product by one of the following:
 - 1. Hunter Douglass, Heavy Duty
 - 2. SWF Contract, Heavy Duty
 - B. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
 - 1. Bead Chains: Manufacturer's standard Stainless steel.
 - a. Loop Length: Full length of roller shade.
 - b. Limit Stops: Provide upper and lower ball stops.
 - c. Chain-Retainer Type: Clip, jamb mount.
 - 2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller shade weight and for lifting heavy roller shades.
 - a. Provide for shadebands that weigh more than **[10 lb (4.5 kg)] <Insert value>** or for shades as recommended by manufacturer, whichever criterion is more stringent.
 - C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
 - 1. Roller Drive-End Location: **[Right side of interior face of shade] [Left side of interior face of shade] [As indicated on Drawings] <Insert requirements>**.
 - 2. Direction of Shadeband Roll: Regular, from back of roller.
 - 3. Shadeband-to-Roller Attachment: Manufacturer's standard method.
 - D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
 - E. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.
 - F. Shadebands:
 - 1. Shadeband Material: Light-filtering fabric.
 - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Type: Enclosed in sealed pocket of shadeband material.
 - b. Color and Finish: **As selected by Architect from manufacturer's full range.**
 - G. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
 - a. Shape: [L-shaped] [Curved] <Insert requirements>.
 - b. Height: Manufacturer's standard height required to conceal roller and shadeband assembly when shade is fully open, but not less than [4 inches (102 mm)] [3 inches (76 mm)] <Insert dimension>.
 2. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.
 - a. Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open, but not less than [4 inches (102 mm)] [3 inches (76 mm)] [height indicated on Drawings] <Insert dimension>.
 3. Endcap Covers: To cover exposed endcaps.
 4. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.
 - a. Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open, but not less than 4 inches or as indicated in drawings.
 - b. Provide pocket with lip at lower edge to support acoustical ceiling panel.
 5. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recess or pocket and for snap-in attachment to wall clip without fasteners.
 - a. Closure-Panel Width: [As indicated on Drawings] [2 inches (51 mm)] <Insert dimension>.
 6. Installation Accessories Color and Finish: As selected from manufacturer's full range,
- 2.3 MANUALLY OPERATED, DOUBLE-ROLLER SHADES AT ALL EXTERIOR WINDOWS AND INTERIOR LITES OF COMMUNITY RM 104.
- A. Basis of Design Product: Subject to compliance with requirements, provide MechoShade Mecho/5 System or comparable product by one of the following:
 1. Hunter Douglass, Heavy Duty
 2. SWF Contract, Heavy Duty
 - B. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
 1. Bead Chains: Manufacturer's standard Stainless steel.
 - a. Loop Length: Full length of roller shade.
 - b. Limit Stops: Provide upper and lower ball stops.
 - c. Chain-Retainer Type: Clip, jamb mount.

