FULTON COUNTY

Vision

People *Families* *Neighborhoods*

Mission

To serve, protect and govern in concert with local municipalities

Values

People *Customer Services*
Ethics *Resource Management*
Innovation *Equal Opportunity*

INVITATION TO BID #09ITB1102K-JD

North Service Center Renovation
7741 Roswell Road

VOLUME II

For
General Services Department

BID ISSUANCE DATE: Tuesday, October 6, 2009
PRE-BID CONFERENCE DATE: Wednesday, October 14, 2009
BID DUE DATE AND TIME: Monday, November 2, 2009 11:00 A.M.
PURCHASING CONTACT: Joyce Daniel, Assistant Purchasing Agent (404) 612-5824
E-MAIL: joyce.daniel@fultoncountyga.gov

LOCATION: FULTON COUNTY DEPARTMENT OF PURCHASING & CONTRACT COMPLIANCE
130 PEACHTREE STREET, S.W., SUITE 1168
ATLANTA, GA 30303

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SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.1 LOCATION OF WORK

A. The work of this contract is located within the City of Sandy Spring, Georgia, at 7741 Roswell Road as shown on Drawing A-0.0

1.2 DESCRIPTION

A. Definition: The Work is defined in General Conditions Section 00030

B. Summary: Major areas of the Work consist of, but are not limited to, the following:

1. Exterior:
   a. Provide silt fences, tree protection, permanent fence, landscaping, walkways and signage

2. First Floor
   a. Replace existing light fixtures and ceiling tiles
   b. Replace existing toilets with low-flow toilets
   c. Replace existing faucets with low-flow fixtures
   d. Add new finishes as indicated on Drawings
   e. Add electrical outlets and data
   f. Add new partition walls as indicated on Drawings
   g. Add new mechanical equipment as indicated on Drawings
   h. Add new plumbing as indicated on Drawings
   i. Add new electrical wiring and equipment as indicated on Drawings
   j. Add new millwork as indicated on drawings
   k. Install various medical and dental equipment.
   l. Add new signage
   m. Replace window blinds where damged

3. Second Floor
   a. Add new partitions walls as indicated on Drawings
   b. Replace existing light fixtures and ceiling tiles
   c. Replace existing toilets with low-flow toilets
   d. Replace existing faucets with low-flow fixtures
   e. Add new floor and wall finishes as indicated on Drawings
   f. Add electrical outlets and data
   h. Add new rest rooms and accessories as indicated on Drawings
   i. Add new millwork as indicated on Drawings
   j. Add fire extinguishers where missing from cabinets
   k. Add new doors, frames and hardware where required
   l. Replace window blinds where damaged
   m. Add new signage

1..2 PRODUCTS (Not Required

1.3 EXECUTION (Not Required)

END OF SECTION 01010

SECTION 01320

SCHEDULE OF VALUES

1.1 GENERAL

A. Description of Work

1. This specification covers the preparation, content and submittal of the schedule of values. The Schedule of Values is an itemized list that establishes the value or cost of each part of the Work. It shall be used as the basis for preparing progress payments.

B. Preparation

1. Schedule shall show breakdown of labor, materials equipment and other costs as directed by the Owner.

2. Costs shall be in sufficient detail to indicate separate amounts for each major subsection of the Work. The Contractor may include an item for bond, insurance, temporary facilities and job mobilization.

3. Schedule of Values shall be prepared on 8-1/2-inch by 11-inch white paper.

4. Use the major subsections of the Detailed Scope of Work as the basis for Schedule format. List sub-items of major products or systems as appropriate or when requested by the Owner.

5. When requested by the Owner, support values with data that will substantiate their correctness.

6. The sum of the individual values shown on the Schedule of Values must equal the total Job Order Price.

7. Schedule shall show the purchase and delivery costs for materials and equipment that the Contractor anticipates he shall request payment for prior to their installation.

C. Submittal: Submit two copies of Schedule, or any other number of copies as directed by the Owner, to the Owner for approval at least 20 days prior to submitting first application for a progress payment.

After review by the Owner, revise and resubmit Schedule as required until it is approved.

1.2 PRODUCTS (Not Used)

1.3 EXECUTION (Not Used)

END OF SECTION 01320

SECTION 01320

REFERENCES

1.1 GENERAL

A. Definitions

1. General: Basic Contract definitions are included in the Conditions of the Contract.

2. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

3. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

4. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

5. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

6. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

7. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

8. "Provide": Furnish and install, complete and ready for the intended use.

9. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

B. Industry Standards

1. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
2. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

3. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
   a. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

C. Abbreviations And Acronyms

1. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA Aluminum Association, Inc. (The) (703) 358-2960
www.aluminum.org
AAADM American Association of Automatic Door Manufacturers (216) 241-7333
www.aaadm.com
AABC Associated Air Balance Council (202) 737-02
AAMA American Architectural Manufacturers Association (847) 303-5664
www.aamanet.org
AASHTO American Association of State Highway and Transportation Officials
(202) 624-5800
www.transportation.org
AATCC American Association of Textile Chemists and Colorists (The) (919) 549-8141
www.aatcc.org
ABAA Air Barrier Association of America (866) 956-5888
www.airbarrier.org
ABMA American Bearing Manufacturers Association (202) 367-1155
www.abma-dc.org
ACI ACI International (248) 848-3700
(American Concrete Institute)
www.aci-int.org
ACPA American Concrete Pipe Association (972) 506-7216
www.concrete-pipe.org
AEIC Association of Edison Illuminating Companies, Inc. (The) (205) 257-2530
www.aeic.org
AF&PA American Forest & Paper Association (800) 878-8878
www.afandpa.org (202) 463-2700
AGA American Gas Association (202) 824-7000
www.aga.org
AGC Associated General Contractors of America (The) (703) 548-3118
www.agc.org
AHA American Hardboard Association
(Now part of CPA)

AHAM Association of Home Appliance Manufacturers (202) 872-5955
www.aham.org
AI Asphalt Institute (859) 288-4960
www.asphaltinstitute.org
AIA American Institute of Architects (The) (800) 242-3837
www.aia.org (202) 626-7300
AISC American Institute of Steel Construction (800) 644-2400
www.aisc.org (312) 670-2400
AISI American Iron and Steel Institute (202) 452-7100
www.steel.org
AITC American Institute of Timber Construction (303) 792-9559
www.aitc-glulam.org
ALCA Associated Landscape Contractors of America
(Now PLANET - Professional Landcare Network)
ALSC American Lumber Standard Committee, Incorporated (301) 972-1700
www.alsc.org
AMCA Air Movement and Control Association International, Inc. (847) 394-0150
www.amca.org
ANSI American National Standards Institute (202) 293-8020
www.ansi.org
AOSA Association of Official Seed Analysts, Inc. (405) 780-7372
www.aosaseed.com
APA Architectural Precast Association (239) 454-6989
www.archprecast.org
APA APA - The Engineered Wood Association (253) 565-6600
www.apawood.org
APA EWS APA - The Engineered Wood Association; Engineered Wood Systems
(See APA - The Engineered Wood Association)
API American Petroleum Institute (202) 682-8000
www.api.org
ARI Air-Conditioning & Refrigeration Institute (703) 524-8800
www.ari.org
ARMA Asphalt Roofing Manufacturers Association (202) 207-0917
www.asphaltroofing.org
ASCE American Society of Civil Engineers (800) 548-2723
www.asce.org (703) 295-6300
ASCE/SEI American Society of Civil Engineers/Structural Engineering Institute
(See ASCE)
ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers
(800) 527-4723
www.ashrae.org (404) 636-8400
ASME ASME International (800) 843-2763
(The American Society of Mechanical Engineers International) (973) 882-1170
www.asme.org
ASSE American Society of Sanitary Engineering (440) 835-3040
www.asse-plumbing.org

ASTM ASTM International (610) 832-9585
EJMA Expansion Joint Manufacturers Association, Inc. (914) 332-0040
www.ejma.org
ESD ESD Association (315) 339-6937
www.esda.org
FIBA Federation Internationale de Basketball 41 22 545 00 00
(The International Basketball Federation)
www.fiba.com
FIVB Federation Internationale de Volleyball 41 21 345 35 35
(The International Volleyball Federation)
www.fivb.ch
FM Approvals FM Approvals (781) 762-4300
www.fmglobal.com
FM Global FM Global (401) 275-3000
(Formerly: FMG - FM Global)
www.fmglobal.com
FMRC Factory Mutual Research
(Now FM Global)
FRSA Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.
(407) 671-3772
www.floridaroof.com
FSA Fluid Sealing Association (610) 971-4850
www.fluidsealing.com
FSC Forest Stewardship Council 49 228 367 66 0
www.fsc.org
GA Gypsum Association (202) 289-5440
www.gypsum.org
GANA Glass Association of North America (785) 271-0208
www.glasswebsite.com
GRI (Now GSI)
GS Green Seal (202) 872-6400
www.greenseal.org
GSI Geosynthetic Institute (610) 522-8440
www.geosynthetic-institute.org
HI Hydraulic Institute (888) 786-7744
www.pumps.org (973) 267-9700
HI Hydronics Institute (908) 464-8200
www.gamanet.org
HMMA Hollow Metal Manufacturers Association
(Part of NAAMM)
HPVA Hardwood Plywood & Veneer Association (703) 435-2900
www.hpva.org
HPW H. P. White Laboratory, Inc. (410) 838-6550
www.hpwhite.com
IAS International Approval Services
(Now CSA International)
IBF International Badminton Federation (6-03) 9283-7155
www.internationalbadminton.org
ICEA Insulated Cable Engineers Association, Inc. (770) 830-0369

www.icea.net
ICRI International Concrete Repair Institute, Inc. (847) 827-0830
www.icri.org
IEC International Electrotechnical Commission 41 22 919 02 11
www.iec.ch
IEEE Institute of Electrical and Electronics Engineers, Inc. (The) (212) 419-7900
www.ieee.org
IESNA Illuminating Engineering Society of North America (212) 248-5000
www.iesna.org
IEST Institute of Environmental Sciences and Technology (847) 255-1561
www.iest.org
IGCC Insulating Glass Certification Council (315) 646-2234
www.igcc.org
IGMA Insulating Glass Manufacturers Alliance (613) 233-1510
www.igmaonline.org
ILI Indiana Limestone Institute of America, Inc. (812) 275-4426
www.iliai.com
ISO International Organization for Standardization 41 22 749 01 11
www.iso.ch
Available from ANSI (202) 293-8020
www.ansi.org
ISSFA International Solid Surface Fabricators Association (877) 464-7732
www.issfa.net (702) 567-8150
ITS Intertek Testing Service NA (972) 238-5591
www.intertek.com
ITU International Telecommunication Union
www.itu.int/home
KCMA Kitchen Cabinet Manufacturers Association (703) 264-1690
www.kcma.org
LMA Laminating Materials Association
(Now part of CPA)
LPI Lightning Protection Institute (800) 488-6864
www.lightning.org
MBMA Metal Building Manufacturers Association (216) 241-7333
www.mbma.com
MFMA Maple Flooring Manufacturers Association, Inc. (847) 480-9138
www.maplefloor.org
MFMA Metal Framing Manufacturers Association, Inc. (312) 644-6610
www.metalframingmfg.org
MH Material Handling
(Now MHIA)
MHIA Material Handling Industry of America (800) 345-1815
www.mhia.org (704) 676-1190
MIA Marble Institute of America (440) 250-9222
www.marble-institute.com
MPI Master Painters Institute (888) 674-8937
www.paintinfo.com
MSS Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

(703) 281-6613
www.mss-hq.com
NAAMM National Association of Architectural Metal Manufacturers (312) 332-0405
www.naamm.org
NACE NACE International (800) 797-6623
(National Association of Corrosion Engineers International) (281) 228-6200
www.nace.org
NADCA National Air Duct Cleaners Association (202) 737-2926
www.nadca.com
NAGWS National Association for Girls and Women in Sport (800) 213-7193, ext. 453
www.aahperd.org/nagws/
NAIMA North American Insulation Manufacturers Association (703) 684-0084
www.naima.org
NBGQA National Building Granite Quarries Association, Inc. (800) 557-2848
www.nbgqa.com
NCAA National Collegiate Athletic Association (The) (317) 917-6222
www.ncaa.org
NCMA National Concrete Masonry Association (703) 713-1900
www.ncma.org
NCPI National Clay Pipe Institute (262) 248-9094
www.ncpi.org
NCTA National Cable & Telecommunications Association (202) 775-3550
www.ncta.com
NEBB National Environmental Balancing Bureau (301) 977-3698
www.nebb.org
NECA National Electrical Contractors Association (301) 657-3110
www.necanet.org
NeLMA Northeastern Lumber Manufacturers' Association (207) 829-6901
www.nelma.org
NEMA National Electrical Manufacturers Association (703) 841-3200
www.nema.org
NETA InterNational Electrical Testing Association (888) 300-6382
www.netaworld.org (303) 697-8441
NFHS National Federation of State High School Associations (317) 972-6900
www.nfhs.org
NFPA NFPA (800) 344-3555
(National Fire Protection Association) (617) 770-3000
www.nfpa.org
NFRC National Fenestration Rating Council (301) 589-1776
www.nfrc.org
NGA National Glass Association (866) 342-5642
www.glass.org (703) 442-4890
NHLA National Hardwood Lumber Association (800) 933-0318
www.natlhardwood.org (901) 377-1818
NLGA National Lumber Grades Authority (604) 524-2393
www.nlga.org

NOFMA NOFMA: The Wood Flooring Manufacturers Association (901) 526-5016
(Formerly: National Oak Flooring Manufacturers Association)
www.nofma.com
NRCA National Roofing Contractors Association (800) 323-9545
www.nrca.net (847) 299-9070
NRMCA National Ready Mixed Concrete Association (888) 846-7622
www.nrmca.org (301) 587-1400
NSF NSF International (800) 673-6275
(National Sanitation Foundation International) (734) 769-8010
www.nsf.org
NSSGA National Stone, Sand & Gravel Association (800) 342-1415
www.nssga.org (703) 525-8788
NTMA National Terrazzo & Mosaic Association, Inc. (The) (800) 323-9736
www.ntma.com (540) 751-0930
NTRMA National Tile Roofing Manufacturers Association
(Now TRI)
NWWDA National Wood Window and Door Association
(Now WDMA)
OPL Omega Point Laboratories, Inc.
(Now ITS)
PCI Precast/Prestressed Concrete Institute (312) 786-0300
www.pci.org
PDCA Painting & Decorating Contractors of America (800) 332-7322
www.pdca.com (314) 514-7322
PDI Plumbing & Drainage Institute (800) 589-8956
www.pdionline.org (978) 557-0720
PGI PVC Geomembrane Institute (217) 333-3929
http://pgi-tp.ce.uiuc.edu
PLANET Professional Landcare Network (800) 395-2522
(Formerly: ACLA - Associated Landscape Contractors of
America)
(703) 736-9666
www.landcarenetwork.org
PTI Post-Tensioning Institute (602) 870-7540
www.post-tensioning.org
RCSC Research Council on Structural Connections
www.boltcouncil.org
RFCI Resilient Floor Covering Institute (301) 340-8580
www.rfci.com
RIS Redwood Inspection Service (888) 225-7339
www.calredwood.org (415) 382-0662
SAE SAE International (877) 606-7323
www.sae.org (724) 776-4841
SDI Steel Deck Institute (847) 458-4647
www.sdi.org
SDI Steel Door Institute (440) 899-0010
www.steeldoor.org
SEFA Scientific Equipment and Furniture Association (516) 294-5424
www.sefalabs.com

SEI/ASCE Structural Engineering Institute/American Society of Civil Engineers
(See ASCE)
SGCC Safety Glazing Certification Council (315) 646-2234
www.sgcc.org
SIA Security Industry Association (703) 683-2075
www.siaonline.org
SIGMA Sealed Insulating Glass Manufacturers Association
(Now IGMA)
SJI Steel Joist Institute (843) 626-1995
www.steeljoist.org
SMA Screen Manufacturers Association (561) 533-0991
www.smacentral.org
SMACNA Sheet Metal and Air Conditioning Contractors' (703) 803-2980
National Association
www.smacna.org
SMPTE Society of Motion Picture and Television Engineers (914) 761-1100
www.smpte.org
SPFA Spray Polyurethane Foam Alliance (800) 523-6154
(Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.;
Spray Polyurethane Foam Division)
www.sprayfoam.org
SPIB Southern Pine Inspection Bureau (The) (850) 434-2611
www.spib.org
SPRI Single Ply Roofing Industry (781) 647-7026
www.spri.org
SSINA Specialty Steel Industry of North America (800) 982-0355
www.ssina.com (202) 342-8630
SSPC SSPC: The Society for Protective Coatings (877) 281-7772
www.sspc.org (412) 281-2331
STI Steel Tank Institute (847) 438-8265
www.steeltank.com
SWI Steel Window Institute (216) 241-7333
www.steelwindows.com
SWRI Sealant, Waterproofing, & Restoration Institute (816) 472-7974
www.swrionline.org
TCA Tile Council of America, Inc. (864) 646-8453
www.tileusa.com
TIA/EIA Telecommunications Industry Association/Electronic Industries Alliance
(703) 907-7700
www.tiaonline.org
TMS The Masonry Society (303) 939-9700
www.masonrysociety.org
TPI Truss Plate Institute, Inc. (703) 683-1010
www.tpinst.org
TPI Turfgrass Producers International (800) 405-8873
www.turfgrasssod.org (847) 649-5555
TRI Tile Roofing Institute (312) 670-4177
www.tileroofing.org

UL Underwriters Laboratories Inc. (877) 854-3577
www.ul.com (847) 272-8800
UNI Uni-Bell PVC Pipe Association (972) 243-3902
www.uni-bell.org
USAV USA Volleyball (888) 786-5539
www.usavolleyball.org (719) 228-6800
USGBC U.S. Green Building Council (202) 828-7422
www.usgbc.org
USITT United States Institute for Theatre Technology, Inc. (800) 938-7488
www.usitt.org (315) 463-6463
WASTEC Waste Equipment Technology Association (800) 424-2869
www.wastec.org (202) 244-4700
WCLIB West Coast Lumber Inspection Bureau (800) 283-1486
www.wclib.org (503) 639-0651
WCMA Window Covering Manufacturers Association
(Now WCSC)
WCSC Window Covering Safety Council (800) 506-4636
(Formerly: WCMA - Window Covering Manufacturers
Association)
(212) 297-2109
www.windowcoverings.org
WDMA Window & Door Manufacturers Association (800) 223-2301
(Formerly: NWWDA - National Wood Window and Door
Association)
(847) 299-5200
www.wdma.com
WI Woodwork Institute (Formerly: WIC - Woodwork Institute of (916) 372-
9943
California)
www.wicnet.org
WIC Woodwork Institute of California
(Now WI)
WMMPA Wood Moulding & Millwork Producers Association (800) 550-7889
www.wmmpa.com (530) 661-9591
WSRCA Western States Roofing Contractors Association (800) 725-0333
www.wsrca.com (650) 570-5441
WWPA Western Wood Products Association (503) 224-3930
www.wwpa.org

2. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

BOCA BOCA International, Inc.
(See ICC)
IAPMO International Association of Plumbing and Mechanical Officials (909)
472-
4100

www.iapmo.org
ICBO International Conference of Building Officials
(See ICC)
ICBO ES ICBO Evaluation Service, Inc.
(See ICC-ES)
ICC International Code Council (888) 422-
7233
www.iccsafe.org (703) 931-
4533
ICC-ES ICC Evaluation Service, Inc. (800) 423-
6587
www.icc-es.org (562) 699-
0543
SBCCI Southern Building Code Congress International, Inc.
(See ICC)
UBC Uniform Building Code
(See ICC)

3. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CE Army Corps of Engineers
www.usace.army.mil
CPSC Consumer Product Safety Commission
www.cpsc.gov (301) 504-7923
DOC Department of Commerce (202) 482-2000
www.commerce.gov
DOD Department of Defense (215) 697-6257
http://.dodssp.daps.dla.mil
DOE Department of Energy (202) 586-9220
www.energy.gov
EPA Environmental Protection Agency (202) 272-0167
www.epa.gov
FAA Federal Aviation Administration (866) 835-5322
www.faa.gov
FCC Federal Communications Commission (888) 225-5322
www.fcc.gov
FDA Food and Drug Administration (888) 463-6332
www.fda.gov
GSA General Services Administration (800) 488-3111
www.gsa.gov
HUD Department of Housing and Urban Development (202) 708-1112
www.hud.gov
LBL Lawrence Berkeley National Laboratory (510) 486-4000
www.lbl.gov
NCHRP National Cooperative Highway Research Program
(See TRB)

NIST National Institute of Standards and Technology (301) 975-6478
www.nist.gov
OSHA Occupational Safety & Health Administration (800) 321-6742
www.osha.gov (202) 693-1999
PBS Public Building Service
(See GSA)
PHS Office of Public Health and Science (202) 690-7694
www.osophs.dhhs.gov/ophs
RUS Rural Utilities Service (202) 720-9540
(See USDA)
SD State Department (202) 647-4000
www.state.gov
TRB Transportation Research Board (202) 334-2934
http://gulliver.trb.org
USDA Department of Agriculture (202) 720-2791
www.usda.gov
USPS Postal Service (202) 268-2000
www.usps.com

4. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG Americans with Disabilities Act (ADA) (800) 872-2253
Architectural Barriers Act (ABA) (202) 272-0080
Accessibility Guidelines for Buildings and Facilities
Available from Access Board
www.access-board.gov
CFR Code of Federal Regulations (866) 512-1800
Available from Government Printing Office (202) 512-1800
www.gpoaccess.gov/cfr/index.html
DOD Department of Defense Military Specifications and Standards (215) 697-2664
Available from Department of Defense Single Stock Point
http://dodssp.daps.dla.mil
DSCC Defense Supply Center Columbus
(See FS)
FED-STD Federal Standard
(See FS)
FS Federal Specification (215) 697-2664
Available from Department of Defense Single Stock Point
http://dodssp.daps.dla.mil
Available from Defense Standardization Program
www.dps.dla.mil
Available from General Services Administration (202) 619-8925
www.gsa.gov
Available from National Institute of Building Sciences (202) 289-7800
www.wbdg.org/ccb

FTMS Federal Test Method Standard (See FS)
MIL (See MILSPEC)
MIL-STD (See MILSPEC)
MILSPEC Military Specification and Standards (215) 697-2664
Available from Department of Defense Single Stock Point
http://dodssp.daps.dla.mil
UFAS Uniform Federal Accessibility Standards (800) 872-2253
Available from Access Board (202) 272-0080
www.access-board.gov

5. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CBHF State of California, Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation
(800) 952-5210
www.dca.ca.gov/bhfti (916) 574-2041
CCR California Code of Regulations (916) 323-6815
www.calregs.com
CPUC California Public Utilities Commission (415) 703-2782
www.cpuc.ca.gov
TFS Texas Forest Service (979) 458-6650
Forest Resource Development
http://txforestservice.tamu.edu

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01320c

SECTION 01320b

CUTTING AND PATCHING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for cutting and patching. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes procedural requirements for cutting and patching.