2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller shade weight and for lifting heavy roller shades.
 - a. Provide for shadebands that weigh more than **[10 lb (4.5 kg)]** <Insert value> or for shades as recommended by manufacturer, whichever criterion is more stringent.
- C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
 1. Double-Roller Mounting Configuration: **[Side by side] [Offset, outside roller over and inside roller under.]**
 2. Inside Roller:
 - a. Drive-End Location: **[Right side of interior face of shade] [Left side of interior face of shade] [As indicated on Drawings]** <Insert requirements>.
 - b. Direction of Shadeband Roll: Regular, from back (exterior face) of roller.
 3. Outside Roller:
 - a. Drive-End Location: **[Right side of interior face of shade] [Left side of interior face of shade] [As indicated on Drawings]** <Insert requirements>.
 - b. Direction of Shadeband Roll: Regular, from back (exterior face) of roller.
 4. Shadeband-to-Roller Attachment: Manufacturer's standard method.
- D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller mounting configuration, roller assemblies, operating mechanisms, installation accessories, and installation locations and conditions indicated.
- E. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.
- F. Inside Shadebands:
 1. Shadeband Material: Light-filtering fabric.
 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Type: Enclosed in sealed pocket of shadeband material.
 - b. Color and Finish: As selected by Architect from manufacturer's full range.
- G. Outside Shadebands:
 1. Shadeband Material: Light-blocking fabric.
 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Type: Enclosed in sealed pocket of shadeband material.
 - b. Color and Finish: As selected by Architect from manufacturer's full range.
- H. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
 - a. Shape: [L-shaped] [Curved] <Insert requirements>.
 - b. Height: Manufacturer's standard height required to conceal roller and shadeband assembly when shade is fully open, but not less than [4 inches (102 mm)] [3 inches (76 mm)] <Insert dimension>.
 2. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.
 - a. Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open, but not less than [4 inches (102 mm)] [3 inches (76 mm)] [height indicated on Drawings] <Insert dimension>.
 3. Endcap Covers: To cover exposed endcaps.
 4. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.
 - a. Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open, but not less than 4 inches or as indicated on Drawings.
 - b. Provide pocket with lip at lower edge to support acoustical ceiling panel.
 5. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recess or pocket and for snap-in attachment to wall clip without fasteners.
 - a. Closure-Panel Width: [As indicated on Drawings] [2 inches (51 mm)] <Insert dimension>.
 6. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.
 7. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
 8. Installation Accessories Color and Finish: As selected from manufacturer's full range.
- 2.4 MANUALLY OPERATED, SINGLE-ROLLER SHADES AT INTERIOR LITES AT EAST WALL OF OFFICE 117 AND OFFICE 118.
- A. Basis of Design Product: Subject to compliance with requirements, provide SWF Contract Pro Series Manual Solar Shades or one of the following:
 1. Hunter Douglass, Heavy Duty
 2. Mecho Shade System.
 - B. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

1. Bead Chains: Manufacturer's standard Stainless steel.
 - a. Loop Length: Full length of roller shade.
 - b. Limit Stops: Provide upper and lower ball stops.
 - c. Chain-Retainer Type: Clip, jamb mount.
2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller shade weight and for lifting heavy roller shades.
 - a. Provide for shadebands that weigh more than [10 lb (4.5 kg)] <Insert value> or for shades as recommended by manufacturer, whichever criterion is more stringent.
- C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
 1. Roller Drive-End Location: [Right side of interior face of shade] [Left side of interior face of shade] [As indicated on Drawings] <Insert requirements>.
 2. Direction of Shadeband Roll: Regular, from back of roller.
 3. Shadeband-to-Roller Attachment: Manufacturer's standard method.
- D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- E. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.
- F. Shadebands:
 1. Shadeband Material: Light-filtering fabric **with visibility**.
 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Type: Enclosed in sealed pocket of shadeband material.
 - b. Color and Finish: **As selected by Architect from manufacturer's full range**.
- G. Installation Accessories:
 1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
 - a. Shape: [L-shaped] [Curved] <Insert requirements>.
 - b. Height: Manufacturer's standard height required to conceal roller and shadeband assembly when shade is fully open, but not less than [4 inches (102 mm)] [3 inches (76 mm)] <Insert dimension>.
 2. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.

- a. Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open, but not less than **.4 inches (102 mm)**.
3. Endcap Covers: To cover exposed endcaps.
4. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.
 - a. Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open, but not less than 4 inches or as indicated in drawings.
 - b. Provide pocket with lip at lower edge to support acoustical ceiling panel.
5. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recess or pocket and for snap-in attachment to wall clip without fasteners.
 - a. Closure-Panel Width: [As indicated on Drawings] **[2 inches (51 mm)]** <Insert dimension>.
6. Installation Accessories Color and Finish: As selected from manufacturer's full range,