C. Definitions

1. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

2. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

D. Submittals

1. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
   a. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
   b. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
   c. Products: List products to be used and firms or entities that will perform the Work.
   d. Dates: Indicate when cutting and patching will be performed.
   e. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
   f. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
   g. the Owner's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

E. Quality Assurance

1. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:
   a. Primary operational systems and equipment.
   b. Air or smoke barriers.
   c. Fire-suppression systems.
   d. Mechanical systems piping and ducts.
   e. Control systems.
   f. Communication systems.
   g. Conveying systems.
   h. Electrical wiring systems.
   i. Operating systems of special construction in Division 13.

4. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:
   a. Water, moisture, or vapor barriers.
   b. Membranes and flashings.
   c. Exterior curtain-wall construction.
   d. Equipment supports.
   e. Piping, ductwork, vessels, and equipment.
   f. Noise- and vibration-control elements and systems.

5. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

6. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

F. Warranty

1. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

1.2 PRODUCTS

A. Materials

1. General: Comply with requirements specified in other Sections.

2. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
   a. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

1.3 EXECUTION

A. Preparation

1. Temporary Support: Provide temporary support of Work to be cut.

2. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

3. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

4. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize OR prevent, as directed, interruption to occupied areas.

B. Performance

1. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
   a. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

2. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
   a. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as

possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

b. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
c. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
d. Excavating and Backfilling: Comply with requirements in applicable Division 02 where required by cutting and patching operations.
e. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
f. Proceed with patching after construction operations requiring cutting are complete.

3. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
   a. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
   b. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
      1) Clean piping, conduit, and similar features before applying paint or other finishing materials.
      2) Restore damaged pipe covering to its original condition.
   c. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
      1) Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
   d. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
   e. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

4. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 01320e

SECTION 01320d

ABBREVIATIONS, ACRONYMS, DEFINITIONS, AND SYMBOLS

1.1 GENERAL

A. Description Of Work

1. This specification covers abbreviations, acronyms, definitions, and symbols used in the Contract Documents.

B. Unit of Measure Definitions

1. Following is a list of Industry Standard abbreviations.

A Area Square Feet;
Ampere
AB Anchor Bolt
ABC Aggregate Base Course
ABS Acrylonitrile Butadiene Styrene
AC Alternating Current;
Air-Conditioning;
Asphaltic Concrete;
Plywood Grade A & C
ACFM Actual Cubic Feet Per Minute
ACM Asbestos Containing Material
ACP Asphaltic Concrete Paving
ACR Acre
AD Plywood, Grade A & D
ADDL Additional
ADJ Adjustable
ADMIN Administer; Administration
AGG Aggregate
AH Ampere Hours
AHM Ampere-Hour Meter
AHU Air Handling Unit
AIC Amperes Interrupting Capacity
AL Aluminum
ALT Alternate
AMP Ampere
AMT Amount
AOT Adjusted Oxygen Transfer
APP Attactic Polypropylene
APPROX Approximate
Apt. Apartment
ART Articulated
ASB Asbestos
ASJ All Surface Jacketing
Avg. Average
AWG American Wire Gauge

BAG Bag
BBL Barrel
B&B Grade B and Better;
Balled & Burlapped
B&S Bell and Spigot
B&W Black and White
BC Between Centers
BCY Bank Cubic Yard
BDL Bundle
BD FT Board Feet
BEV Bevel/Beveled
BF Board Feet
BFP Boiler Feed Pump
BHN Brinell Hardness Number
BHP Boiler Horsepower;
Brake Horsepower
BI Black Iron
Bit. Bituminous
Bitum. Bituminous
Bk. Backed
Brkrs. Breakers
Bldg. Building
BLK Black; Block
BM Bank Measure; Beam
BOD Biochemical Oxygen Demand
BOX Box (each)
BR Bedroom
Brg. Bearing
BRK Brick
BTFLY VLV Butterfly Valve
BTR Better (Lumber)
BTU British Thermal Units
BTU/HR British Thermal Units per Hour
BUR Built Up Roof
BW Butt Weld
BWG Birmingham Wire Gauge
BX Interlocked Armored Cable
C Centigrade; Conductance;
Conductivity, Hundred
CA Corrosion Allowance
Cab. Cabinet
CAP Capacity
CB Circuit Breaker
CC Center to Center
CCA Chromate Copper Arsenate
CCF Hundred Cubic Feet
CCY Compacted Cubic Yard
cd Candela
cd/sf Candela per Square Foot
CF Cubic Foot (Feet)

CFM Cubic Feet per Minute
CHG Charge
CHW Chilled Water;
Commercial Hot Water
CI Cast Iron
CIP Cast in Place; Cast Iron Pipe
CIRC Circulating; Circuit
CLF Hundred Linear Feet;
Current Limiting Fuse
CLP Cross Linked Polyethylene
cm Centimeter
CMP Corrugated Metal Pipe
CMPA Corrugated Metal Pipe - Arched
CMU Concrete Masonry Unit
CO Carbon Monoxide
CO2 Carbon Dioxide
COL Column
Comb Combination
Compr Compressor
CONC Concrete
CONSTR Construction
Cont Continuous; Continued
Corr Corrugated
CP Chrome Plated
CPE Chlorinated Polyethylene
Cplg. Coupling
CPM Cycles per Minute
CPM Critical Path Method
CPS Centipoise
CPRSR Compressor
CPVC Chlorinated Polyvinyl Chloride
CS Carbon Steel
CSF Hundred Square Feet
CSPE ChloroSulphinated Polyethylene
CSS Cast Semi Steel
CT Current Transformer
CTB Cement Treated Base
CTR Center
CU FT Cubic Foot
CU IN Cubic Inch
CU YD Cubic Yard
CW Chilled Water; Cold Water
CWR Chilled Water Return
CWS Chilled Water Supply
CWT Hundred Weight
CY Cubic Yard (27 cu. ft.); Cycle
CYH Cubic Yards Per Hour
Cyl Cylinder
d Penny (nail size)
D Deep; Depth; Discharge

Dis. Discharge
Disch. Discharge
DB Dry Bulb; Decibel
DBL Double
DC Direct Current
DCS Distributed Control System
DDC Direct Digital Control
Demob Demobilization
DF Douglas Fir
DFT Dry Film Thickness
DH Double Hung
DHW Domestic Hot Water
DI Ductile Iron
D/P Differential Pressure
DIA Diameter
Diam Diameter
Diag. Diagonal
Distrib. Distribution
DL Dead Load; Diesel
DLH Deep Long Span Bar Joist
DPST Double Pole, Single Throw
DS Double Strength
DSA Double Strength A Quality Glass
DSB Double Strength B Quality Glass
DWV Drain, Waste, Vent Piping
DX Deluxe White, Direct Expansion
dyn Dyne
e Eccentricity
E Electrical Grade (Fiberglass Construction)
EA Each
Econ. Economy
ECR Electrical Grade, Corrosion Resistant
(Fiberglass Construction)
EDP Electronic Data Processing
EDR Equiv. Direct Radiation
EG Electro Galvanized
EIFS Exterior Insulation Finish System
ELEC Electric; Electrical
Elev. Elevator; Elevating
EM Electron Microscopy
EMT Electric Metallic Tubing; Thin Wall Conduit
Eng. Engine, Engineered
EPDM Ethylene Propylene Diene Monomer
EPS Expanded Polystyrene
EQL Equally
Equip. Equipment
ERW Electrical Resistance Welded
EROPS Enclosed Roll Over Protection System
ES Energy Saver
Est. Estimated

EW Each Way
EWT Entering Water Temperature
Excav. Excavation

EXH Exhaust
Exp. Expansion; Exposure
EXP JT Expansion Joint
Ext. Exterior
F Fahrenheit; Female; Fill
f Fiber stress
fc Compressive Stress in Concrete
fy Minimum Yield Stress of Steel
f'm Compressive Strength of Masonry
F&D Flanged-and-Dished
F&I Furnished and Installed
Fab. Fabricated
FAD Free Air Delivery
FBGS Fiberglass
FC Footcandles
FCXP Fan Cooled Explosion Proof
FDA Food and Drug Administration
FEP Fluorinated Ethylene Propylene (Teflon)
FF Flat Face
Fig. Figure
Fin. Finished
FL Full Load
FLDG Folding
Fl. Oz. Fluid Ounces
Flr. Floor
FM Frequency Modulation;
Factory Mutual
Frmg. Framing
Fndtn. Foundation
FT Foot, Feet
FTNG(S) Fitting(s)
FLG Flange
FOB Freight on Board
Fount. Fountain
FPM Feet Per Minute
FPS Feet Per Second
FPT Female Pipe Thread
FRP Fiberglass Reinforced Plastic
FS Forged Steel
FSC Cast Body, Cast Switch Box
Ftg. Footing
Ft. Lb. Foot Pound
Furn. Furniture
FVNR Full Voltage Non-Reversing
FXM Female by Male

G Gravity
g Gram
GA Gauge or Gage
G & A General and Administrative
GAL Gallon
Gal./Min. Gallon per Minute
GALV Galvanized
GBSD Gear Box Sheave Diameter
Gen. General
GFCI Ground Fault Circuit Interrupter
GFR Ground Fault Relay
GPD Gallons per Day
GPH Gallon per Hour
GPM Gallon per Minute
GR Grade
Grnd. Ground
GSF Ground Square Foot
GVW Gross Vehicle Weight
H High, Height; High Strength Bar Joist
HC Handicapped; High Capacity
HD High Density; Heavy Duty
HDO High Density Overlay
HDPE High Density Polyethylene
Hdr. Header
Hdw. Hardware
HEPA High Efficiency Particulate Air
Hg Mercury
HIC High Interrupting Capacity
HM Hollow Metal
HNDL Handle
HO High Output; Heel Outlet
Horiz. Horizontal
HP High Pressure;Horse Power
HPF High Pressure Factor
HPL High Pressure Laminate
HR Hour
HRS Hot-Rolled Steel
HS High Speed; High Strength
HSC High Short Circuit
HSLA High Strength Low Alloy
HT Hospital Tips; Height
Htg. Heating
Htrs. Heaters
HVAC Heating, Ventilating & Air Conditioning
Hvy. Heavy
HW Hot Water
HWR Hot Water Return
HWS Hot Water Supply
HWT Hundred Carton Weight
Hyd. Hydraulic

Hydr. Hydraulic
HZ Hertz (cycles)
I Moment of Inertia
IC Interrupt Capacity
ICFM Inlet Cubic Feet per Minute
ID Inside Diameter
I.D. Identification; Inside Dimension
IF Inside Frosted
IMC Intermediate Metal Conduit
IN Inch
IN LB Inch Pound
IN WC Inches Water Column
Incan. Incandescent
Incl. Include, Including
Inst. Install, Installation
Insul. Insulation, Insulated
Int. Interior
INTSCT Intersect
IP Iron Pipe
IPS International Pipe Standard
Iron Pipe Size
Inches per Second
IPT Iron Pipe Threaded
ISP Inlet Steam Pressure
IW Indirect Waste
J Joule
JOB Job
JOC Job Order Contracting
JT Joint
K Thousand; Thousand Pounds;
Heavy Wall Copper Tubing; Kelvin
KAH Thousand Amp Hours
KD Kiln Dried; Knocked Down
KDAT Kiln Dried After Treatment
Kip 1000 Pounds
KO Knockout
Km Kilometer
KLF Kips per Linear Foot
KSF Kips per Square Foot
KSI Kips per Square Inch
kA KiloAmp
kg Kilogram
kHz Kilohertz
kJ Kilojoule
kV Kilovolt
kVA Kilovolt Ampere (1,000 volt amps)
KVAR Kilovar (Reactance)
kW Kilowatt
kWh Kilowatt Hour
L Length; Long;

Medium Wall Copper Tubing
L&E Labor and Equipment
LAB Labor
LAN Lane
LAT Latitude
LAV Lavatory
L.B. Load Bearing; L Conduit Body
LB Pound (Force or Mass)
LB/HR Pounds per Hour
LBS Pounds
LBSF Pounds per Square Foot
LCD Liquid Crystal Display
LCL Less Than Carload Lot
LCY Loose Cubic Yard
LE Leading Edge; Lead Equivalent
LED Light Emitting Diode
LEL Lower Explosive Limit
LF Linear Foot
LFD Linear Feet Per Day
LFTL Lineal Feet Tube Length
Lge. Large; Long
LH Labor Hours; Long Span Bar Joist
LIN Linear
LL Live Load
LLD Lamp Lumen Depreciation
LNG Liquid Natural Gas
LOA Length Over All
L-O-L Lateralolet
LP(G) Liquid Propane (Gas)
LS Low Speed; Lump Sum
Lt Light
Lt Ga Light Gauge
LTL Less than Truck Load
Lt Wt Light Weight
LV Low Voltage
lm Lumen
lm/sf Lumen per square foot
lm/W Lumen per Watt
m Meter
m3/H Cubic Meters per Hour
mA Milliampere
m/S Meters per Second
M Thousand; Male;
Light Wall Copper Tubing
MATL Material
MAX Maximum
Mach Machine
Mag. Str. Magnetic Starter
Maint. Maintenance
Mat Material

Mat'l; Material
Max. Maximum
Mb Million Bytes (characters(
MBF Thousand Board Feet
MBH Thousand BTU per Hour
MBtu Thousand British Thermal Units
MC Metal Clad Cable
MCF Thousand Cubic Feet
MCM Thousand Circular Mills
MCP Motor Circuit Protector
MD Medium Duty
MDO Medium Density Overlaid
Med. Medium
MF Thousand Feet
MF3 Thousand Cubic Feet
Mfg. Manufacturing
Mfrs. Manufacturers
Mg Milligram
MG Market Grade
MGD Million Gallons per Day
MGPH Thousand Gallons per Hour
MH Manhole; Manhour; Metal Halide
MHz MegaHertz
Mi Mile
MI Malleable Iron; Mineral Insulated
MIN Minimum; Minute
MISC Miscellaneous
ml Milliliter; Mainline
MLF Thousand Linear Feet
mm Millimeter
MO Month
Mobil. Mobilization
Mog. Mogul Base
MPH Miles Per Hour
MPT Male Pipe Thread
MRT Mile Round Trip
ms Millisecond
MSD Motor Sheave Diameter
MSF Thousand Square Feet
MSY Thousand Square Yards
MT Mount
MTD Mounted
MTG Mounting
MTR Mill Test Report
MVA Million Volt Ampere
MVAR Million Volt Amperes Reactance
MV Megavolt
MW Megawatt
MXM Male by Male
MYD Thousand Yards

N Natural; North
nA Nanoampere
NA Not Applicable
NC Normally Closed
NEHB Bolted Circuit Breaker to 600V
NDT Non Destructive Testing
NIOSH National Alloy
NLB Non-Load Bearing
NM Non-Metallic Cable
nm Nanometer
NO Normally Open
No. Number
NOM Nominal
NQOD Combination Plug-on/Bolt-on Circuit Breaker to 240V
NRC Noise Reduction Coefficient
NPT National Pipe Thread
NPS Nominal Pipe Size
NRP Non-Removable Pins
NRS Non-Rising Stem
ns Nanosecond
NTE Note
NTP National Taper Pipe (Thread)
nW Nanowatt
OAL Overall Length
OB Opposing Blade
OC On Center
OD Outside Diameter
O.D. Outside Dimension
ODP Open Drip Roof
ODS Overhead Distribution System
OEM Original Equipment Manufacturer
OG Ogee
OH Overhead
OH&P Overhead and Profit
OHL Over Hung Load
Oper. Operator
Opng. Opening
OPR Operating
Orna. Ornamental
OSA Outside Air
OSB Oriented Strand Board
OS & Y Outside Screw and Yoke
OUT Outlet or Output (each)
Ovhd. Overhead
OWG Oil, Water or Gas
OWSJ Open Web Steel Joist
OZ Ounce
P Pole; Applied Load; Projection
p Page

pp Pages
PAPR Powered Air Purifying Respirator
PAR Weatherproof Reflector
PB Push Button
PC Personal Computer; Piece;
PCs Pieces
P.C. Portland Cement; Power Connector
PCF Pounds per Cubic Foot
PCM Phase Contrast Microscopy
PE Professional Engineer; Plain End
Porcelain Enamel; Polyethylene;
PERF Perforated
PH Phase
PI Pressure Injected
PID Programmable Integral Derivative Controller
PKG Package
PL Plate
PLC Programmable Loop Controller
PLM Polarized Light Microscopy
PLTC Power Limited Tray Cable
PLY Plywood
PNEU Pneumatic
PNTD Painted
POA Priced On Application/Priced On Approval
PESB Pre-engineered Steel Building
PPD Pounds Per Day
PP; PPL Polypropylene
PPM Parts Per Million
PPS Polyphenylene Sulfide
PR Pair
Prefab. Prefabricated
Prefin. Prefinished
PROGEN® Proposal Generator Software for
Job Order Contracting
PROP Propelled; Propeller
PSF Pounds Per Square Foot
PSI Pounds Per Square Inch
PSIA Pounds Per Square Inch Atmosphere
PSIG Pounds Per Square Inch Gauge
PSP Plastic Sewer Pipe
PT Power or Potential Transformer
Pt. Pint
Ptns. Partitions
P&T Pressure & Temperature
PTFE Polytetrafluoroethylene
Pu Ultimate Load
PV Photovoltaic
PVA Polyvinyl Acrylate
PVC Polyvinyl Chloride
PVDC Polyvinylidene Chloride

PVDF Polyvinylidene Fluoride
PVF Polyvinyl Fluoride
Pvmt. Pavement
PVQ Pressure Vessel Quality
Pwr. Power
Q Quantity Heat Flow
QA Quality Assurance
QC Quality Control; Quick Coupling
QT Quart
Quan. Quantity
Qty. Quantity
R Thermal Resistance
R/L Random Lengths
R/W/L Random Widths and Lengths
RA Return Air; Registered Architect
RCP Reinforced Concrete Pipe
Rect. Rectangle
REINF Reinforced/Reinforcing
Req'd Required
RF Raised Face
RGH Rough
RGS Rigid Galvanized Steel
RH Relative Humidity
RHW Rubber, Heat & Water Resistant; Residential Hot Water
rms Root Mean Square
RND Round
ROL Roll (each)
ROM Room
ROPS Roll Over Protection System
ROW Row
R.O.W. Right of Way
RPM Revolutions Per Minute
RR Direct Burial Feeder Conduit
RS Rapid Start
RSC Rigid Steel Conduit
RSR Riser (Per Rise)
RT Round Trip
RTD Resistance Temperature Detector
RTJ Ring Type Joint
RTRP Reinforced Thermoset Resin Piping
RVT Reinforced Vinyl Tile
S Suction; Single Entrance; South
S1S2E Surfaced 1 side, 2 Edges
S2S Surfaced 2 Sides
S4S Surfaced 4 Sides
Sa Sack
SA Supply Air
SBS Styrene Butyl Styrene
Scaf. Scaffolding

SCFH Standard Cubic Foot Per Hour
SCFM Standard Cubic Foot per Minute
SCH Schedule
SCR Modular Brick
SCRD Screwed
SD Sound Deadening
SDR Standard Dimension Brick;
Size To Diameter Ratio
SE Surfaced Edge; Semi-Elliptical
SEA Seat
SER Service Entrance Cable
SEU Service Entrance Cable
SET Set
SF Square Foot/Feet
SFCA Square Feet of Form in Contact with Concrete
SHTS Sheets
SI Square Inch
SIS Synthetic Heat-Resistant
SLDR Solder
SLH Super Long Span Bar Joist
SN Solid Neutral
S-O-L Socketolet
SP Self-Propelled; Single Pole;
Space; Standpipe
Static Pressure (measured in inches of water);
SPDT Single Pole, Double Throw
SPGR Specific Gravity
SPWG Static Pressure Water Gauge
SQ Square;
Hundred Square Feet (10' x 10' area)
SQ FT Square Foot/Square Feet
SQ IN Square Inch
SQ YD Square Yard
SS Stainless Steel; Single Strength
SSB Single Strength B Quality Glass
SSL Self Sealing Lap
STC Sound Transmission Class
STD Standard
STK Select Tight Knot
STP Stop (each);
Standard Temperature & Pressure
SURF Surface
STL Steel
SURF Surface
SW Seam Weld
SW Switch
SWBD Switchboard
SWS Segmentally Welded Steel

SWSI Single Width, Single Inlet
SY Square Yard
SYN Synthetic
SYP Southern Yellow Pine
SYS System
T Thick; Temperature; Ton
T&C Threaded and Coupled
T&G Tongue and Grove
TBC Tensile Bolt Cloth
TBE Threaded Both Ends
TC Terra Cotta
TDS Total Dissolved Solids
TEAO Totally Enclosed Air Over
TEFC Totally Enclosed Fan Cooled
TETC Totally Enclosed Tube Cooled
TFE Tetrafluoroethylene (Teflon)
THHN Nylon Jacketed Wire
THK Thick
THKNS Thickness
THW Insulated Strand Wire
THWN Nylon Jacketed Wire
TI Titanium
TL Truckload
TM Track Mounted
T-O-L Threadolet
TON Ton
Tot. Total
TPH Tons Per Hour
Transf. Transformer
TSHP Total Shaft Horse Power
T'STAT Thermostat
TV Television
TW Thermoplastic Water Resistant Wire
UA Unequal Angle
UCI Uniform Construction Index
UF Underground Feeder
UHF Ultra High Frequency
UI United Inch
UNC Unified Coarse (Threads)
USP United States Primed
UTP Unshielded Twisted Pair
UV Under Voltage
V Volt
VA Volt Amperes
VAV Variable Air Volume
VCT Vinyl Composition Tile
Vert. Vertical
VF Vinyl Faced
VHF Very High Frequency
VLF Vertical Linear Foot

VLV Valve
Vol. Volume
VRP Vinyl Reinforced Polyester
w/ With
W Watt; Width; Wire; West
WB Wet Bulb
WC Water Column; Water Closet
WF Wide Flange
WG Water Gauge
WHM Watthour Meter
WK Week
Wldg. Welding
WOG Water, Oil, Gas
W-O-L Weldolet
WP Weather Protected
WR Water Resistant
WSP Water, Steam, Petroleum
WT Weight
WWF Welded Wire Fabric
X or x By or Times
XFER Transfer
XFMR Transformer
XHD Extra Heavy Duty
XHHW; XLPE Cross-Linked Polyethylene Wire Insulation
XLP Cross-Linked Polyethylene
XP Explosion Proof
Y Wye
YD Yard
YR Year

2. Symbols

Δ Delta / per-through or to
@ at
% per 100 or percent
$ U.S. dollars
~ Approximate
Ø Phase
' feet
" inches
pound or number
° degree
< Less Than
> Greater Than

3. Explanation Of Terms

BTU: Stands for British Thermal Unit. The BTU number indicates the amount of heat required to raise one pound of water by one degree Fahrenheit. What

this means is the higher the BTU rating, the higher the heating capacity of a product.
MBH: Equal to 1000 BTUs. Tons (In Reference To Cooling): Unit of measurement for determining cooling capacity. One ton equals 12,000 BTUH.
SEER: Stands for Seasonal Energy Efficiency Ratio. This measures the cooling efficiency in air conditioners or heat pumps. The higher the SEER rating, the more energy-efficient the unit. The government's minimum SEER rating is 10.

4. Calculation Of Board Feet
   a. All Lumber Grades Are Presumed To Be 75 Percent Construction And 25 Percent Standard Or Equivalent Grade Unless Otherwise Listed. Dimensions Are Nominal. Board Foot Is Defined As 1" x 12" x 1' Long; To Calculate BF/LF, Multiply The Size Of The Board Height x Width/12.
      1) 1"x2" = 0.167 BF/LF
      2) 1"x3" = 0.25 BF/LF
      3) 2"x3" = 0.5 BF/LF
      4) 2"x4" = 0.667 BF/LF
      5) 2"x6" = 1.0 BF/LF
      6) 2"x8" = 1.333 BF/LF
      7) 2"x10" = 1.667 BF/LF
      8) 2:x12" = 2.0 BF/LF
      9) 4"x4" = 1.333 BF/LF
      10) 6"x4" = 2.0 BF/LF
      11) 6"x6" = 3.0 BL/LF
      12) 8"x8" = 5.333 BF/LF
      13) etc.

   b. To Calculate Board Feet;
      1) For most lumber: Thickness (inches) x width (inches) x length (feet) divided by 12 = board feet.
      2) For small pieces: Thickness (inches) x width (inches) x length (inches) divided by 144 = board feet.

1.2 PRODUCTS (Not Used)

1.3 EXECUTION (Not Used)

END OF SECTION 01320d

SECTION 01510

CONSTRUCTION WASTE MANAGEMENT

1.1 GENERAL

A. Summary

1. This Section includes administrative and procedural requirements for the following:
   a. Salvaging nonhazardous demolition and construction waste.
   b. Recycling nonhazardous demolition and construction waste.
   c. Disposing of nonhazardous demolition and construction waste.

B. Definitions

1. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

2. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

3. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

4. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

5. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

6. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

C. Performance Goals or Requirements:

1. General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of 75, percent by weight of total waste generated by the Work.

2. Salvage/Recycle Goals: Owner has established minimum goals for the following materials:
   a. Demolition Waste:
      1) Asphaltic concrete paving.
      2) Concrete.
      3) Concrete reinforcing steel.
      4) Brick.
      5) Concrete masonry units.

6) Wood studs.
7) Wood joists.
8) Plywood and oriented strand board.
9) Wood paneling.
10) Wood trim.
11) Structural and miscellaneous steel.
12) Rough hardware.
13) Roofing.
14) Insulation.
15) Doors and frames.
16) Door hardware.
17) Windows.
18) Glazing.
19) Metal studs.
20) Gypsum board.
21) Acoustical tile and panels.
22) Carpet.
23) Carpet pad.
24) Demountable partitions.
25) Equipment.
26) Cabinets.
27) Plumbing fixtures.
28) Piping.
29) Supports and hangers.
30) Valves.
31) Sprinklers.
32) Mechanical equipment.
33) Refrigerants.
34) Electrical conduit.
35) Copper wiring.
36) Lighting fixtures.
37) Lamps.
38) Ballasts.
39) Electrical devices.
40) Switchgear and panelboards.
41) Transformers.

b. Construction Waste:
1) Site-clearing waste.
2) Masonry and CMU.
3) Lumber.
4) Wood sheet materials.
5) Wood trim.
6) Metals.
7) Roofing.
8) Insulation.
9) Carpet and pad.
10) Gypsum board.
11) Piping.
12) Electrical conduit.

13) Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
   a) Paper.
   b) Cardboard.
   c) Boxes.
   d) Plastic sheet and film.
   e) Polystyrene packaging.
   f) Wood crates.
   g) Plastic pails.

D. Submittals

1. Waste Management Plan: Submit 3 copies of plan within 7 days of date established for commencement of the Work.

2. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit three copies of report. Include separate reports for demolition and construction waste. Include the following information:
   a. Material category.
   b. Generation point of waste.
   c. Total quantity of waste in tons.
   d. Quantity of waste salvaged, both estimated and actual in tons.
   e. Quantity of waste recycled, both estimated and actual in tons.
   f. Total quantity of waste recovered (salvaged plus recycled) in tons.
   g. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

3. Waste Reduction Calculations: Before request for Substantial Completion, submit three copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

4. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

5. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

6. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

7. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

8. Qualification Data: For Waste Management Coordinator and refrigerant recovery technician.

9. 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.

E. Quality Assurance

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

2. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

3. Waste Management Conference: Conduct conference at Project site. Review methods and procedures related to waste management including, but not limited to, the following:
   a. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
   b. Review requirements for documenting quantities of each type of waste and its disposition.
   c. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
   d. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
   e. Review waste management requirements for each trade.

F. Waste Management Plan

1. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Include separate sections in plan for demolition and construction waste if Project requires selective demolition or building demolition. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

2. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

3. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
   a. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
   b. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.

c. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
d. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
e. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
f. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

4. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:
   a. Total quantity of waste.
   b. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
   c. Total cost of disposal (with no waste management).
   d. Revenue from salvaged materials.
   e. Revenue from recycled materials.
   f. Savings in hauling and tipping fees by donating materials.
   g. Savings in hauling and tipping fees that are avoided.
   h. Handling and transportation costs. Include cost of collection containers for each type of waste.
   i. Net additional cost or net savings from waste management plan.

1.2 PRODUCTS (Not Used)

1.3 EXECUTION

A. Plan Implementation

1. General: Implement waste management plan as approved by the Owner. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
   a. Comply with Division 01 Section "Temporary Facilities And Controls" for operation, termination, and removal requirements.

2. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.

3. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

a. Distribute waste management plan to everyone concerned within three days of submittal return.
b. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

4. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   a. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
   b. Comply with Division 01 Section "Temporary Facilities And Controls" for controlling dust and dirt, environmental protection, and noise control.

B. Salvaging Demolition Waste

1. Salvaged Items for Reuse in the Work:
   a. Clean salvaged items.
   b. Pack or crate items after cleaning. Identify contents of containers.
   c. Store items in a secure area until installation.
   d. Protect items from damage during transport and storage.
   e. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

2. Salvaged Items for Sale and Donation: Permitted as directed, on Project site.

3. Salvaged Items for Owner's Use:
   a. Clean salvaged items.
   b. Pack or crate items after cleaning. Identify contents of containers.
   c. Store items in a secure area until delivery to Owner.
   d. Transport items to off-site as designated by the Owner.
   e. Protect items from damage during transport and storage.

4. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

C. Recycling Demolition And Construction Waste, General

1. General: Recycle paper and beverage containers used by on-site workers.

2. Recycling Receivers and Processors: Provide a list of proposed recycling receiver companies planned to be contracted with.

3. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner.

4. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separaterecyclable waste by type at Project site to the maximum extent practical.
   a. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
      1) Inspect containers and bins for contamination and remove contaminated materials if found.
   b. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   c. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
   d. Store components off the ground and protect from the weather.
   e. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

D. Recycling Demolition Waste

1. Asphaltic Concrete Paving: Grind asphalt to maximum 1-1/2-inch (38-mm) size.
   a. Crush asphaltic concrete paving and screen to comply with requirements in Division 02 Section "Earthwork" for use as general fill.

2. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.

3. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
   a. Pulverize concrete to maximum 1-1/2-inch.
   b. Crush concrete and screen to comply with requirements in Division 02 Section "Earthwork" for use as satisfactory soil for fill or subbase.

4. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
   a. Pulverize masonry to an as directed, size.
      1) Crush masonry and screen to comply with requirements in Division 02 Section "Earthwork" for use as general fill.

5. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

6. Metals: Separate metals by type.
   a. Structural Steel: Stack members according to size, type of member, and length.
   b. Remove and dispose of bolts, nuts, washers, and other rough hardware.

7. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

8. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.
   a. Separate suspension system, trim, and other metals from panels and tile and sort with other metals.

10. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
    a. Store clean, dry carpet and pad in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

11. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

12. Plumbing Fixtures: Separate by type and size.

13. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

14. Lighting Fixtures: Separate lamps by type and protect from breakage.

15. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

16. Conduit: Reduce conduit to straight lengths and store by type and size.

E. Recycling Construction Waste

1. Packaging:
   a. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
   b. Polystyrene Packaging: Separate and bag materials.
   c. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
   d. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

2. Site-Clearing Wastes: Chip brush, branches, and trees on-site.
   a. Comply with requirements in Division 02 Section "Exterior Plants" for use of chipped organic waste as organic mulch.

3. Wood Materials:
   a. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
   b. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

4. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.
   a. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.
   1) Comply with requirements in Division 02 Section "Exterior Plants" for use of clean ground gypsum board as inorganic soil amendment.

F. Disposal of Waste

1. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
   a. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
   b. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

2. Burning: Do not burn waste materials.

3. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 01510

SECTION 01520

TEMPORARY FACILITIES AND CONTROLS

1.1 GENERAL

A. Summary

1. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Definitions

1. Permanent Enclosure: As determined by the Owner, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

C. Use Charges

1. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, the Owner, occupants of Project, testing agencies, and authorities having jurisdiction.

2. Water Service: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

3. Electric Power Service: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

D. Submittals

1. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

E. Quality Assurance

1. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

2. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

F. Project Conditions

1. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

1.2 PRODUCTS

A. Materials

1. Pavement: Comply with Division 02 Section(s) "Asphalt Paving".

2. Chain-Link Fencing: Minimum 2-inch thick, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails.

3. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch-(60-mm-) OD line posts and 2-7/8-inch-(73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-

B. Temporary Facilities

1. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

2. Common-Use Field Office: Of sufficient size to accommodate needs of construction personnel. Keep office clean and orderly. Furnish and equip offices as follows:
   a. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
   b. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack board.
   c. Drinking water and private toilet.
   d. Coffee machine and supplies.
   e. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
   f. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

3. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
   a. Store combustible materials apart from building.

C. Equipment

1. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

2. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
   a. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
   b. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
   c. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction.

1.3 EXECUTION

A. Installation, General

1. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

2. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

B. Temporary Utility Installation

1. General: Install temporary service or connect to existing service.
   a. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

2. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
   a. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

3. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
   a. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.

4. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

a. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

5. Heating and Cooling, Provide temporary heating and cooling, required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

6. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

7. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner.
   a. Install electric power service overhead unless otherwise indicated.
   b. Connect temporary service to Owner's existing power source, as directed by Owner.

8. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
   a. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
   b. Install lighting for Project identification sign.

9. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line for each field office.
   a. Provide additional telephone lines for the following:
      1) Provide a dedicated telephone line for each facsimile machine and computer in each field office.
   b. At each telephone, post a list of important telephone numbers.
      1) Police and fire departments.
      2) Ambulance service.
      3) Contractor's home office.
      4) the Owner's office.
      5) Owner's office.
      6) Principal subcontractors' field and home offices.
   c. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

10. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail, in common-use facilities.

C. Support Facilities Installation

1. General: Comply with the following:
   a. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines. Comply with NFPA 241.
   b. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

2. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.
   a. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

4. Traffic Controls: Comply with requirements of authorities having jurisdiction.
   a. Protect existing site improvements to remain including curbs, pavement, and utilities.
   b. Maintain access for fire-fighting equipment and access to fire hydrants.

5. Parking: Use designated areas of Owner's existing, parking areas for construction personnel.

6. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
   a. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
   b. Remove snow and ice as required to minimize accumulations.

7. Project Identification and Temporary Signs: Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.
   a. Provide temporary, directional signs for construction personnel and visitors.
   b. Maintain and touchup signs so they are legible at all times.

8. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with General Requirements for progress cleaning requirements.

9. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
   a. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

10. Temporary Elevator Use: Refer to Division 14 for temporary use of new elevators.

11. Existing Elevator Use: Use of Owner's existing elevators will be permitted, as long as elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.
    a. Do not load elevators beyond their rated weight capacity.
    b. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

12. Existing Stair Usage: Use of Owner's existing stairs will be permitted, as long as stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
    a. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If, despite such protection, stairs become damaged, restore damaged areas so no evidence remains of correction work.

13. Temporary Use of Permanent Stairs: Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

D. Security And Protection Facilities Installation

1. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

2. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
    a. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

3. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

4. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from

construction operations. Protect tree root systems from damage, flooding, and erosion.

5. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.

6. Site Enclosure Fence: Before construction operations begin furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
   a. Extent of Fence: As required to enclose portion of site determined sufficient to accommodate construction operations.
   b. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.

7. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

8. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

9. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
   a. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

10. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise.
    a. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
    b. If containment of airborne particles and dust generated by construction activities is critical to occupants of other spaces in building, e.g., occupied healthcare facilities: Construct dustproof partitions with 2 layers of 3-mil (0.07-mm) polyethylene sheet on each side. Cover floor with 2 layers of 3-mil (0.07-mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant plywood.
       1) Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water-dampened foot mats in vestibule.
    c. Insulate partitions to provide noise protection to occupied areas.

d. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
e. Protect air-handling equipment.
f. Weather strip openings.
g. Provide walk-off mats at each entrance through temporary partition.

12. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of typesneeded to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
a. Prohibit smoking in construction, areas.
b. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
c. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
d. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

E. Operation, Termination, And Removal

1. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

2. Maintenance: Maintain facilities in good operating condition until removal.
a. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

3. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.

4. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

5. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
a. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.

b. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
c. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in General Requirements

END OF SECTION 01520

FULTON COUNTY DESIGN STANDARDS FOR DEPARTMENT OF HUMAN SERVICES FACILITIES

SECTION 01720

PART I – GENERAL

1.1 GENERAL

A. In order to maintain the continuity within various Centers that the Department of Human Servicesxdesires in their facilities, the following general design considerations shall be incorporated.

1. Each facility shall have a vestibule having bi-parting doors actuated by motion detectors. Doors shall be at each end of the vestibule creating an air lock. A recessed floor mat shall be installed at the exterior set of doors. This mat shall be as wide as the double doors and 48" deep.

2. A Message Board shall be located adjacent to the vestibule to announce events, hours and other rotating events. Boards shall be 4' wide x 3' high, be aluminum trim, have grooved felt background (for tabbed plastic letters) and have glass doors.

3. Bulletin Board Cabinets shall be 4' wide x 3' high, have aluminum trim, have 1/4" corkboard covered in fabric, and have continuous hinged doors with flat key tumbler locks.

4. Handrails shall be vinyl covered and corner guards shall be vinyl covered to match handrails.

5. Exterior Work:
   a. Because of the nature of the users, additional accessible parking stalls beyond the ADAAG requirements are desired. This increase of numbers shall be twice the ADAAG requirements. Ref. GA Accessibility Code, 120-23-20.07 (e)1.
   b. For all driveways that will accommodate buses, the base course of pavement shall be increased for heavy duty use (8" deep), tack coat, 2"asphalt type "B", tack coat, second layer of 2" asphalt type "B", tack coat, and a top layer of 1" asphalt type "F".
   c. Provide covered walkways from accessible parking to the entrance of the building.

END OF SECTION 01720

SECTION 02111

DEMOLITION

1.1 GENERAL

A. Description of Work

1. This specification covers the furnishing and installation of materials for building demolition. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Hazardous Materials: Hazardous material remediation is specified elsewhere in the Contract Documents. Remediation of hazardous materials shall be the responsibility of this contractor.

B. Summary

1. This Section includes the following:
   a. Demolition and removal of interior partitions, ceiling tiles, flooring material, doors, door frames, light fixtures, certain millwork and related items as indicated on the drawings.
   b. Removal and disposal of hazardous materials indicated in the report by Corporate Environmental Risk Management dated February 20, 2009 and addressed to the Fulton County General Services Department.
   b. Disconnecting, capping or sealing, and abandoning in-place or removing, site utilities.
   d. Salvaging items for reuse by Owner.

C. Definitions

1. Demolish: Completely remove and legally dispose of off-site.

2. Recycle: Recovery of demolition waste for subsequent processing in preparation for reuse.

3. Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse. Include fasteners or brackets needed for reattachment elsewhere.

D. Materials Ownership

1. Unless otherwise indicated, demolition waste becomes property of Contractor.

2. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

a. Carefully salvage in a manner to prevent damage and promptly return to Owner.

E. Submittals

1. Qualification Data: For refrigerant recovery technician.

2. Schedule of Building Demolition Activities: Indicate the following:
   a. Detailed sequence of demolition work, with starting and ending dates for each activity.
   b. Temporary interruption of utility services.
   c. Shutoff and capping or re-routing of utility services.

3. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.

4. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

F. Quality Assurance

1. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

2. Standards: Comply with ANSI A10.6 and NFPA 241.

3. Predemolition Conference: Conduct conference at Project site to review methods and procedures related to building demolition including, but not limited to, the following:
   a. Inspect and discuss condition of construction to be demolished.
   b. Review structural load limitations of existing structures.
   c. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
   d. Review and finalize protection requirements.
   e. Review procedures for noise control and dust control.
   f. Review items to be salvaged and returned to Owner.

G. Project Conditions

1. Building will be vacated and its use discontinued before start of the Work.

2. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.
   a. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.
   b. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.

1) Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.

3. Owner assumes no responsibility for buildings and structures to be demolished.
   a. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
   b. Before demolition, Owner will remove certain items, as directed by the Owner.

4. Hazardous Materials: Hazardous materials are present in buildings and structures to be demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
   a. Hazardous material remediation is specified elsewhere in the Contract Documents, but will be carried out by this Contractor.
   b. Remove hazardous materials under procedures specified elsewhere in the Contract Documents.
   c. Contractor will provide material safety data sheets for materials that are known to be present in buildings and structures to be demolished because of building operations or processes performed there.

5. On-site storage or sale of removed items or materials is not permitted.

H. Coordination

1. Arrange demolition schedule so as not to interfere with Owner's on-site operations or operations of adjacent occupied buildings, as directed.

1.2 PRODUCTS

A. No Products Used

1.3 EXECUTION

A. Examination

1. Verify that utilities have been disconnected and capped before starting demolition operations.

2. Review Project Record Documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

3. Inventory and record the condition of items to be removed and salvaged. Provide photographs as directed, of conditions that might be misconstrued as damage caused by salvage operations.

4. Perform or engage a professional engineer to perform, as directed, an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.

5. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

B. Preparation

1. Refrigerant: Remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction before starting demolition.

2. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.
   a. Arrange to shut off indicated utilities with utility companies, as directed.
   b. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
   c. Cut off pipe or conduit a minimum of 24 inches (610 mm) below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.

3. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.
   a. Strengthen or add new supports when required during progress of demolition.

4. Salvaged Items: Comply with the following:
   a. Clean salvaged items of dirt and demolition debris.
   b. Pack or crate items after cleaning. Identify contents of containers.
   c. Store items in a secure area until delivery to Owner.
   d. Transport items to storage area designated by Owner.
   e. Protect items from damage during transport and storage.

C. Protection

1. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.

2. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.
   a. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
   b. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.

1) Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.

3. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction, and as indicated. Comply with requirements in Division 01 Section "Temporary Facilities And Controls".
   a. Protect adjacent buildings and facilities from damage due to demolition activities.
   b. Protect existing site improvements, appurtenances, and landscaping to remain.
   c. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
   d. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   e. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
   f. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
   g. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.
4. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

D. Demolition, General

1. Cutting torches:
   a. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
   b. Maintain fire watch during and for at least <Insert number> hours after flame cutting operations.
   c. Maintain adequate ventilation when using cutting torches.
   d. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

2. Engineering Surveys: During demolition, perform surveys to detect hazards that may result from building demolition activities.

3. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   a. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
   b. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use

water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

E. Demolition by Mechanical Means

1. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
   a. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.

F. Demolition By Explosives: Use of explosives is not permitted

G. Site Restoration

1. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials.

2. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

H. Repairs

1. Promptly repair damage to adjacent buildings caused by demolition operations.

I. Disposal Of Demolished Materials

1. Remove demolition waste materials from Project site and legally dispose of them in an EPAapproved landfill acceptable to authorities having jurisdiction.
   a. Do not allow demolished materials to accumulate on-site.
   b. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

2. Do not burn demolished materials.

J. Cleaning

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

END OF SECTION 02111

SECTION 02630

PORTLAND CEMENT CONCRETE SIDEWALKS

1.1 GENERAL

A. Description Of Work: This standard covers the furnishing and installation of cast-in-place Portland cement (PCC) sidewalks. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be required to support the work. Sidewalks shall meet Georgia Accessibility Code and/or ADAAG and all applicable codes.

1.2 PRODUCTS

A. Ready-Mixed Concrete: Ready-mixed concrete shall comply with ASTM C 94, Alternate No. 2. The concrete shall have a slump of not more than three inches. The concrete shall attain a minimum compressive strength of 3,000 PSI at 28 days.

B. Base: The Base (top 3 to 6 inches) shall be common borrow material (free of organic material) and shall be tamped using motorized vibratory plate tamper (sheeps foot) before placement of concrete.

C. Sub-Base: The Sub-Base shall be cleared, grubbed, and compacted using vibratory plate tamper (Sheep's foot).

D. Aggregates: ASTM C33.

E. Reinforcement: Welded Wire Mesh (WWM, 6 X 6 X W2.9 X W2.9) in compliance with ASTM A185 & A82 shall be used. WWM shall be cut sheets (not rolled).

F. Expansion Joint Fillers: Expansion Joint Fillers shall comply with ASTM D 1751 or shall be resin impregnated fiberboard complying with ASTM D 1752. One expansion joint filler shall be installed perpendicular to the run of the sidewalk at a distance along the run equal to twice the sidewalk's width. (Example: Sidewalk width is 4' then expansion joint shall be at 8' along the run.) Expansion joint fillers shall also be installed at every junction where new concrete is placed next to existing concrete or structures. The top edge of the expansion joint shall be installed so that the top edge is 2" below the finished concrete surface.

G. Joint Sealers: Joint sealers shall meet ASTM D 1191. Joints shall be clean, dry and free of all scale, dirt, dust, curing compound, and other foreign matter prior to installing joint sealers.

1.3 - EXECUTION

A. Form Work: Forms may be metal or wood. Forms shall be oiled before placing concrete. Forms shall be adequately braced, installed, and maintained so that a straight line of sight is established along all edges when straight runs are being constructed. Forms shall not be removed after concrete pour for 24 hours or longer depending on climatic conditions and structural requirements. Placed forms so that

adequate drainage of water from the concrete sidewalk surface is obtained (min. 1% slope, max. 2%).

B. Welded Wire Mesh (WWM): Shall be installed so that the WWM is a minimum of 1.5" from any edge of concrete. WWM shall not be in contact with the base or sub-base at any point. Where necessary to lap, the laps shall be a minimum of six (6) inches.

C. Concrete Conveying: Convey concrete to construction areas by methods that will prevent segregation.

D. Concrete Placing: Moisten the sub-grade just before the concrete is placed. Place concrete in one layer of such thickness that when compacted and finished the sidewalk will be of the required thickness. Cold weather placing shall be in compliance with ACI 306. Concrete mixture temperature shall not be less than 50 deg. F. Hot weather placing shall be in compliance with ACI 305 and concrete mixture temperature shall not be less than 80 deg. F.

E. Edge and Joint Finishing: Carefully finish all edges, including those at formed joints, with an edge having a radius of 3 inch. Cut joints are not acceptable.

F. Construction Joints: Construction Joints shall be installed evenly between expansion joints (tooled joints) along the run so that the surface is divided into square areas, equal to the width of the sidewalk. Construction joints shall be tooled with a 3" radius and shall extend from the finished surface to a 2" minimum depth below the finished concrete surface.

G. Joint Sealing: At the end of the curing period, carefully clean and seal expansion joints.

H. Portland Cement Concrete Curing: Cure new concrete by protection against loss of moisture and rapid temperature changes for a period not less than 7 days.

I. Back-filling: After curing, remove forms and all debris adjoining the sidewalk, backfill, grade, and compact to conform to the surrounding area. Final grade shall provide a one (1) foot wide level shoulder starting 1" below finished sidewalk surface before any tapering. Tapering shall not exceed a 1:3 slope. (Example: For every 1' of rise the run shall be 3'.) the Owner will instruct as to grass seed type and rate of application based on the season and surrounding existing grasses. Seed and fertilizer shall be spread in a manner consistent with landscape industry standards for the variety grass chosen. See Specification 2810.

J. Dusting: dusting shall not be allowed.

K. Sealing: Sealing shall not be allowed.

L. Finishing: The finished concrete surface shall be as follows:

1. New sidewalks: Shall be light broom finished. Edges and joints shall be tooled as to have a frame effect on the finished surface. The acceptable finished

concrete surface at the junction of the broom finish surface and tooled joint shall have no variances in height exceeding 1/8". The acceptable concrete finish surface shall be void of depressions or rises, uneven surfaces, of 1/8" or greater.

2. Patching: The concrete finish shall match existing surrounding concrete finishes, unless otherwise directed by the Owner. Finished surface shall be flush with adjoining concrete surfaces.

3. Existing Sidewalks/Option: Fulton County reserves the right to specify different finishes.

M. Erosion Control: Erosion control measures shall be undertaken for all work.

END OF SECTION 02630

SECTION 02825

ORNAMENTAL ALUMINUM FENCES AND GATES

PART 1- GENERAL

1.1 RELATED DOCUMENTS

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

B. The contractor shall provide all labor, materials and all necessary accessory items for the installation of the ornamental aluminum fence system specified herein.

1.2 RELATED WORK

Section 03300 – Cast-In-Place Concrete

1.3 SYSTEM DESCRIPTION

The manufacturer shall apply a total ornamental aluminum fencing system of the style, strength, and color defined herein. The system shall be a total package including all components; pickets, posts, stringers, gates, and hardware as required.

1.4 QUALITY ASSURANCE

The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and the materials specified.

1.5 REFERENCES

AAMA 2603 – Performance requirements & testing procedures for pigmented organic coatings.

ASTM B221 – Specifications for aluminum alloy extruded bars, shapes and tubes.

1.6 SUBMITTAL

The manufacturer's literature shall be submitted prior to installation to confirm compliance with all requirements for materials specified in this section.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Fence panels, gates, posts and accessories shall be delivered to the construction site in packed cartons.

B. Each package shall be identified and shall bear the name of manufacturer.

C. Store all materials in a secure and dry area.

PART 2 – PRODUCTS

2.1 MANUFACTURER

The aluminum fencing system shall be manufactured by Alumi-Guard Ornamental Aluminum Fencing, 15050 Labor Place, Hudson, FL 34667 or other approved equal manufacturer. Color: Black, Height 8 feet.

2.2 MATERIALS

A. Aluminum Extrusions: All components shall be made of 6063-T6 and 6063-T5 in accordance with ASTM B221.

B. Fasteners: All screws shall be 410 and 18-8 stainless self-drilling head. All screws shall be painted to match the finish of fence.

C Accessories: Aluminum or other non-ferrous metal castings shall be used for all post caps, wall brackets, scrolls, finials, flanges and other miscellaneous hardware. Hinges and latches shall be fabricated from aluminum extrusions with stainless steel springs and powder coated to match.

2.3 FINISH

A. The fence shall be pre-treated and then coated with TGIC® polyester powder coating, which exceeds AAMA 2603. The finish should be able to withstand a 3000 hour salt spray test. Application of the TGIC® powder coating shall be electrostatic. Curing shall be at a temperature of 400°F for 10 minutes.

B. The pre-treat shall be a 4-stage chemical system.
Stage #1: Alkaline cleaner consisting of Potassium Hydroxide. This stage also etches the material to the original surface removing organic and in-organic material.
Stage #2: Clean water rinse.
Stage #3: Reverse/Osmosis clean water rinse.
Stage #4: Micro etch, and a polymer compound primer application.

C. TGIC® polyester powder coating shall meet or exceed a H-2H pencil hardness in accordance to ASTM D3363.

D. TGIC® polyester powder coating shall meet or exceed ASTM D3359 adhesion test.

2.4 FABRICATION

A. Stringers, (Horizontal rails) shall be punched to allow pickets to pass through the top of the rail. The number of stringers shall vary with the style, height and strength as determined by manufacturer.

B. Pickets, shall be fastened to stringers mechanically with stainless steel TEK screws on one side of the stringer only.

C. Posts, shall be pre-punched to allow the stringers to slide in and be attached with stainless steel TEK. Cast aluminum post caps shall be affixed to all posts.

D. Gates, shall be fabricated using the same components as for the complete fencing system. Walk gates shall have adjustable self-closing hinges and will be self-latching.

PART 3 - EXECUTION

3.1 PREPARATION

Prepare the grade and remove surface irregularities, if any, which may cause interference with the installation of aluminum fence.

3.2 INSTALLATION

A. General: Do not begin installation and erection before final grading is completed, unless otherwise permitted. Coordinate installation with concrete paving.

B. Excavation: Drill or hand excavate (using post-hole digger) holes for posts in firm, undisturbed or compacted soil.

1. Excavate holes for each post to minimum diameter recommended by fence manufacturer, but not less than 4 times largest cross section at post.

2. Excavate hole depths approximately 3 inches lower than post button, with bottom of posts set not less than 36 inches below finish grade surface.

C. Setting Posts: Center and align posts in holes 3 inches above bottom of excavation space maximum 8 feet o.c. unless noted otherwise. Protect portion of posts above ground from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operations.

D. Center and align posts. Place concrete around posts, and vibrate or tamp for consolidation. Re-check vertical and top alignment of posts, verify they are plumb and level. Make necessary corrections if needed before concrete hardens.

E. Install gates plumb, level and secure for full opening without interference. Adjust all hardware for smooth operation.

D. Gates: Install gates plumb, level and secure for full opening without interference. Install ground set items in concrete for anchorage. For double gates, install drop rod.

Adjust hardware for smooth operation and lubricate where necessary. Install hold open or close rods per manufacturer's instructions. Drill required holes in concrete or asphalt.

3.03 CLEANING

Contractor shall clean jobsite of excess materials; post hole excavations shall be scattered uniformly away from posts. Clean aluminum fence with mild household detergent and clean water rinse well. Mortar should be removed from exposed posts and other fencing material using a 10% solution of muriatic acid followed immediately by several rinses with clean water.

END OF SECTION 02825

SECTION 02900

LANDSCAPING

PART 1 -GENERAL

1.1 SCOPE

A. The Contractor shall furnish all labor, materials, and permits and perform all Work in accordance with these Specifications, drawings, and instructions provided by the Engineer. The Work shall include everything shown on the Drawings and required by the specifications and everything dealing with the planting of trees, shrubs, groundcover, and other plant material that in the judgement of the Engineer is incidental to what is shown on the Drawings or required by the Specifications.

B. All Work completed and materials furnished and installed shall be of the best quality in strict accordance with the intention of the Drawings, Specifications and samples. The Contractor shall cooperate with the Engineer so that no error or discrepancy in the Drawings or Specifications shall cause defective or inappropriate materials to be used or poor workmanship to be allowed and so that the work may proceed in the most efficient and effective manner.

1. 2 APPLICABLE PUBLICATIONS

A. Federal Specifications (Fed. Spec.):

O-F-241d	Fertilizers, Mixed, Commercial
Q-P-166e	Peat, Moss; Peat, Humus; and Peat, Reed-Sedge

B. American National Standards Institute (ANSI) Standard:

Z60.1-1980	American Standard for Nursery Stock

C. American Joint Committee on Horticultural Nomenclature (AJCHN) Publication:
Standardized Plant Names (2nd Ed. 1942)

D. American Society for Testing and Materials (ASTM) Publications:

C 136-84a	Sieve Analysis of Fine and Coarse Aggregates
D 2103-86	Polyethylene Film and Sheeting
D 2178-86	Asphalt Glass Felt Used in Roofing and Waterproofing
D 2607-69	Peats, Mosses, Humus and Related Products
D 270-83	Standard Specifications for Poly Vinyl Chloride (PVC) Plastic Tubing

E. American Wood-Preserver's Association (AWPA) Publication:

C2-85	Lumber, Timbers, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes

F. U.S. Department of Commerce, Product Standard (Prod. Std.) Publication:

PS 23-70 Horticultural Grade Perlite

1. 3 WEATHER CONDITIONS

A. Work must be carried out only during weather conditions favorable to landscape construction and to the health and welfare of plants.

1. 4 GUARANTEE

A. All plants and materials shall have a one-year replacement guarantee, including labor and materials, beginning on the Date of Substantial Completion approval.

B. The condition of all new plant materials is the responsibility of the Contractor and shall be approved by the Engineer.

C. Until final approval, any replacement of plant materials that may be necessary shall be at the expense of the Contractor, except those plants damaged by other contractors.

D. In addition to other standard provisions, the Contractor's bid amount shall also provide the following:

1. Maintenance necessary during Establishment Period.
2. Replacement in kind, or with a substitute acceptable to the Engineer, of all plant materials not in a healthy growing condition or that has died back to the crown or beyond normal pruning limits.
3. The Contractor shall also be responsible for any damage caused by his operations.

1. 5 SOURCE INSPECTIONS

A. Plant Materials:

1. The Contractor shall locate the specified trees and issue photographs that display size of trees to the Engineer for approval prior to any nursery shipment or installation. Plants shall be subject to inspection and approval by the Engineer for conformity to specification requirements.
2. Source approval shall not impair the right of inspection and rejection during progress of the work.
3. Availability: If proof is submitted in writing that any plant specified is not obtainable in the Eastern United States by a minimum of five (5) reliable Nursery sources, which are members of The American Nurseryman's Association, then a proposal will be considered by the Engineer to use the nearest equivalent size or variety with no increase of contract price.

B. Topsoil: The source of topsoil shall be inspected by the Engineer to determine the acceptability of the topsoil and the maximum depth to which it is to be stripped.

1. 6 PROTECTION

A. Before commencing work, all trees and shrubs which are to be saved must be protected from damage by the placement of fencing flagged for visibility or some other suitable protective procedure approved by the Implementation Manager. No work may begin until this requirement is fulfilled. Retain all trees and shrubs in area undisturbed by construction operations.

B. In order to avoid damage to roots, bark or lower branches, no truck or other equipment shall be driven or parked within the drip line of any tree, unless the tree overspreads a paved way.

C. The Contractor shall use any and all precautionary measure when performing work around trees, walks, pavements, utilities, and any other features either existing or previously installed under this Contract.

D. The Contractor shall adjust depth of earthwork and loaming when working immediately adjacent to any of the aforementioned features in order to prevent disturbing tree roots, undermining walks and pavements, and damage in general to any existing or newly incorporated item.

E. Plants transported to the project in open vehicles shall be covered with tarpaulins or other suitable covers securely fastened to the body of the vehicle to prevent injury to the plants. Closed vehicles shall be adequately ventilated to prevent overheating of the plants. Evidence of inadequate protection following digging, carelessness while in transit, or improper handling or storage shall be cause for rejection. All plants shall be kept moist, fresh, and protected. Such protection shall encompass the entire period during which the plants are in transit, being handled, or are in temporary storage.

F. Where excavating, fill, or grading is required within the branch spread of trees that are to remain, the work shall be performed as follows:

1. Trenching: When trenching occurs around trees to remain, the tree roots shall not be cut but the trench shall be tunneled under or around the roots by careful hand digging and without injury to the roots.
2. Lowering Grades: Existing trees in areas where the new finished grade is to be lowered shall have regrading work done by hand to elevation as indicated. Roots, as required, shall be cleanly three inches (3") below finished grade.
3. Trees marked for preservation that are located more than six inches (6") above proposed grades shall stand on broad rounded mounds and be graded smoothly into the lower level. Trees located more than 16 inches (16") above proposed grades shall have a dry laid stone wall, or other retaining structure, as detailed on the plans, constructed a minimum of five feet (5') from the trunk. Exposed or broken roots shall be cut clean and covered with topsoil.

G. Existing Utilities: The Contractor's attention is directed to the fact that there are active utilities located within the limits of work. Before commencing any work required under the

contract, he/she shall find the location of all utilities, subsurface drainage, and underground construction so that proper precautions may be taken not to disturb or damage any subsurface improvements. The Contractor shall be held responsible for making, at his own expense, all repairs to damaged utilities resulting from the work covered by this contract.

H. Environmental Protection: All work and Contractor operations shall comply with the requirements of applicable local, state, and federal environmental and erosion control methods.

1.7 LICENSES

A. Licenses (2 copies) of Landscape Pesticide Sprayers shall be submitted to the Owner.

1. 8 REQUIRED TESTS

A. Plant Bed Drainage: Subsurface drains have not been included as part of the project; therefore, the Contractor shall make such reasonable percolation tests and at least 3 as approved by the Engineer, as may be necessary to determine if subsurface drainage conditions in landscape areas are so poor as to support moisture conditions potentially fatal to plantings. The following procedure shall be followed:

1. Wait at least 24 hours after rain and dig test pit 12 inches square or 13-1/2 inches in diameter to depth of bottom of plant bed, trench or pit; remove all loose soil (if standing water is visible, notify Contracting Officer);
2. Quickly fill bottom with 6 inches (approximately 3-1/4 gallons) of water;
3. Record length of time from filling until disappearance of water and divide number of minutes by six to give average time of 1 inch fall;
4. Compare 1 inch fall time with the following table;
   1 inch in 0-3 minutes indicates rapid absorption
   1 inch in 3-5 minutes indicates medium absorption
   1 inch in 5-30 minutes indicates slow absorption
   1 inch in 30-60 minutes indicates semi-impervious soil
   1 inch in over 60 minutes indicates impervious soil

B. If test indicates soil to be semi-impervious or impervious, or if water is initially found in test pit, notify the Engineer before proceeding further.