2.5 SHADEBAND MATERIALS

- A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701 Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.
 1. Source: MechoShade Systems, Ecoveil 1550 Series.
 2. Type: Thermoplastic Olefin.
 3. Weave: Basketweave
 4. Thickness: 0.034 in.
 5. Weight: 13.57 oz/ sq yd.
 6. Roll Width: 96"w.
 7. **Location:** All exterior windows with single and double roller shades and Interior Lites at Community Rm 104.
 8. Orientation on Shadeband: Up the bolt.
 9. Openness Factor: 3 percent.
 10. Color: As selected by Architect from manufacturer's full range.
- C. Light-Blocking Fabric: Opaque fabric, stain and fade resistant.
 1. Source: MechoShade Systems, Equinox Blackout 0100 Series.
 2. Type: 60% Acrylic Coating and 40% Polyester.
 3. Thickness: 0.021in.
 4. Weight: 14.75 oz/sq yd.
 5. Roll Width: 126"w.
 6. Orientation on Shadeband: Up the bolt.
 7. Color: As selected by Architect from manufacturer's full range.

8. **Location:** Exterior Windows and Interior Lites with double roller shades at Community RM 104.

D. Light-Filtering Fabric with Visibility: Woven fabric, stain and fade resistant.

1. Source: SWF Contract, Sheerweave by Phifer, Style 3000.
2. Type: Vinyl Coated with fiberglass and polyester yarns.
3. Thickness: 0.028 in.
4. Weight: 13.46 oz/ sq yd.
5. Roll Width: As required.
6. **Location:** Interior lites at East Walls of Office 117 and Office 118.
7. Orientation on Shadeband: Up the bolt.
8. Openness Factor: 14 percent.
9. Color: As selected by Architect from manufacturer's full range.

2.6 ROLLER SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch (6 mm) per side. Length equal to head-to-sill or - floor dimension of opening in which shade is installed less 1/4 inch (6 mm), plus or minus 1/8 inch (3.1 mm).
 2. Outside of Jamb Installation: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:
 1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.
 2. Railroaded Materials: Railroad material where material roll width is less than the required width of shadeband and where indicated. Provide battens and seams as required by railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, locations of connections to building electrical system, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.
 - 1. Opaque Shadebands: Located so shadeband is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.
- B. Roller Shade Locations: As indicated in specifications.

3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

- A. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain motor-operated roller shades.

END OF SECTION 122413

SECTION 124816 - ENTRANCE FLOOR GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Attention is directed to the Contract and General Conditions and all Sections within Division 01 – General Requirements, which are hereby made part of this Section of the Specifications.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. **Sustainable Design Intent: Comply with certain prerequisites and credits needed to achieve sustainable design, measured and documented according to the LEED Green Building Rating System, of the United States Green Building Council (LEED v4 BD + C).**

1.2 SUMMARY

- A. Section includes recessed floor grilles and Resilient Entrance Mats.
- B. Related Requirements:
 - 1. **Reference Section 018113 “Sustainable Design Requirements” for targeted strategies for certification level and certification requirements.**
 - 2. Division 03 Section “Cast-in-Place Concrete” for slab depression for recessed foot grilles and frames. Section 124813 "Entrance Floor Mats and Frames" for flexible floor mats and frames.

1.3 COORDINATION

- A. Coordinate size and location of recesses in concrete to receive floor grilles and frames.

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide roll-up rail mats and frames capable of withstanding the following loads and stress:
 - 1. Uniform floor load of 300lbf/sq. ft.
 - 2. Wheel load of 350 lbs per wheel

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for entrance floor grilles and frames.
- B. Shop Drawings:
 1. Divisions between grille sections.
 2. Perimeter floor moldings.
- C. Samples: For the following products, in manufacturer's standard sizes:
 1. Floor Grille: Assembled section of floor grille, min 12" square.
 2. Frame Members: Sample of each type and color, 12" long.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For floor grilles and frames to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Source Limitations: Obtain foot grilles and frames through one source from a single manufacturer.
- B. Accessibility Requirements: Provide installed foot grilles that comply with Section 4.5 in the US Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)".