C. If Contractor does not make tests at representative locations and file records of results with Engineer, or if he/she plants in areas shown to have poor drainage without written release from Engineer, he shall be liable for any future guaranteed replacements due to subsurface water damage.

D. If Contractor makes proper tests and files complete records indicating no semi-impervious or worse conditions, he will not be held responsible for future subsurface water damage to Work of Contract. The Engineer may supervise testing at any time and shall be informed in advance of the time and place of testing.

1.9 SAMPLES

A. The following samples shall be submitted to the Engineer for approval before work is started:

1. Topsoil - Representative samples shall be taken from several locations in the area under consideration.
2. Soil Amendments - Ten pounds of each type to be used in the project.
3. Organic Mulch - Ten pounds of each type to be used in the project.

1.10 CERTIFICATES OF CONFORMANCE OR COMPLIANCE

A. Before delivery, notarized certificates attesting that the following materials meet the requirements specified, shall be submitted in triplicate for approval:

1. Plant Materials
2. Fertilizers
3. pH Adjusters
4. Soil Conditioners

1.11 CERTIFIED LABORATORY TEST REPORTS

A. Testing of the required samples submitted for approval shall be performed by an independent laboratory approved by the Engineer within two (2) weeks of their submittal. Test reports on a previously tested material shall be accompanied by notarized certificates from the manufacturer certifying that the material is equal in all respects to that proposed for this project. Certified copies of the test reports listed below shall be submitted:

1. Offsite/Onsite Topsoil - for pH, nitrogen, phosphorus, potassium, sand, and organic matter content.
2. Organic Amendments (Peat) - for classification of total nitrogen, moisture, ash and organic matter, sand content and pH.

1.12 MANUFACTURER'S LITERATURE

A. Manufacturer's literature shall be submitted on the following materials:

1. Chemicals - Such as herbicides, fungicides, and super-absorbent material.

1.13 RIGHT OF REJECTION

A. The Engineer reserves the right to inspect and reject any plants or materials at any time and at any place.

1.14 DELIVERY, STORAGE, AND HANDLING

A. Delivery: The Contractor shall notify the Engineer in advance of the delivery schedule. The Contractor shall furnish and itemized list, in duplicate, of the actual quantity of plant materials in order to ensure satisfactory coordination of delivery and to expedite the required inspection at the point of delivery. The itemized list of the plant materials for each delivery shall include the pertinent data as specified in the plant schedule found on the Drawings.

1. Plant material shall be inspected upon arrival at the job site and unacceptable plant material shall be removed immediately from the job site.
2. Plants shall be protected during delivery to prevent damage to the root balls or desiccation of leaves. Trees shall be protected during transportation by tying in and covering all exposed branches.
3. The use of equipment such as "tree spades" shall be permitted provided that the plant balls are sized in accordance with ANSI Z60.1 and tops are protected from damage.
4. Certificates: Soil conditioners and amendments conforming to State and Federal regulations shall be delivered to the site in the original, unopened containers bearing the manufacturer's guaranteed chemical analysis, trade name, and trademark. In lieu of containers, soil conditioners and amendments may be furnished in bulk and a certificate from the manufacturer indicating the above information shall accompany each delivery.
5. All pesticide material, including soil fumigants, shall be delivered to the site in the original unopened containers. Containers that do not have a legible label containing the Environmental Protection Agency's registration number and the manufacturer's registered uses, will be rejected.

B. Storage: Storage of materials shall be in areas designated or approved.

1. Plant Storage: Plants not installed on the day of arrival at the site shall be stored and protected. Outside storage locations shall be continually shaded and protected from the wind. No plant material is to be stored on pavement. Bare root plants shall be heeled-in. Plants stored on the site shall be protected from drying out at all times by covering the balls or roots with moist sawdust, wood chips, shredded bark, peat moss, or other similar mulching material. Plants, including those in containers, shall be kept in a moist condition until planted by watering with a fine mist spray.
2. Storage of Other Materials: Soil conditions and amendments shall be kept in dry storage away from contaminants. Soil sterilant shall be isolated from any other landscape materials. Pesticide material shall be kept in dry storage, shall not contaminate adjacent material, and shall be handled and stored following manufacturer's directions.

C. Handling: Care shall be taken to avoid drying or damaging plants being moved from the nursery or storage area to the planting site. Balled and burlapped plants shall be handled carefully to avoid cracking or breaking the earth ball. Plants shall not be handled by the trunk or stems. Bare root plants shall be "puddled" when removed from the heeling-in bed to protect the roots from drying out. Plants shall be protected from freezing or drying by a covering of burlap, tarpaulin, or mulching material during transportation from the heeling-

in bed to the planting site. Damaged plants will be rejected and shall be removed from the site.

1.15 MAINTENANCE OPERATIONS BEFORE APPROVAL

A. Plant care shall begin immediately after each plant is satisfactorily installed. Maintenance shall continue until 90 days after Date of Final Acceptance for trees, shrubs, and groundcover and 60 days after Date of Final Acceptance for lawn, seeding, or sod areas.

B. Care shall be include, but not be limited to, replacing topsoil and mulch that has been displaced by erosion or other means, repairing and reshaping water rings or saucers, maintaining stakes and guys as originally installed, watering when needed or directed, and performing any other work required to keep the plants in a healthy condition.

C. Contractor shall remove and replace all dead, defective and rejected plants as required before final acceptance.

D. Grassed areas damaged during the process of Work shall be the responsibility of the Contractor, who shall restore the disturbed areas to a condition satisfactory to the Engineer. This includes filling to grade, fertilizing, seeding and mulching.

E. In areas where plants have been damaged or destroyed due to another contractor's work, the offending contractor shall be responsible for the cost of repair and replacement. The Contractor shall contact the Engineer immediately upon damage discovery. If the Contractor does not notify the Engineer, he/she takes full responsibility for the damage.

1.16 APPROVAL AND SELECTION OF MATERIALS AND WORK

A. The selection of all materials and the execution of all operations required under the Specifications and Drawings shall be subject to the approval of the Engineer. They shall have the right to reject any/or all materials and any/or all Work which, in their opinion, does not meet the requirements of the Contract Documents at any stage of the operations. All rejected materials shall be removed promptly from the site by the Contractor.

B. All additions and/or deletions to the contract, shall be based on the Contract's unit prices as submitted on the materials list of the Lump Sum Contract.

1.17 FINAL APPROVAL

A. The Engineer shall have the final approval for acceptance of the landscaping.

1.18 RELATED DOCUMENTS

A. Construction Drawings
Section 02824 Seeding

PART 2 -MATERIALS

2. 1 QUALITY

A. Plant material, including collected material, shall be grade Georgia No. 1 or better, as outlined in Grades and Standards for Nursery Plants, Part I and II, latest edition, and shall in all cases conform with ANSI 260.1 rules and grading adopted by the American Association of Nurserymen, Inc., but upgraded to meet the following additional requirements. Where Drawings or Specifications conflict with ANSI 260.1, the Drawings and Specifications shall prevail.

B. Unless specifically noted otherwise, all plants shall be of selected specimen quality, exceptionally heavy, symmetrical, tightly knit, so trained or favored in their development and appearance as to be superior in form, number of branches, compactness and symmetry. Planting stock shall be well-branched and well-formed, sound, vigorous, healthy; free from disease, sunscald, windburn, abrasion, and shall have healthy, normal, unbroken, ungirdling root systems.

C. Deciduous trees and shrubs shall be symmetrically developed, of uniform habit of growth, with straight boles or stems, and free from objectionable disfigurements.

D. Evergreen shrubs shall have well-developed symmetrical tops with typical spread of branches for each particular species or variety.

E. Ground covers shall be vigorous, have the number and length of runners and clump size specified, and be the proper age for the grade of plants specified.

F. Ground cover plants with well established roots and runners in removable containers, integral containers, or romed homogeneous soil sections shall be used.

G. Plants shall be free of disease, fire ants, weeds, insect pests, eggs or larvae.

H. Plants shall not be pruned to seven feet of the finished grade before delivery unless broken or dead.

I. Trees with abrasion of the bark, sunscalds, disfiguring knots or fresh cuts of limbs over one and one-fourth inches (1-1/4") which have not completely calloused shall be rejected.

J. All plants shall be typical of their species or variety and shall have a normal habit of growth and be legibly tagged with the proper name. All plants shall have been grown under the climatic conditions similar to those in the locality of the site of the project under construction or have been acclimated to such condition for at least two (2) years.

K. The root system of each shall be well provided with fibrous roots. All parts shall be sound, healthy, vigorous, well-branched and densely foliated when in leaf. Plants with girdling roots shall be rejected.

L. All plants designated ball and burlap (B&B) must be moved with the root systems as solid

units with balls of earth firmly wrapped with burlap. The diameter and depth of the balls of earth must be sufficient to encompass the fibrous root feeding systems necessary for the healthy development of the plant. No plant shall be accepted when the ball of earth surrounding its roots has been badly cracked or broken preparatory to or during the process of planting. The balls shall remain intact during all operations. All plants that cannot be planted at once must be heeled-in by setting in the ground and covering the balls with soil or mulch and then watering. Hemp burlap and twine is preferable to treated. If treated burlap is used, all twine is to be cut from around trunk and all burlap is to be completely removed. Wire baskets shall be cut, folded back or removed completely.

M. The trunk of each tree shall be a single trunk growing from a single unmutilated crown of roots, unless designated as a multi-trunk tree. Each trunk of a multi-trunk tree shall conform to the preceding trunk standard. No part of the trunk shall be conspicuously crooked as compared with normal trees of the same variety. All canopy trees shall have a central leader, unless in the Rosaceae Family.

N. The thickness of each shrub shall correspond to the trade classification "No.1". Single stemmed thin plants shall not be accepted. The side branches must be generous, well-twigged, and the plant as a whole well-branched to the ground. The plants must be in moist condition, free from dead wood, bruises or other root or branch injuries.

O. Plants grown in containers shall be delivered and remain in containers in a shady location until planted. Plants in containers shall be watered prior to transportation and shall be kept moist until planted. The container must be removed prior to planting, care being exercised so as not to injure the plant.

2. 2 PLANT SIZINGS

A. Plants shall be measured when branches are in their normal position. Height measurements shall be taken from the top of rootball or lip of container.

B. Shrubs shall meet the requirements for spread, height and container size stated in the plant schedule. The measurements are to be taken from the ground level to the average height of the shrub and not to the longest branch. Height and spread dimensions specified refer to the main body of the trees (measured from the crown of the roots to the tip of the top branch) shall be not less than the minimum size designated.

C. Caliper measurements for trees shall be taken at a point on the trunk six inches (6") above natural ground line for trees up to four inches (4") in caliper, and at a point 12 inches (12") above the natural ground line for trees exceeding four inches (4") in caliper. Height and spread dimensions specified refer to the main body of the plant and not from branch tip to tip.

D. If a range of size is given, no plant shall be less than the minimum size, and not less than the minimum size, and not less than 50% of the plants shall be as large as the upper half of the range specified.

E. The measurements specified are the minimum size acceptable and, where pruning is required, are the measurements after pruning.

F. Plants shall conform to the measurements given in the plant list. Plants larger in size than specified may be used as approved by the Engineer with no change in the unit price. If the larger plants are used, the ball of earth or spread or roots shall be increased in accordance with ANSI Z60.1.

G. Balled and burlapped (B&B) and balled and potted (B&P) plants shall have ball sizes and ratios conforming to ANSI Z60.1. Plants shall be balled with firm, natural balls of soil. B&B plants shall be wrapped firmly with burlap, strong cloth, or plastic and tied.

H. Balled and Platformed (B&PL) plants shall be balled and wrapped in the same manner as balled and burlapped plants and bound securely to strong platforms.

I. Bare-root (BR) or bulb plants shall be dug when fully dormant, with the root system substantially intact but with the earth carefully removed. The roots on woody plants shall be covered with a thick coating of mud by "puddling" after the plants are dug.

J. Container grown plants shall have sufficient root growth to hold the earth intact when removed from containers but shall not be root bound.

K. Transplanted Existing Plants: Existing plants designated for transplanting shall be prepared and dug with ball sizes conforming with ANSI Z60.1 requirements for collected plants and handled and replanted in accordance with this section.

2. 3 SUBSTITUTIONS

A. Plant substitutions shall be made only when a plant (or its specified alternate) is not obtainable and the Engineer authorizes a Change Order providing for use of the nearest equivalent obtainable size or variety of plant having the same essential characteristics, with an equitable adjustment of the contract price. If all other requirements are met, any of the following plants may be furnished:

1. Container-grown instead of balled or burlapped or bare-root.
2. Balled or burlapped instead of bare-root.

2. 4 TOPSOIL

A. If additional topsoil is required beyond that available from the stockpile, topsoil shall be a natural friable soil representative of productive soils in the vicinity. It shall be obtained from well-drained areas and be free of any admixture of subsoil, foreign matter, toxic substances, objects larger than 1" in diameter, and any material that may be harmful to plant growth. Acceptable pH range shall be 5.3 to 6.5, and if the topsoil does not meet this pH range, it shall be amended by adding pH adjusters, at a rate recommended by the County Cooperative Extension Service Agent, based on soil tests submitted by the

Contractor. Testing and pH adjustment costs shall be borne by the Contractor.

B. Topsoil shall meet the following characteristics

1. pH 5.3 to 6.5
2. Organic matter 5-10%
3. Sand 50-70%
4. Silt less than 30%
5. Clay 10-25%

2. 5 SOIL TESTING

A. The Contractor shall be responsible for testing the topsoil. The Contractor shall furnish in duplicate the soil analysis and recommended amendments required to meet the desired pH, nutritional and organic levels determined to be adequate for the area by the County Extension Agent of the State University's Cooperative Extension Service.

2. 6 LIMESTONE

A. Agricultural limestone shall contain not less than 95 percent calcium carbonate equivalent and shall be ground to such a fineness that at least 98 percent will pass a 20 -mesh sieve and at least 50 percent will pass a 100-mesh sieve. Coarser materials will be acceptable provided they pass the 20-mesh sieve and the specified rates of application are increased in linear proportion to the quantities passing the 100-mesh sieve where zero passage indicates doubling the application rate. Dolomitic Limestone is preferred.

B. Other liming material shall have a minimum calcium carbonate equivalent of 80 percent and shall be crushed to such a fineness that at least 98 percent will pass a 20 mesh sieve and at least 50 percent will pass a 100-mesh sieve.

2. 7 TREATMENT OF SALINE SOIL

A. Saline soil shall be leached out by a controlled amount of water sufficient enough to leach the salts to a level below the root zone. Water used for this purpose shall have a low salt content.

2. 8 SOIL CONDITIONERS AND AMENDMENTS

A. <u>Peat Moss:</u>

1. Peat moss shall be Michigan peat moss or approved equal in color and consistency, to be used for planting soil mixture only.
2. Peat moss shall be a moss peat, finely shredded to pass a one-half inch (1/2") mesh and shall be no less than 90% organic material by weight, with an ash content by ignition of no more than 10%.
3. Material shall contain no less than 35% and no more than 66% moisture by weight, but shall have a water-holding capacity of 150% - 200%.

4. Material shall have a pH value between 4 and 5.
5. Material may be imported (supplied in bales) or domestic (furnished in bulk). If furnished in bulk, the material and its source must be acceptable to the Engineer.
6. Peat moss shall not be used as mulch.

B. Sand: Sand shall be clean and free of toxic materials.

C. Rotted Manure: Manure shall be unleached stable or cattle manure not less than 8 months old nor more than 2 years old, containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; and containing no chemicals or ingredients harmful to plants. The manure shall be heat treated to kill weed seeds. No manure shall be used until it has been tested and the results approved by the Engineer.

D. Rotted Sawdust: Rotted sawdust shall have 7.5 pounds of nitrogen added uniformly to each cubic yard and shall be free of chips, stones, sticks, soil, and toxic substances.

E. Gypsum: Gypsum shall be 90 percent pure, free of any toxic materials, and at least 95 percent by weight shall pass a 4-mesh sieve.

F. Super Absorbent Material: The super-absorbent material shall be polymer which absorbs 40 times its weight in water, is nontoxic, neutral pH and nonbiodegradable (such as Agrosoke by Grosoke of America, 817-284-0696).

G. Planting Soil Mixture: The planting soil mixture, when specified for backfilling tree, shrub and ground cover beds, shall be composed of 5 parts topsoil, 1 part peat, or 1 part manure and super absorbent material at manufacturer's recommended rate.

H. Fertilizer:

1. Fertilizer shall be delivered to the site, mixed as specified, in the original unopened standard size bags showing weight, analysis and name of manufacturer. Containers shall bear the manufacturer's guaranteed statement of analysis or a manufacturer's certificate of compliance covering analysis shall be furnished to the Engineer. Store fertilizer in a weatherproof place and in such a manner that it shall be kept dry and its effectiveness shall not be impaired.
2. Percentages of nitrogen, phosphorus and potash shall be based on laboratory test recommendations as approved by the Engineer. If soil results are not back before bidding submittal the Contractor may assume the fertilizer to be 10% nitrogen, 6% phosphorus and 4% potash by weight. At least 50% of the total nitrogen shall contain no less than 3% water-insoluble nitrogen. At least 60% of the nitrogen content shall be derived from super-phosphate containing not less than 18% phosphoric acid or bone meal containing 25% - 30% phosphoric acid and 2% - 3% nitrogen. Potash shall be derived from muriate of potash containing 55% - 60% potash.
3. Granular fertilizer shall conform to Fed. Spec. 0F-241, Type I, Level B, and shall bear the manufacturer's guaranteed statement of analysis. Granular fertilizer shall contain a minimum percentage by weight of: 12% nitrogen (of which 50% shall

be organic), 12% available phosphoric acid, and 12% potash.

4. With the approval of the Engineer, packet, tablet, pellet or other forms of slow release fertilizers conforming to Fed Spec O-F-241, may be used, and shall bear the manufacturer's guaranteed statement of analysis. Slow release fertilizers shall also contain the minimum percentages by weight of plant nutrients specified hereinbefore.
5. Bonemeal shall be a finely ground, steamed bone product containing from 2 to 4 percent nitrogen and 16 to 40 percent phosphoric acid.

2. 9 HERBICIDES AND PESTICIDES

A. Herbicides and Pesticides used must comply with all applicable State and Federal laws and be registered with the U.S. Environmental Protection Agency.

1. Herbicide control shall be:
   a. Preemergence application of "Treflan 5 percent Granules", Atrazine, or equivalent, applied according to manufacturer's recommendations and incorporated into soil as specified.
   b. Post-emergence application of "Roundup" or equivalent, applied as specified by manufacturer. Use with extreme care and avoid succulent herbaceous plants such as daylilies or existing wildflowers.
2. Insect control shall be applied as required and as recommended by the local County Extension Agent of the State University's Cooperative Extension Service.
3. Fungicide control shall be applied as required and as recommended by the local County Extension Agent of the State University's Cooperative Extension Service.

2.10 WATER

A. On-site water shall be furnished by the Contractor. Hose and other watering equipment shall be furnished by the Contractor.

B. Water shall not contain elements toxic to plant life. Water transportation shall be furnished by the Contractor.

C. All shade/street trees shall be priced and planted with watering bags (gator bags or similar) as approved by the Engineer.

2.11 MULCH

A. Shredded bark mulch or approved equal shall be used as a three inch (3") top dressing in all plant beds and around all trees planted by the Contractor. Single trees or shrubs shall be mulched to the outside edge of the saucer. Mulch shall be of sufficient character as not to be easily displaced by wind or water runoff. Perennial beds shall receive 2" layer of pine bark mini nuggets. The bark mulch shall be level with the tree grates.

B. Acceptable Bark:

1. 100% pine bark, mini-nuggets, 1/2" or smaller, free from wood, wood shavings, cambium, sawdust, leaves, twigs, weeds, or other material or substance harmful to plant growth.
2. 100% organic cypress bark, fresh, fibrous type, grade 'B' or better, free from debris or other material harmful to plant growth.

PART 3 -PLANTING PROCEDURES

3. 1 PLANTING COORDINATION

A. The Contractor shall inform the Engineer of the date when the planting shall commence and of the anticipated delivery date of the material.

B. Failure to notify the Engineer in advance of order to arrange proper scheduling may result in loss of time or rejection of a plant or plants not installed as specific or directed.

3. 2 DIGGING AND HANDLING

A. Balled and burlapped plants shall be dug with firm natural balls of earth of sufficient diameter and depth to include most of the fibrous roots.