1.8 FIELD CONDITIONS

- A. Field Measurements: Indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Mats Inc.; Grate Mat Foot Grille, aluminum Entrance Floor Mat System or a comparable product by one of the following:
 1. Balco USA
 2. Cactus Mat Mfg. Co
 3. Nystrom Inc
- B. Basis-of-Design Product: Subject to compliance with requirements, provide American Floor Mats, Scraper Rubber Mat; or a comparable product
 1. Beveled Edge, Surface mounted – Rubber Mats
 2. Size 4' x 6' x 3/8"
 3. Raised oval design, 100% skid resistant
 4. Qty – Two, Color - Black

2.2 ENTRANCE FLOOR GRILLES, GENERAL

- A. Structural Performance: Provide floor grilles and frames capable of withstanding the following loads and stresses:
 - 1. Uniform floor load of 300 lbf/sq. ft.
 - 2. Wheel load of 350 lb per wheel.

2.3 FLOOR GRILLES

- A. General: Provide manufacturer's standard floor-grille assemblies consisting of treads of type and profile indicated, interlocked or joined together by cross members, and with support legs (if any) and other components needed to produce a complete installation.
- B. Aluminum Floor Grilles: Provide manufacturer's standard floor grilles with extruded members, top-surfaced tread rails, and as follows:
 - 1. Tread Rails: Extruded-aluminum tread rails.
 - a. Aluminum Color: Mill finish
 - 2. Tread Rail Spacing: 2 inches o.c. with 1/8 to 3/16-inch-wide openings between treads. ADA compliant
 - 3. Top Surface: Smooth
 - a. Top Surface Color: Match tread rail
 - 4. Grille Size: As indicated

2.4 FRAMES

- A. Aluminum frame shall be a 7/16" deep recessed frame in 6063-T5 aluminum alloy with 1/8" wide exposed surface. Frame color shall be mill finish. **Note:** Mill finish frames in contact with concrete to be primer coated.

2.5 MATERIALS

- A. Extruded Aluminum: Exposed rail connectors shall be extruded Alloy 6063-T5, as standard with manufacturer. Coat surface of frame in contact with cementitious materials complete with perforations for drainage. Complete with co-extruded soft-durometer cushions, supplied in mill finish.
- B. **Carpet shall meet the Carper and Rug Institutes' standard for indoor air quality.** Fibers shall include a minimum of 100, 12mil monofilament fibers per square inch and color fast, solution dyed nylon. Each carpet fiber and monofilament shall be fusion-bonded to a rigid two-ply backing to prevent fraying and supplied in continuous splice-free lengths. Carpet weight shall be 33 oz./sq. yd.

1. Color: As selected by Architect from Manufacturer's standard range.

2.6 FABRICATION

- A. Shop fabricate floor grilles to greatest extent possible in sizes as indicated. Unless otherwise indicated, provide each grille as a single unit; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in grilles are necessary, space symmetrically and away from normal traffic lanes. Where possible, verify sizes by field measurement before shop fabrication.
- B. Fabricate frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.

2.7 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes
- B. Protect Mechanical Finishes on exposed surfaces from damage by applying strippable, temporary protective covering before shipping. finishes.

2.8 ALUMINUM FINISHES

- A. Finish designation prefixed AA comply with the system established by the aluminum Association for designating aluminum finishes.
- B. Mill Finish: AA-M10 (Mechanical Finish: as fabricated); grind and buff as required to remove scratches, welding, or abrasions produced in fabrication process.

2.9 EXAMINATION

- A. Examine substrates and floor conditions for compliance with requirements for location, size, minimum recess depth, and other conditions affecting installation of floor grilles and frames. Subfloor shall be clean and dry and within acceptable tolerances.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

2.10 INSTALLATION

- A. Install recessed floor grilles and frames to comply with manufacturer's written instructions at locations indicated and with top of floor grilles and frames in relationship to one another and to adjoining finished flooring as recommended by manufacturer. Set floor-grille tops at height for most effective cleaning action.

2.11 PROTECTION

- A. After completing frame installations, provide temporary filler of plywood or fiberboard in floor-grille recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION 124816