B. Roots or balls of all plants shall be adequately protected at all times from the sun and from drying winds.

C. All balled and burlapped plants which cannot be planted immediately upon delivery shall be set on the ground and shall be well protected with soil, wet moss or other acceptable material. Bare rooted plants which cannot be planted immediately shall be heeled-in upon delivery. All plants shall be kept moist.

D. Bundles of plants shall be opened and the plants separated before the roots are covered. Care shall be taken to prevent air pockets among the roots. During planting operations, bare roots shall be covered with canvas, hay or other suitable material. No plant shall be bound with wire or rope at any time so as to damage the bark or break the branches.

3. 3 SITE PREPARATION

A. Clearing and Grading: Clearing shall consist of the satisfactory removal and disposal of brush, snags, and rubbish occurring within the area shown. Clearing shall be accomplished by hand within 5 feet of existing vegetation to left standing.

B. Protection of Existing Vegetation: If lawns have been established prior to planting operations, the surrounding turf shall be covered in a manner that will protect turf areas before excavations are begun. Existing trees that are to be preserved shall be barricaded in a manner that will effectively protect the entire dripline area during planting operations.

C. Turf Removal: Where planting beds occur in existing turf areas, the turf shall be removed

to a depth that will ensure the removal of the entire root system.

D. Underground Obstructions to Planting: If underground utilities, construction, or solid rock ledges are encountered other locations for planting may be selected by the Engineer. Damage to utility lines shall be repaired at the Contractor's expense and no additional cost to the Owner.

E. Locations containing unsuitable subsoil shall be treated in one of the following manners:

1. Debris and Compaction: Where unsuitability within the construction site is deemed by the Engineer to be due to excessive compaction caused by heavy equipment or by the presence of boards, mortar, concrete or other construction materials in sub-grade, and where the natural subsoil is other than A.A.S.H.O. classification of A6 or 7, the Contractor shall loosen such areas with spikes, disking, or other means to loosen the soil to a condition acceptable by the Engineer. The Contractor shall also remove all debris and objectionable material. Soil should be loosened to a minimal depth of 12 inches (12") with additional loosening as required to obtain adequate drainage. Contractor may introduce peat moss, sand, or organic matter into the subsoil to obtain adequate drainage should he so desire. All such remedial measures shall be considered as incidental to the work and no extra payment shall be made for this part of the work.

2. Subgrade: Where sub-grade is deemed by the Engineer to be unsuitable because the natural subsoil falls into an A.A.S.H.O. classification of A6 or 7 and contains moisture in excess of 30%, then such a condition shall be rendered suitable by installation of a sub-drainage system or by other means described elsewhere in these specifications. Where such conditions have not been known or revealed prior to planting time and where they have not been recognized in the preparation of plans and specifications, then the Implementation Manager and Engineer shall issue a Change Order to install the proper remedial measures, all of which shall be in addition to the contract sum.

3. Hardpan or moisture barrier: All tree pits must be loosened to a depth of 2' below the bottom of the pit to such depth that any hardpan has been broken and moisture is allowed to move through freely. The Contractor shall then fill each tree pit with water and observe the pit for a period of 12 hours and if the water has not dissipated by 50%, the tree pit shall be drilled with a 12" auger with depth of 3' below the bottom of the pit and filled with gravel. If, in the opinion of the Contractor, the drainage is still not sufficiently handled relative to the life of the tree, the Contractor shall notify the Engineer of such in writing before installing the trees in the questionable areas, otherwise, the Contractor is deemed to be totally responsible for the guarantee and livability of the tree.

4. Notification: Notify the Engineer in writing immediately of all subsurface drainage of soil conditions which the Contractor considers detrimental to growth or survival of plant material. State conditions and submit proposal for correction. Obtain approval of method of correction before continuing the affected portion of

the Work. Alternate locations may be selected by the Engineer and the Contractor shall prepare such pits with no additional cost to the Owner.

3. 4 TREES AND SHRUB PLANTING OPERATIONS

A. Planting operations shall be performed at a steady rate of work unless weather conditions make it impossible to work. No plant material shall be planted in frozen ground.

B. The Contractor shall provide sufficient tools and equipment required to carry out the planting operation.

C. All plants too large for two men to lift in and out of holes shall be placed with a sling. Do not rock trees in holes to raise or lower rootball.

D. To the topsoil in the backfilling of tree holes and shrub beds, there shall be added as the progress of the Work permits, ground limestone if soil tests indicate it is needed, and commercial fertilizer at the rate of three (3) pounds for tree up to three inches (3") in caliper, one (1) pound per one inch (1") in caliper for larger trees, six (6) ounces for small shrubs and eight (8) ounces for each shrub four feet (4') or over. Ground limestone shall be omitted in the case of acid soil plants. The limestone and fertilizer shall be thoroughly mixed with the topsoil in the planting operation.

E. If rock or other underground obstruction is encountered that cannot be moved by a moderate amount of effort and site equipment, the Engineer may require plant pits to be relocated, the pits enlarged or the plants deleted from the contract.

3. 5 LAYOUT

A. Plant material locations and bed outlines shall be staked on the project site by the Contractor and approved by the Engineer before any plant pits or beds are dug. Plant material locations may be adjusted by the Contracting Officer to meet field conditions. The center of shrubs and trees shall not be less than 2 and 5 feet respectively from any underground utility.

B. Adjustments in locations and outlines shall be made as directed. In the event that pits or areas for planting are prepared and backfilled with topsoil to grade prior to commencement of lawn operations, they shall be so marked that when the work of planting proceeds, they can be readily located. In case underground obstructions such as ledges or utilities are encountered, location shall be changed under the direction of the Engineer without charge.

3. 6 PLANT PITS AND BED PREPARATION

A. Plant pits shall be dug to produce vertical sides and flat, uncompacted bottoms. When pits are dug with an auger and the sides of the pits become glazed, the glazed surface shall be scarified. The size of plant pits shall be shown. The minimum allowable dimensions of the plant pits shall be 6 inches deeper than the depth of ball or the depth of base roots; for

ball or root spreads up to 2 feet, pit diameters shall be 2 feet greater; for ball or root spreads over 4 feet, pit diameters shall be 1 1/2 times the ball root spread.

B. Prepare planting pits as specified and as shown on the Drawings, prior to inserting plants. Use planting soil to backfill plant pits. When plant pits have been backfilled approximately 2/3 full, water thoroughly before installing remainder of soil to top of pit. Eliminate all air pockets. All shrubs shall be planted in individual pits. If the individual pits are arranged in a group, place stakes 1 foot (minimum) away from trunk of tree.

C. The area between the pits shall be filled to the required grade with clean soil from the excavation of the plant areas or with other acceptable soil. Plant beds shall be neatly edged and kept in this condition until the work is accepted.

D. Ground Cover Plant Beds in Existing Soil: Where existing soil is to be used in place, plant beds shall be tilled to a depth of 12 inches and super-absorbent material added at manufacturer's recommended rate. For ground cover beds, peat and/or manure shall be spread uniformly over the bed to a depth of 3 inches and thoroughly incorporated into the existing soil to a depth of 8 inches using a rotary tiller or similar type of equipment to obtain a uniform and well pulverized soil mix. During tillage operations, all sticks, stones, roots, and other objectionable materials shall be removed. Plant beds shall be brought to a smooth and even surface conforming to established grades.

E. Shrub and Ground Cover Plant Beds in Replaced Soil: Existing soil to be replaced in plant beds shall be excavated to a depth of 12 inches and replaced with planting soil mixture or the existing soil amended by rototilling amendments in specified amounts to meet plant mix specifications. Plant beds shall be mounded slightly to drain and be brought to a smooth and even surface blending into established grades.

F. Soil Fumigation: Fumigation shall be performed only in areas to receive no or minimal soil disturbance and only in accordance with manufacturer's recommendations.

G. Herbicide and Pesticide Application: Herbicides, insecticides and fungicides shall be applied as needed and in accordance with the manufacturer's recommendations.

3. 7 INSTALLATION

A. No landscaping shall be installed until all Work which could damage the new plantings is completed.

B. Planting Seasons and Conditions: Planting shall be done only when the ground is not frozen, snow covered, or in an otherwise unsuitable condition for planting. Planting shall be done within the following dates:

1. Deciduous (B&B and BR) Material: From December 31 to March 15 for spring planting and from October 1 to December 31 for fall planting.
2. Evergreen (B&B) Material: From February 15 to April 15 for spring planting and

from October 1 to December 31 for fall planting.

3. Container Grown Stock: May be planted at anytime.
4. If special conditions exist that may warrant a variance in the above planting dates or conditions, a written request shall be submitted to the Engineer stating the special conditions and proposed variance.

C. Setting Plants:

1. All trees shall be set so that when settled they will occur approximately 2"-3" above the finished grade and also 2"-3" above the grade that they bore to the natural grade before transplanting. Shrubs shall be set 1" above finished grade. Each plant shall be planted neatly in the center of the pit.
2. Set plants plumb and brace rigidly in position until the planting soil has been tamped solidly around the ball and roots.
3. Cut ropes, strings and wire from top of the rootball after the plant has been set and lay open the burlap. Leave natural burlap or cloth wrapping intact around the edge of the rootball, but cover with backfill. Remove all inorganic ball wrapping from
4. Loam shall be backfilled in layers of not more than eight inches (8") and each layer watered sufficiently to settle before the next layer is put in place. Loam shall be tamped under edges of balled plants. Enough topsoil shall be used to bring the surfaces to finish grade when settled.
5. A saucer shall be provided around each plant capable of holding water as shown on the planting details.
6. Plants shall be soaked with water twice within the first twenty-four (24) hours of time planting. Water shall be applied with low pressure so as to soak in thoroughly without dislodging the topsoil.
7. Approved weed mat shall be placed under all areas to be designated on the plans, covered with mulch. Secure weed mat in place with soil staples, anchor, then cover with mulch as directed.
8. A three inch (3") layer (after settlement) of mulch or approved equal shall be applied directly on top of soil to the entire area of each saucer or planting bed.
9. Fertilizer, in packet or tablet form shall be placed prior to backfilling and in accordance with the manufacturer's recommendations.
10. Excess planting soil mix shall either be used to form watering basins around plants as specified hereinbefore, or removed from the project site as designated.

D. Balled and Burlapped Material: B&B stock shall be backfilled with planting soil mix approximately half the depth of the ball and tamped and watered. Burlap and tying materials shall be carefully removed or opened and folded back. Plastic wrap shall be completed removed before the placement of backfill. The remainder of backfill of soil mix shall be tamped and watered. Earth saucers or water basins shall then be formed around isolated plants. Water holding basins shall be ample enough in size and height to hold at least 2 1/2 gallons for shrubs or 5 gallons of trees.

E. Existing Material: Existing stock which is moved by means of a mechanical transplanter shall be removed from the ground with a ball attached which meets the requirements of

paragraph MATERIALS. The ball shall be wrapped with proper material and kept moist if it is not replanted within 1 hour. The plant's stem or trunk shall be centered in the ball, and all roots at the ball's surface shall be cut cleanly. No roots shall be pulled from the ground.

F. Bare-Root Material: BR stock shall be planted so that the roots are arranged in a natural position. Damaged roots shall be removed with a clean cut. Cuts larger than 1/2 inch diameter shall be painted with tree wound dressing. Planting soil mix shall be carefully worked in among the roots. Remainder of backfill of soil mix shall be tamped and watered. Earth saucers or water basins shall be formed around isolated plants.

G. Groundcover Material: Ground cover plants may be planted after the mulch is in place. Care shall be taken to avoid contaminating the mulch with the planting soil.

H. Container-Grown Material: Container-grown stock shall be removed from containers without damaging plant or root system. Planting shall be completed as specified for balled and burlapped plants.

3. 8 WATERING

A. All watering shall be done immediately after planting in each area and in a manner which will provide uniform coverage but which will not cause erosion or damage to the finished surface. Sufficient water shall be applied to penetrate the planting bed to a depth of 4 inches.

3. 9 EDGING PLANT BEDS OR INDIVIDUAL PLANTS

A. Beds or individual plants shall be uniformly edged, to a 6" depth, wedge shaped, using a sharp tool to provide a clear cut division line between the planted area and the adjacent lawn. Bed shape shall be as indicated on the plans. Individual plant pits shall be circular in shape.

3.10 FINISH GRADE BEDS

A. After planting, smooth to conform the specified grades after full settlement has occurred.

3.11 MULCHING

A. Mulching shall take place within 48 hours after planting.

B. A layer of approved or specified mulch 4" thick shall be placed on the finished surface about the plant. The mulch around isolated plants shall cover the entire area of the pit. Where plants are planted in groups, the area about as well as the entire area between the plants shall be covered with mulch. If directed, the mulch shall be lighting incorporated into the soil.

C. Mulch shall be kept out of the crowns of shrubs and off buildings, sidewalks, light

standards, and other structures.

3.12 PRUNING

A. The amount of pruning shall be limited to the minimum necessary to remove dead or injured twigs and branches and to compensate for the loss of roots as a result of transplanting operation and to maintain safety in vehicular use areas.

3.13 MAINTENANCE DURING CONSTRUCTION

A. Maintenance shall begin immediately after planting. Plants shall be watered, mulched, weeded, pruned, sprayed, fertilized, annuals deadheaded, cultivated, and otherwise maintained and protected until provisional acceptance. Settled plants shall be reset to proper grade and position, planting saucer restored and dead material removed. Defective work shall be corrected as soon as possible after it becomes apparent and weather and season permit.

B. All plant material and work required by this contract shall be in a satisfactory and acceptable condition when the Contractor applies for payment.

C. Plants and planting areas shall be protected at all times against trespassing, other Contractor's work, and damages of any kind until final acceptance. If any plants become damaged or injured, they shall be treated or replaced as indicated by the Engineer and charged to the offending source at no additional cost to the Owner. No work shall be done within, adjacent to or over any plant or planting areas without proper safeguards and protection to the plant material and beds.

D. If a substantial number of plants are sickly or dead at the time of inspection, acceptance shall not be granted and the Contractor's responsibility for maintenance of all plants shall be extended until replacements are made.

E. All replacements shall be plants of the same kind and size specified on the plant schedule on the Drawings. They shall be furnished and planted as specified herein. All costs shall be borne by the Contractor. Replacements resulting from removal, loss, or damage due to occupancy of the project in any part, vandalism, physical damage by animals, vehicles,

or tenent activities and losses due to curtailment of water by local authorities shall be assessed and paid for by the Owner.

F. Plants shall be guaranteed for a period of one (1) year after date of substantial completion.

G. Landscape maintenance contractor, if different from the Landscape Contractor, shall purchase and maintain Contractor's general liability insurance in the amounts of $1,000,000 to protect him from the Contractor's operations under the maintenance contract. Certification of such insurance shall be filed with the Owner prior to the commencement of the work.

H. Watering:

1. The quality of water applied at one time shall be sufficient to penetrate the soil to a minimum of eight inches (8") in shrub beds and six inches (6") in turf areas at a rate which will prevent overspray and surface runoff onto pavement or roads. An equivalent of 1.5"-2" of absorbed water per week during the establishment period from natural rain is estimated to be adequate for shrubs and groundcovers. During the establishment period new turf areas shall receive the equivalent of 1/2" of absorbed water per day until well rooted.
2. On-site water shall be furnished by the Contractor. Hose and other watering equipment shall be furnished by the Contractor.

I. Weeding: Maintenance contractor shall keep all planting areas free from weeds and undesirable grasses by a method and by materials approved by the A.N.A.

J. Mowing: Mow all grass areas at regular intervals to keep the grass height from exceeding three inches (3"). Mow grass areas in such a manner as to prevent clippings from blowing on paved areas and sidewalks. Cleanup after mowing shall include sweeping or blowing of paved areas and sidewalks to clear them from mowing debris.

3.14 RELOCATION OR OMISSION OF PLANTS

A. Where subsurface conditions provide inadequate drainage and subsurface drainage system is not used as a remedy or when another obstruction, structure or site element prevented plant placement in the designated area, make reasonable location of plants as directed by the Engineer.

3.15 WASTE REMOVAL, TURF REPAIR AND CLEANUP

A. Excess and waste material shall be removed daily.

A. When planting in an area has been completed, the area shall be cleared of all debris, containers, and spoil piles.

C. Existing grass areas that have been damaged or scarred during planting operations shall be restored to their original condition by the Contractor at his own expense.

D. At least one paved pedestrian access route and one paved vehicle access route to each building shall be kept clear at all times. Other paving shall be cleaned when work in adjacent areas is completed.

E. Remove all fences, signs, barriers, or other temporary protective devices prior to substantial completion walkthrough.

F. At the end of the establishment period, inspection shall be made by the Engineer again.

Any plant required under this contract that is dead or unsatisfactory to the Engineer shall be removed from the site. These shall be replaced during the normal planting season.

3.16 EXTENDED CONTRACTOR RESPONSIBILITY

A. The Contractor's responsibility for complete maintenance (exclusive of replacement) shall terminate on the 90 days after Date of Final Acceptance for trees, shrub, groundcover, and perennials and 60 days after Date of Final Acceptance for lawns, seeding, and sod areas. In the event that maintenance by the Contractor is not continued, the Contractor shall issue in writing complete maintenance guidelines for the complete care of all planting specified.

B. Due to his/her vested interest, the Contractor, if different from the Maintenance Contractor, shall make monthly inspections, at no extra cost to the Owner, during the guarantee period to determine what changes, if any, should be made in the Owner's maintenance program. All such recommended changes shall be submitted in writing to the Engineer.

END OF SECTION 02900

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SCOPE

A. General

1. Contractor shall furnish all labor, materials, equipment and incidentals needed to provide form work, reinforcement, concrete including all concrete joints, grout and incidentals required to complete the Work as shown and specified.

2. The Work includes providing concrete consisting of portland cement, fine and coarse aggregate, water, and approved admixtures combined, mixed, transported, placed, finished and cured. The Work also includes:

   a. Providing openings in concrete to accommodate the Work under this and other Sections and building into the concrete all items such as sleeves, frames, anchor bolts, inserts and all other items to be embedded.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed in the concrete as a prime responsibility of the Contractor.

2. Notify other contractors in advance of the placing of concrete to provide the other contractors with sufficient time for furnishing of items included in their contracts that must be installed in the concrete.

3. Required City formal pour card with all required signatures.

C. Classes of Concrete:

1. Class "B" concrete 3,000 psi compressive strength at 28 days shall be steel reinforced and includes the following:
   a. Slab on grade.

1.2 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. List of concrete materials and concrete mix designs proposed for use. Include the results of all tests performed to qualify the materials and to establish the mix designs.

2. Copies of manufacturer's specifications with application and installation instructions for proprietary materials and items, including admixtures and bonding agents.

1.3 QUALITY ASSURANCE

A. Reference Standards: Comply with the applicable provisions and recommendations of the latest edition following, except as otherwise shown or specified.

1. ACI 301-81, Specification for Structural Concrete for Buildings, (includes ASTM Standards referred to herein).
2. ACI 304-83, Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
3. ACI 318-89, Building Code Requirements for Reinforced Concrete.
4. ACI 347-78, Recommended Practice for Concrete Formwork.
5. ASTM C94-86a, Standard Specification for Ready-Mixed Concrete.
6. ASTM C143-78, Standard Test Method for Slump of Portland Cement Concrete.
7. ASTM C172-82, Standard Method of Sampling Freshly Mixed Concrete.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. All materials used for concrete must be kept clean and free from all foreign matter during transportation and handling and kept separate until measured and placed in the mixer. Bins or platforms having hard clean surfaces shall be provided for storage. Suitable means shall be taken during hauling, piling and handling to insure that segregation of the coarse and fine aggregate particles does not occur and the grading is not affected.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Cement:

1. Portland cement, ASTM C 150, Type II.

2. Use portland cement made by a qualified, acceptable manufacturer and produced by not more than one plant.

B. Aggregates: ASTM C 33 and as herein specified.

1. Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite, ochre, or other materials that can cause stains on exposed concrete surfaces. Slag materials are not allowed.

2. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances.

a. Dune sand, bank run sand and manufactured sand are not acceptable.

3. Coarse Aggregate: Clean granitic, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter as follows:

a. Crushed stone, processed from natural rock or stone.
b. Coarse Aggregate Size: Size to be ASTM C 33, Nos. 57 or 67, except that No. 467 may be used for footings, foundation mats and walls 16 inches or greater in thickness.

C. Water: Clean, free from injurious amounts of oils, acids, alkalis, organic materials or other substances that may be deleterious to concrete or steel.

2.2 CONCRETE ADMIXTURES

A. Provide admixtures produced by established reputable manufacturers, and use in compliance with the manufacturer's printed instruction. Do not use admixtures, which have not been incorporated and tested in the accepted mixes, unless otherwise authorized in writing by the Engineer.

B. Air-Entraining Admixtures: ASTM C 260.

1. Product and Manufacturer: Provide one of the following:

a. MB-VR as manufactured by Master Builders Company.
b. Sika AER as manufactured by Sika Chemical corporation.
c. Air Entraining Agent as manufactured by W. R. Meadows.
d. Or equal.

2. Air entrainment required for all concrete used on this project.

C. Water-Reducing Admixture: ASTM C 494, Type A.

1. Proportion all concrete with non-air entraining, normal setting, water-reducing, aqueous solution of a modification of the salt of polyhydroxylated organic acids. The admixture shall not contain more chloride ions than are contained in municipal drinking water. Provide one of the following:

a. WRDA-86 as manufactured by Grace Construction Products.
b. Pozzolith by Master Builders Company.
c. Plastocrete 161 as manufactured by Sika Chemical corporation
d. Approved Equal.

2. Water-reducing admixture required for all type A and B concrete unless directed otherwise by the Engineer.

D. Calcium Chloride: Do not use calcium chloride in concrete.

2.3 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes of concrete. Use the same design mix for both classes of concrete. Mixes subject to the following limitations:

1. Specified 28-day Compressive Strength:

a. Class A - 4,000 psi.
b. Class B - 3,000 psi.

2. Maximum Water-Cement Ratio by Weight: .45.

Coarse Aggregate Number	Minimum Cement Content, Pounds Per Cubic Yard	Percent Air Content
57,67	564	6 ± 1%
467	517	5 1/2 ± 1%

B. Use an independent testing facility approved by the Engineer for preparing and reporting proposed mix designs.

1. The testing facility shall not be the same as used for field quality control testing.

2. Calibration charts on the lab equipment must be submitted.

C. Proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the Project for concrete required. Comply with ACI 211.1 and report to the Engineer the following data:

1. Complete identification of aggregate source of supply.

2. Tests of aggregates for compliance with specified requirements.

3. Scale weight of each aggregate.

4. Absorbed water in each aggregate.

5. Brand, type and composition of cement.

6. Brand, type and amount of each admixture.

7. Amounts of water used in trial mixes.

8. Proportions of each material per cubic yard.

9. Gross weight and yield per cubic yard of trial mixtures.

10. Measured slump.

11. Measured air content.

D. Submit written reports to the Engineer of proposed mix of concrete at least 15 days prior to start of Work. Do not begin concrete production until mixes have been approved by the Engineer.

E. Field Experience Method: When field experience methods are used to select concrete proportions, establish proportions as specified in ACI 301, Chapter 3, Method 2.

F. Water-Cement Ratio Methods: If suitable data from field experience or laboratory trial batches cannot be obtained, concrete proportions may be established as specified in ACI 301, Chapter 3, Method 3.

G. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when

characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to the City and as accepted by Engineer. Laboratory test data for revised mix designs and strength results must be submitted to the Engineer for acceptance before using the revised mixes.

H. Admixtures:

1. Use air-entraining and water reducer admixtures in all concrete. Add air-entraining admixture at the manufacturer's prescribed rate to result in concrete at the point of placement having air content within the prescribed limits.

2. Use amounts of admixtures as recommended by the manufacturer for climatic conditions prevailing at the time of placing. Adjust quantities and types of admixtures as required to maintain quality control.

J. Slump Limits:

1. Proportion and design mixes to result in concrete slump at the point of placement as follows:

a. For slabs on grade, elevated concrete floor, beams, walls and columns, not less than 1 inch and not more than 4 inches.

2.4 CONCRETE CURING MATERIALS

A. Absorptive Cover: Burlap cloth made from jute of kenaf, weighing approximately 10 ounces per square yard and complying with AASHTO M 182, Class 3.

B. Moisture-Retaining Cover: One of the following, complying with ASTM C 171:

1. Waterproof paper.

2. 4 mil polyethylene.

C. Curing and Sealing Compound: ASTM C-309:

1. Product and Manufacturer: Provide one of the following:

a. Res-X curing compound as manufactured by the Burke Company.
b. Masterkure as manufactured by Master Builders Company.
c. Concrete Curing Compounds as manufactured by W. R. Meadows, Inc.
d. Or equal.

PART 3 - EXECUTION

3.1 CONCRETE MIXING

A. General:

1. Concrete may be produced at batch plants or it may be produced by the ready-mixed process. Batch plants shall comply with the recommendations of ACI 304, and shall have sufficient capacity to produce concrete of the qualities specified, in quantities required to meet the construction schedule. All plant facilities are subject to testing laboratory inspection and acceptance of the Engineer.

2. Mixing:

   a. Mix concrete with an approved rotating type batch machine, except where hand mixing of very small quantities may be permitted.
   b. Remove hardened accumulations of cement and concrete frequently from drum and blades to assure acceptable mixing action.
   c. Replace mixer blades when they have lost 10 percent of their original height.
   d. Use quantities such that a whole number of bags of cement is required, unless otherwise permitted.

B. Ready-Mix Concrete:

1. Comply with the requirements of ASTM C 94, and as herein specified. Proposed changes in mixing procedures, other than herein specified, must be accepted by the Engineer before implementation.

   a. Plant equipment and facilities: Conform to National Ready Mix Concrete Association "Plant and Delivery Equipment Specification".
   b. Mix concrete in revolving type truck mixers which are in good condition and which produce thoroughly mixed concrete of the specified consistency and strength.
   c. Do not exceed the proper capacity of the mixer.
   d. Mix concrete for a minimum of two minutes after arrival at the job site, or as recommended by the mixer manufacturer.
   e. Do not allow the drum to sit while in transit.
   f. Mix at proper speed until concrete is discharged.
   g. Maintain adequate facilities at the job site for continuous delivery of concrete at the required rates.
   h. Provide access to the mixing plant for the Engineer at all times.

C. Maintain equipment in proper operating condition, with drums cleaned before charging each batch. Schedule rates of delivery in order to prevent delay of placing the concrete after mixing, or holding dry-mixed materials too long in the mixer before the addition of water and admixtures.

3.2 TRANSPORTING CONCRETE

A. Transport and place concrete not more than 60 minutes after water has been added to the dry ingredients.

B. Take care to avoid spilling and separation of the mixture during transportation.

C. Do not place concrete in which the ingredients have been separated.

D. Do not retemper partially set concrete, and do not add any water at the jobsite.

E. Use suitable and approved equipment for transporting concrete from mixer to forms.

3.3 CONCRETE PLACEMENT

A. General: Place concrete continuously so that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. Where new concrete is placed next to existing, or a section cannot be placed continuously, provide construction joints as specified in Section 03250 of these Specifications. Apply approved epoxy bonding agent and waterstop

as close as possible to time of actual concrete placement. Do not allow epoxy bonding agent to dry. Deposit concrete as nearly as practical in its final location to avoid segregation due to rehandling or flowing. Do not subject concrete to any procedure which will cause segregation.

1. Screed concrete which is to receive other construction to the proper level to avoid excessive skimming or grouting.

2. Do not use concrete which becomes non-plastic and unworkable, or does not meet the required quality control limits, or which has been contaminated by foreign materials. Do not use retempered concrete. Remove rejected concrete from the job site and dispose of it in an acceptable location.

3. Do not place concrete until all forms, bracing, reinforcement, and embedded items are in final and secure position.

4. Unless otherwise approved, place concrete only when Engineer is present.

B. Concrete Conveying:

1. Handle concrete from the point of delivery and transfer to the concrete conveying equipment and to the locations of final deposit as rapidly as practical by methods which will prevent segregation and loss of concrete mix materials.

2. Provide mechanical equipment for conveying concrete to ensure a continuous flow of concrete at the delivery end. Provide runways for wheeled concrete conveying equipment from the concrete delivery point to the locations of final deposit. Keep interior surfaces of conveying equipment, including chutes, free of hardened concrete, debris, water, snow, ice and other deleterious materials.

3. Do not use chutes for distributing concrete unless approved in writing by the Engineer.

   a. Provide sketches showing methods by which chutes will be employed when requesting such approval.
   b. Design chutes, if permitted, with proper slopes and supports to permit efficient handling of the concrete.

4. Pumping of concrete is permitted however, do not use aluminum piping to convey the concrete.

C. Placing Concrete Slabs and Sidewalks:

1. Deposit and consolidate concrete slabs in a continuous operation, within the limits of expansion joints, until the placing of a panel or section is completed.

2. Consolidate concrete during placing operations using mechanical vibrating equipment, so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

3. Bring slab surfaces to the correct level. Smooth the surface, leaving it free of humps or hollows. Do not sprinkle water on the plastic surface. Do not disturb the slab surfaces prior to beginning finishing operations. Coordinate applying contraction joint, per Section 03250, with finishing operations.

E. Bonding for Next Concrete Pour: Comply with Division 03250 and 03300 of these Specifications.

F. Quality of Concrete Work:

1. Make all concrete solid, compact and smooth, and free of laitance, cracks and cold joints.

2. All concrete for liquid retaining structures, and all concrete in contact with earth, water, or exposed directly to the elements shall be watertight.

3. Cut out or chip out and properly replace to the extent ordered by the Engineer, or repair to the satisfaction of the Engineer, surfaces which contain cracks or voids, are unduly rough, or are in any way defective. Thin patches or plastering will not be acceptable.

4. All leaks through concrete, and cracks, holes or other defective concrete in areas of potential leakage, shall be repaired and made watertight by the Contractor.

5. Repair, removal, and replacement of defective concrete as ordered by the Engineer shall be at no additional cost to the City.

G. Cold Weather Placing:

1. Protect all concrete Work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with the requirements of ACI 306 and as herein specified.

2. When the air temperature has fallen to or may be expected to fall below 40 F, provide adequate means to maintain the temperature, in the area where concrete is being placed, at between 50^0 F and 70^0 F for at least seven days after placing. Provide temporary housings or coverings including tarpaulins or plastic film. Maintain the heat and protection, if necessary, to insure that the ambient temperature does not fall below 30^0 F in the 24 hours following the seven-day period. Avoid rapid dry-out of concrete due to overheating, and avoid thermal shock due to sudden cooling or heating.

3. When air temperature has fallen to or is expected to fall below 40 F uniformly. heat all water and aggregates before mixing as required to obtain a concrete mixture temperature of not less than 55^0 F and not more than 90^0 F at point of placement.

4. Do not use frozen materials containing ice or snow. Ascertain that forms, reinforcing- steel, and adjacent concrete surfaces are entirely free of frost, snow and ice before placing concrete.

5. Do not use salt and other materials containing anti freeze agents or chemical accelerators, or set-control admixtures, unless approved by the Engineer, in mix designs.

H. Hot Weather Placing:

1. When hot weather conditions exist that would seriously impair the quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

2. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90^0 F when the temperature is rising and below 85^0 F when the temperature is falling. Mixing water may be chilled, or chopped ice may be used to control the concrete temperature provided the water equivalent of the ice is calculated by the Engineer in the total amount of mixing water.

3. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that the steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.

4. Wet forms thoroughly before placing concrete.

5. Do not place concrete at a temperature so as to cause difficulty from loss of slump, flash set, or cold joints.

6. Do not use set-control admixtures unless approved by the Engineer in mix designs.

7. Obtain ENGINEER'S approval of other methods and materials proposed for use.

3.4 MONOLITHIC SLAB FINISHES

A. Float Finish:
   1. After placing concrete slabs, do not work the surface further until ready for floating. Begin floating when the surface water has disappeared or when the concrete has stiffened sufficiently. Use a wood float only. Check and level the surface plane to a tolerance not exceeding 1/4 inch in 10 feet when tested with a 10 foot straightedge placed on the surface at not less than 2 different angles. Cut down high spots and fill all low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat the surface to a uniform, smooth, granular texture.

B. Trowel Finish:

   1. After floating, begin the first towel finish operation using a power-finish trowel. Begin final toweling when the surface produces a ringing sound as the trowel is moved over the surface.

   2. Consolidate the concrete surface by final hand toweling. Finish shall be free of trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding 1/8 inch in 10 feet when tested with a 10 foot straight edge, and all edges adjacent to walls will have a struck, tooled intersection joint. Apply to operating floor slab.

C. Non-Slip Broom Finish:

   1. Apply non-slip broom finish to exterior concrete platforms, sidewalks, drives, interior drive areas and elsewhere as shown on the Drawings or in schedules.

   2. Immediately after trowel finishing, slightly roughen the concrete surface by brooming in the direction perpendicular to the main traffic route. Use fiber-bristle broom unless otherwise directed. Coordinate the required final finish with the Engineer before application.

D. Grind Finish:

   1. Where indicated on the Drawings, grind the concrete surface to reveal aggregate. Coordinate the required finish with the Architect.

3.06 CONCRETE CURING AND PROTECTION

A. General:

   1. Protect freshly placed concrete from premature drying and excessive cold or hot temperature, and

maintain without drying at a relatively constant temperature for the period of time necessary for hydration of the cement and proper hardening of the concrete.

2. Start initial curing after placing and finishing concrete as soon as free moisture has disappeared from the concrete surface. Keep continuously moist for not less than 72 hours.

3. Begin final curing procedures immediately following initial curing and before the concrete has dried. Continue final curing for at least 7 days and in accordance with ACI 301 procedures. Avoid rapid drying at the end of the final curing period.

B. Curing Methods:

1. Perform curing of all concrete by moist curing or by moisture-retaining cover curing. Use curing compound when approved by the ENGINEER and as herein specified. For curing, use water that is free of impurities which could etch or discolor exposed, natural concrete surfaces.

2. Provide moisture curing by any of the following methods:

a. Keeping the surface of the concrete continuously wet by covering with water.
b. Continuous water-fog spray.
c. Covering the concrete surface with the specified absorptive cover, thoroughly saturating the cover with water, and keeping the absorptive cover continuously wet with sprinklers or porous hoses. Place absorptive cover so as to provide coverage of the concrete surfaces and edges, with a 4-inch lap over adjacent absorptive covers.

3. Provide moisture-retaining cover curing as follows:

Cover the concrete surfaces with the specified moisture-retaining cover for curing concrete, placed in the widest practical width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during the curing period using cover material and waterproof tape.

4. Provide liquid curing compound as follows:

Apply the specified curing and sealing compound to all exposed slabs not receiving chemical hardener or epoxy floor sealer. The compounds shall be applied immediately after final finishing in a continuous operation by power spray equipment in accordance with the manufacturer's directions. Recoat areas which are subjected to heavy rainfall within 3 hours after initial application. Maintain the continuity of the coating and repair damage to the coat during the entire curing period. For concrete surfaces which will be in contact with potable water, the manufacturer shall certify that the curing compound used is nontoxic. Liquid curing compound will only serve as the initial step. Final cure by providing a moisture-retaining cover. Curing compound with petroleum or wax bases are not acceptable.

C. Curing Formed Surfaces:

1. Cure formed concrete surfaces, including the walls, supported slabs and other similar surfaces by moist curing with the forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as approved by the Engineer.

D. Curing Unformed Surfaces:

1. Initially cure unformed surfaces, such as slabs, sidewalks and other flat surfaces by applying the specified curing compound.

2. Final cure unformed surfaces, unless otherwise specified, by moisture-retaining cover curing.

3. Provide moisture curing for surfaces receiving chemical hardener or epoxy floor sealer.

E. Temperature of Concrete During Curing:

1. When the atmospheric temperature is 40^0 F and below, maintain the concrete temperature between 50^0 F and 70^0 F continuously throughout the curing period. When necessary, make arrangement before concrete placing for heating, covering, insulation or housing as required to maintain the specified temperature and moisture conditions continuously for the concrete curing period. Provide cold weather protection complying with the requirements of ACI 306.

2. When the atmospheric temperature is 80^0 F and above, or during other climatic conditions which will cause too rapid drying of the concrete, make arrangements before the start of concrete placing for the installation of wind breaks or shading, and for fog spraying, wet sprinkling, or moisture-retaining covering. Protect the concrete continuously for the concrete curing period. Provide hot weather protection complying with the requirements of ACI 305, unless otherwise specified.

3. Maintain concrete temperature as uniformly as possible, and protect from rapid atmospheric temperature changes. Avoid temperature changes in concrete which exceed 5^0 F in any one hour and 50^0 F in any 24 hour period.

F. Protection from Mechanical Injury:

1. During the curing period, protect concrete from damaging mechanical disturbances including load stresses, heavy shock, excessive vibration, and from damage caused by rain or flowing water. Protect all finished concrete surfaces from damage by subsequent construction operations.

3. 7 FIELD QUALITY CONTROL

A. Testing for concrete field quality control shall be performed by R&D Testing & Drilling, Inc., which is under annual contract to the City to provide certain testing services. Engineer will direct the number of slump tests and cylinders required. Contractor shall make standard compression test cylinders and entrained air tests as specified below, under the direct inspection by the Engineer. Contractor shall furnish all necessary assistance required by the Engineer. Contractor shall also furnish all labor, material and equipment required including cones, rods, molds, air tester, thermometer, curing in a insulated storage box that is heated if necessary and all other incidentals required. Above will be subject to approval by Engineer. Contractor shall furnish all necessary storage, curing, and transportation required by the testing.

B. Quality Control Testing During Construction:

1. Perform sampling and testing for field quality control during the placement of concrete, as follows:

a. Sampling Fresh Concrete: ASTM C 172.
b. Slump: ASTM C 143; one for each set of compressive strength test specimens.
c. Air Content: ASTM C 231; one for each set of compression cylinders cast.
d. Compressive Strength Tests: ASTM C 39; one set of compression cylinders for each 50 cubic

yards of fraction thereof, of each mix design placed in any one day; 1 specimen tested at 3 and 7 days, and 2 specimens tested at 28 days.

1. Adjust mix if test results are unsatisfactory and resubmit for ENGINEER'S approval.
2. Concrete which does not meet the strength requirements is subject to rejection and removal from the Work, or to other such corrective measures as directed by the Engineer, at the expense of the Contractor.

e. Compression Test Specimens: ASTM C 1; make one set of 4 standard cylinders for each compressive strength test, unless otherwise directed.
f. Concrete Temperature: Test hourly when air temperature is 40 F and below, and when 80 F and above; and each time a set of compression test specimens is made.

2. The testing laboratory shall submit certified copies of test results directly to the Engineer and the Contractor within 24 hours after tests are made.

C. Evaluation of Quality Control Tests:

1. Do not use concrete delivered to the final point of placement which has slump temperature or total air content outside the specified values.

2. Compressive strength tests for laboratory-cured cylinders will be considered satisfactory if the averages of all sets of thee consecutive compressive strength tests equal or exceed the 28 bay design compressive strength of the type or class of concrete; no individual strength test falls below the required compressive strength by more than 500 psi.

a. Where questionable field conditions may exist during placing concrete or immediately thereafter, strength tests of specimens cured under field conditions will be required by the Engineer to check the adequacy of curing and protecting of the concrete placed. Specimens shall be molded at the same time and from the same samples as the laboratory cured specimens.

1. Provide improved means and procedures for protecting concrete when the 28 day compressive strength of field-cured cylinders is less than 85 percent of companion laboratory cured cylinders.

2. When laboratory-cured cylinder strengths are appreciably higher than the minimum required compressive strength, field-cured cylinder strengths need not exceed the minimum required compressive strength by more than 500 psi even though the 85 percent criterion is not met.

3. If individual tests of laboratory-cured specimens produce strengths more than 500 psi below the required minimum compressive strength, or if tests of field-cured cylinders indicate deficiencies in protection and curing, provide additional measures to assure that the load-bearing capacity of the structure is not jeopardized. If the likelihood of low-strength concrete is confirmed and computations indicate the load-bearing capacity may have been significantly reduced, tests of cores drilled from the area in question will be required at the CONTRACTOR'S expense.

a. If the compressive strength tests fail to meet the minimum requirements specified, the concrete represented by such tests will be considered deficient in strength and subject to replacement, reconstruction or to other action approved by Engineer, and shall be done at the Contractor's expense.

D. Testing Concrete Structure for Strength:

1. When there is evidence that the strength of the in-place concrete does not meet specification requirements, Contractor shall employ at his expense the services of a concrete testing service to take cores drilled from hardened concrete for compressive strength determination. Tests shall comply with ASTM C 42 and the following:

    a. Take at least 3 representative cores from each member or suspect area at locations directed by Engineer.
    b. Strength of concrete for each series of cores will be considered satisfactory if their average compressive strength is at least 85 percent and no single core is less than 75 percent of the 28 day required compressive strength, and at least 100% by 56 days.
    c. Report test results in writing to Engineer on the same day that tests are made. Include in test reports the Project identification name and number, date, name of Contractor, nab of concrete testing service, location of test core in the structure, type of class of concrete represented by core sample, nominal maximum size aggregate, design compressive strength, compression breaking strength and type of break (corrected for length-diameter ratio), direction of applied load to core with respect to horizontal plane of the concrete as placed, and the moisture condition of the core at time of testing.

2. Fill core holes solid with patching mortar, and finish to match adjacent concrete surfaces.

3. Conduct static load test and evaluations complying with ACI 318 if the results of the core tests are unsatisfactory, or if core tests are impractical to obtain, as directed by Engineer.

E. Testing for Watertightness of Concrete Structures.

1. All concrete structures designed to contain or convey fluid shall be tested for watertightness by the Contractor prior to earth backfilling by filling with water to levels approximating what will be attained during operation and measuring the drop in level due to leakage, if any. These tests shall be made under the direction of the Engineer, and if necessary the tests shall be repeated until watertightness is insured. Perform tests prior to backfilling below grade structures and prior to installations of any coating.

2. Rate of filling shall be limited to minimize shock-effect to new concrete construction. Water shall be held under each condition long enough to satisfy the Engineer that the structures are watertight. Structures shall be free of internal or external water leakage.

3. The total loss of water-level in any basin or flume shall not exceed 1/2 in. (13 mm) depth in 24 hours. Leakage shall be located and stopped and the structure again tested until this requirement is met. If the structure does not meet the test, the Contractor shall repair or replace at his own expense, such part of the work as may be necessary to secure the desired results, as approved by the Engineer.

4. Regardless of the rate of leakage there shall be no visible leakage from any concrete structure.

3. 8 MISCELLANEOUS CONCRETE ITEMS

A. Filling-In:

1. Fill-in holes and openings left in concrete structures for the passage of work by other contractors and as indicated on drawings, with non-shrink nonmetallic grout per Section 03250 of this Specifications.

2. Dry packing will be approved by the Engineer on case by case basis.

3. 9 CONCRETE REPAIRS

A. Repair of Formed Surfaces:

1. Repair exposed-to-view formed concrete surfaces, that contain defects which adversely affect the appearance of the finish. Surface defects that require repair include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, and holes left by the tie rods and bolts; fins and other projections on the surface; and stains and other discolorations that cannot be removed by cleaning.

2. Repair concealed formed concrete surfaces that may contain defects that adversely affect the durability of the concrete. Surface defects that require repair include cracks in excess of 0.01 inch wide, cracks of any width and other surface deficiencies which penetrate to the reinforcement or completely through non-reinforced sections, honeycomb, rock pockets, holes left by tie rods and bolts, and spalls except minor breakage at corners.

3. Pressure grout structural cracks, and cracks in water-holding structures, using one of the following:

   a. Sikadur 35, Hi-Mod LV Gel by Sika Chemical Company.
   b. 881 LPL Epoxy by the Burke Co.
   c. Or equal.

4. Repair and patch defective areas with sand cement mortar immediately after removal of forms and as directed by Engineer.

5. Cut out or chip out honeycomb, rock pockets, voids over 1/2-inch diameter, and holes left by tie rods and bolts, down to solid concrete but, in no case, to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Before placing the cement mortar, thoroughly clean, dampen with water, and brushcoat the area to be patched with the specified bonding agent.

   a. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, the patching mortar color will match the color of the surrounding concrete.
   b. Contractor shall impart texture to repaired surfaces to match texture of existing adjacent surfaces. Provide test areas at inconspicuous locations to verify mixture, texture and color match before proceeding with the patching. Compact mortar in place and strike off slightly higher than the surrounding surface.

6. Fill holes extending through concrete by means of a plunger-type gun or other suitable device from the least exposed face, using a flush stop held at the exposed face to insure complete filling.

7. Sandblast exposed-to-view surfaces that require removal of stains, grout accumulations, sealing compounds, and other substances marring the surfaces. Use sand finer than No. 30 and air pressure from 15 to 25 psi.

B. Repair of Unformed Surfaces:

1. Test unformed surfaces, such as monolithic slabs, for smoothness and to verify surface plane to the tolerances specified for each surface and finish. Correct low and high areas as herein specified.

2. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having the required slope. Correct high and low areas as herein specified.

3. Repair finish of unformed surfaces that contain defects which adversely affect the durability of the concrete. Surface defects, as such, include crazing, cracks in excess of 0.01-inch wide or which penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.

4. Grout structural cracks, and cracks in water holding structures, using one of the following:

   a. Sikadur 35, Hi-Mod LV Gel by Sika Chemical Company.
   b. 881 LPL Epoxy by the Burke Co.
   c. Or equal.

5. Correct high areas in unformed surfaces by grinding, after the concrete has cured sufficiently so that repairs can be made without damage to adjacent area.

6. Correct low areas in unformed surfaces during, or immediately after completion of surface finishing operations by cutting out the low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Use one of the following:

   a. Mastertop MP by Master Builders.
   b. Sikatop by Sika Chemical Company.
   c. Or equal.

7. Repair defective areas, except random cracks and single holes not exceeding 1-inch diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cut, and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen all concrete surfaces in contact with patching concrete and brush with the specified bonding agent. Place patching concrete before grout takes its initial set. Mix patching concrete of the same materials and proportions to provide concrete of the same type or class as the original adjacent concrete. Place, compact and finish as required to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.

8. Repair isolated random cracks, and single holes not over 1-inch diameter, by the dry-pack method. Groove the top of cracks, and cut out holes to sound concrete and clean of dust, dirt and loose particles. Dampen all cleaned concrete surfaces and brush with the specified bonding agent. Place dry-pack before 'the cement grout takes its initial set. Mix dry-pack, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched areas continuously moist for not less than 72 hours.

9. Repair methods not specified above may be used if approved by the Engineer.

3.10 CONCRETE COATINGS

A. All areas listed below shall receive concrete coating:

   1. All surfaces between columns D to P and 12 to 18, up to elevation 844.00.

   2. Containment sumps and diked areas for all chemical storage tanks.

3. Chemical truck unloading area up to elevation 859.00

B. Surface preparation, application, dry film thickness and curing shall be in strict conformance with the manufacturer's published recommendations

+++ END OF SECTION 03300 +++

SECTION 05500

METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Steel framing and supports.
2. Steel framing and supports for mechanical and electrical equipment.
3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
4. Shelf angles
5. Steel Fences
6. Miscellaneous steel trim including steel angle corner guards and steel edgings.

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

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel bollards

1.3 SUBMITTALS

The following information shall be provided in accordance with Section 01300.

1. A copy of this specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check marks (✓) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The Construction Manager shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined shall signify compliance on the part of the Contractor with the specifications. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.
3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.3 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304 316L.

C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304 316L.

D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

E. Rolled-Stainless-Steel Floor Plate: ASTM A 793.

F. Steel Tubing: ASTM A 500, cold-formed steel tubing.

G. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

2.4 FASTENERS

A. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

B. Anchor Bolts: ASTM F 1554, Grade 36.

1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.

C. Eyebolts: ASTM A 489.

D. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).

E. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).

F. Wood Screws: Flat head, ASME B18.6.1.

G. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).

H. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).

I. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

J. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material for Anchors in Exterior Locations: Alloy Group 1 (A1) 2 (A4) stainless-steel bolts complying with ASTM F 593 (ASTM F 738M) and nuts complying with ASTM F 594 (ASTM F 836M).

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primers: Provide primers that comply with Division 9 painting Sections.

C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

2.6 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Fabricate units from slotted channel framing where indicated.
2. Furnish inserts if units are installed after concrete is placed.

C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.

D. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.

1. Provide bearing plates welded to beams where indicated.
2. Drill girders and plates for field-bolted connections where indicated.
3. Where wood nailers are attached to girders with bolts or lag screws, drill holes at 24 inches o.c.

E. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness, unless otherwise indicated.

1. Unless otherwise indicated, fabricate from Schedule 40 steel pipe.
2. Unless otherwise indicated, provide 1/2-inch baseplates with four 5/8-inch anchor bolts and 1/4-inch top plates.

F. Galvanize miscellaneous framing and supports where indicated.

G. Prime miscellaneous framing and supports with zinc-rich primer where indicated..

2.8 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.

C. Galvanize loose steel lintels located in exterior walls.

D. Prime loose steel lintels located in exterior walls with zinc-rich primer.

2.9 SHELF ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.

1. Provide mitered and welded units at corners.
2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.

B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.

C. Galvanize shelf angles located in exterior walls.

D. Prime shelf angles located in exterior walls with zinc-rich primer.

E. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.10 LOOSE BEARING AND LEVELING PLATES

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

B. Galvanize plates after fabrication.

C. Prime plates with zinc-rich primer.

2.11 STEEL WELD PLATES AND ANGLES

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

2.12 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize exterior miscellaneous steel trim and interior miscellaneous steel trim, where indicated.

D. Prime exterior miscellaneous steel trim and interior miscellaneous steel trim, where indicated with zinc-rich primer.

2.13 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:

1. ASTM A 123/A 123M, for galvanizing steel and iron products.
2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B) and Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.14 STAINLESS-STEEL FINISHES

A. Remove tool and die marks and stretch lines or blend into finish.

B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

C. Bright, Directional Satin Finish: No. 4.

D. Dull Satin Finish: No. 6.

E. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

C. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.

1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 painting Sections.

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05500

SECTION 06100

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Rooftop equipment bases and support curbs.
2. Wood blocking and nailers.
3. Plywood backing panels.

1.3 SUBMITTALS

The following information shall be provided in accordance with Section 01300.

1. A copy of this specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check marks (✓) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The Construction Manager shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined shall signify compliance on the part of the Contractor with the specifications. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

1.4 DEFINITIONS

A. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NLGA: National Lumber Grades Authority.
3. WWPA: Western Wood Products Association

1.5 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments specified to be High-Temperature (HT) type, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

C. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Powder-actuated fasteners.
5. Expansion anchors.
6. Metal framing anchors.

1.6 QUALITY ASSURANCE

A. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA C2 except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

D. Application: Treat all rough carpentry, unless otherwise indicated. Items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.

4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood).

1. Use Exterior type for exterior locations and where indicated.
2. Use Interior Type A, High Temperature (HT) for enclosed roof framing, framing in attic spaces, and where indicated.
3. Use Interior Type A, unless otherwise indicated.

B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

C. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

D. Application: Treat all rough carpentry, unless otherwise indicated. items indicated on Drawings, and the following:

1. Framing for raised platforms.
2. Concealed blocking.
3. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. Maximum Moisture Content: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness.

B. Non-Load-Bearing Interior Partitions: No. 2 Standard grade lumber with 19 percent maximum moisture content and the following species:

1. Mixed southern pine; SPIB.
2. Spruce-pine-fir; NLGA

2.5 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.

3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.
7. Utility shelving.

B. For items of dimension lumber size, provide No. 2 Standard grade lumber with 19 percent maximum moisture content and the following species:

1. Mixed southern pine; SPIB.
2. Spruce-pine-fir; NLGA.

C. For exposed boards, provide lumber with 19 percent maximum moisture content and any of following species and grades:
1. Mixed southern pine, No. 2 grade; SPIB.
2. Spruce-pine-fir (south) or spruce-pine-fir, No. 1 grade; NeLMA, NLGA, WCLIB, or WWPA.

G. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.
2. Spruce-pine-fir (south) or spruce-pine-fir, Construction Standard grade; NeLMA, NLGA, WCLIB, or WWPA.

H. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

I. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

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

2.6 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch (13-mm) nominal thickness.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or Type 304 stainless steel.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).

F. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

2.8 METAL FRAMING ANCHORS

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

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

C. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated on Drawings and comparable products by one of the following:

1. Alpine Engineered Products, Inc.
2. Cleveland Steel Specialty Co.
3. Harlen Metal Products, Inc.
4. KC Metals Products, Inc.
5. Simpson Strong-Tie Co., Inc.
6. Southeastern Metals Manufacturing Co., Inc.
7. USP Structural Connectors.

D. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated and products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

E. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.

1. Use for interior locations where stainless steel is not indicated.

F. Stainless-Steel Sheet: ASTM A 666, Type 304.

1. Use for exterior locations and where indicated.

2.9 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.

B. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

C. Adhesives for Gluing and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

1. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate, nailers, blocking, grounds and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

D. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.

E. Do not splice structural members between supports, unless otherwise indicated.

F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
3. Table 2306.1, "Fastening Schedule," in SBCCI's Standard Building Code.
4. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

J. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

K. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

1. Comply with indicated fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.
2. Use finishing nails, unless otherwise indicated. Do not countersink nail heads.

3.2 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal size furring horizontally and vertically at 24 inches o.c.

C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal size furring vertically at 16 inches o.c.

3.4 WALL AND PARTITION FRAMING INSTALLATION

A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions and for load-bearing partitions where framing members bearing on partition are located directly over studs. Fasten plates to supporting construction, unless otherwise indicated.

1. For interior partitions and walls, provide 2-by-4-inch nominal size wood studs spaced 16 inches o.c., unless otherwise indicated.
2. Provide continuous horizontal blocking at midheight of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.

B. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.

C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.

1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal depth for openings 48 inches and less in width, 6-inch nominal depth for openings 48 to 72 inches in width, 8-inch nominal depth for openings 72 to 120 inches in width, and not less than 10-inch nominal depth for openings 10 to 12 feet in width.

2. Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.

D. Provide bridging of type indicated below, at intervals of 96 inches o.c., between joists.

1. Diagonal wood bridging formed from bevel-cut, 1-by-3-inch nominal size lumber, double-crossed and nailed at both ends to joists.
2. Steel bridging installed to comply with bridging manufacturer's written instructions.

3.5 PROTECTION

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

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

+++ END OF SECTION 06100 +++

SECTION 06200

FINISH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

A. Related Work specified elsewhere:

1. Section 06100 - Rough Carpentry.
2. Section 07900 - Sealants and Caulking.
3. Section 08710 - Door Hardware.
4. Section 09260 - Gypsum Board Systems.
5. Section 09900 - Painting.

1.2 REFERENCES

A. Standards of the following as referenced:

1. Architectural Woodwork Institute (AWI).
2. American National Standards Institute (ANSI).
3. National Electrical Manufacturer's Association (NEMA).

B. Industry standards:

1. AWI: Quality Standards, Guide Specifications and Quality Certification Program, 1985 edition.

C. Grading rules and standards of the following apply to materials, furnished under this section:

1. American Lumber Standards Committee (ALSC).
2. American Plywood Association (APA).
3. National Hardwood Lumber Association (NHLA).
4. National Bureau of Standards (NBS) Voluntary Product Standards (PS).
5. Southern Forest Products Association (SFPA).
6. Southern Pine Inspection Bureau (SPIB).
7. West Coast Lumber Inspection Bureau (WCLIB).

8. Western Wood Products Association (WWPA).

D. Preservative treated material: Meet specified standards of:

1. American Wood Preservers Association (AWPA).
2. American Wood Preservers Bureau (AWPB).
3. American Wood Preservers Institute (AWPI).

E. Plywood grading rules:

1. Softwood plywood: NBS PS-1-83.
2. Hardwood plywood: NBS PS-51-71.

1.3 SUBMITTALS

A. Shop drawings:

1. Submit for casework, standing and running trim, shelving, and miscellaneous ornamental work.
2. Indicate construction and installation details, species and grades of materials, finishes, plastic laminate selections, and cabinet hardware selections.

B. Product data: Submit for cabinet hardware and similar manufactured items. Submit with shop drawings.

C. Samples, submit as follows:

1. Plastic laminate: Manufacturer's standard color and pattern selection for verification by Construction manager.
2. Finish samples: Indicate selected finishes on samples of species and grade material specified.
3. Hardware items: Submit, if requested by Construction manager. Samples will be returned to supplier.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Schedule delivery of finish carpentry Work to Project site to coincide with installation but not to cause delay in Work.

B. Immediately upon delivery to Project site, place materials indoors, under cover, protected from weather.

C. Store materials minimum 6" above ground on framework or blocking; cover with protective waterproof covering providing for adequate air circulation and ventilation. Store in cool, dry, conditioned space.

1.5 PROJECT CONDITIONS

A. Field measurements: Take field measurements to determine exact millwork sizes. Indicate exact dimensions on shop drawings.

B. Installation of interior finish carpentry or millwork until spaces are enclosed, dry, and capable of being heated is prohibited. Maintain temperature between 55^0 F and 65^0 F for 72 hours before beginning installation and for Project duration.

PART 2 – PRODUCTS

2.1 MATERIALS

A. General:

1. Dimensions: Indicated lumber dimensions are nominal. Actual dimensions conform to industry standards established by ALSC and the Rules Writing Agencies.
2. Moisture content: 12% maximum.
3. Surfacing: Surface four sides, S4S, unless otherwise indicated.
4. Grades for exposed and semi-exposed finish carpentry and millwork and plywood are based on AWI Quality Standards. Grades for unexposed Work are based on Rules Writing Agencies grading rules.

B. Lumber:

1. Species and grades:
   a. Unexposed millwork framing and blocking:
      1) 2" by 4": Standard Grade West Coast Lumber.
      2) Members larger than 2" by 4": #2 Grade.
   b. Semi-exposed millwork components: Custom Grade Poplar.
   c. Exposed and semi-exposed painted millwork and trim: Custom Grade White Pine, kiln dried (KD) or as indicated on drawings.
2. Plywood; thicknesses indicated:
   a. Unexposed and semi-exposed millwork and general carpentry: APA A-C G-1, EXTERIOR
   b. Exposed painted millwork: APA M.D. OVERLAY, GROUP 1, EXT. exposed sides.
3. Plastic laminate substrate:
   a. Particleboard for wall cabinets: ANSI 208.1-87, three-ply, mat formed, manufactured using long fibered cuttings, bonded with water-resistant adhesive; 42.5 pcf, minimum.
   b. Plywood for base cabinets and countertops: ANSI/HPMA HP 1983; five-ply, rotary cut birch; 1/8" thickness, minimum, Grade 2-2 veneers; sanded face; Technical Type core.
   c. Thickness: ¾ - inch, minimum.

4. Plastic laminates:
   a. Acceptable manufacturers:
      1. Exxon Chemical Company; Nevamar.
      2. Formica Corp.; Formica.
      3. Lamin-Art Div. of Eagle Picher Inc.; Lamin-Art.
      4. Ralph Wilson Plastics Company; Wilson-Art.
   b. Conforming to NEMA Standard LD-3.1-1985, as follows:
      1. Horizontal applications: Grade GP-50.
      2. Backing sheet: Grade BK-20.
      3. Horizontal post-forming: Grade PF-42.
   c. Colors and patterns: Indicated in Finish Schedule on drawings as PL-#.

C. Hardware:

1. Acceptable manufacturers:
   a. Grant Hardware Company (Grant).
   b. The Engineered Products Company (EPCO).
   c. Knape & Vogt Mfgr. Co. (K&V).
   d. National Lock Cabinet Hardware (National).
   e. Stanley Hardware, Div. of the Stanley Works (Stanley).

2. Closet materials:
   a. Rod, 1-1/16" dia.: K&V, #660 SS; stainless steel clad tubing with K&V, #769 CR flange end cap assembly at exposed ends; K&V #734 and #735 flanges at wall.
   b. Closet shelf and rod bracket: K&V, #1195; wrought steel, cream enamel finish; one for each two feet or portion thereof.

3. Door and drawer pulls: EPCO; 402 Series, 4" centers; satin finished stainless steel wire pulls.

4. Magnetic catches: EPCO; #560.

5. Concealed cabinet hinges:
   a. 100 degrees self-closing 3D type, zinc die cast with cover caps: Grass; #1003, #1004, and #1005.
   b. 165 degrees self-closing 3D type, zinc die cast with cover caps: Grass; #1203 and #1204.

6. Drawer slides: Accuride; Model 3837, full extension, 100 lb. capacity.

7. Cabinet drawer/door lock: National; #8475, nickel plate.

8. Recessed shelf standards and supports: K&V; #255 Standard with #256 Support.

D. Fasteners: Provide bolts, nuts, washers: screws toggle bolts and similar fasteners as indicated or required to attach and secure Work under this section.

2.2 FABRICATION

A. Shop assembly:

1. Comply with applicable requirements of AWI.

2. Quality standards for following types of architectural woodwork; comply with indicated standards as applicable:
   a. Standing trim, running trim, and rails: AWI Section 300, Custom Grade.
   b. Architectural cabinets, laminate clad: AWI Sections 400 for Flush Overlay and 400B; Premium Grade.
   c. Architectural cabinets, tops: AWI Sections 400 for High Pressure Decorative Laminate Tops and 400C for Custom Grade.
   d. Shelving: AWI Section 600: Custom Grade.
   e. Miscellaneous ornamental items: AWI Section 700.

3. Provide joints at logical break points for items which cannot be manufactured in one piece; note joints on shop drawings.

B. Shop finishing:

1. Finish millwork items in accord with finishing requirements of allowable AWI Grade indicated unless otherwise indicated.

2. Provide finish Work smooth, free from abrasion, tool marks, raised grain, and other Grade prohibited defects on exposed surfaces.

C. Tolerances: Fabricate millwork items for Reception Area and Break Area to AWI Custom Grade unless otherwise indicated.

2.3 SOURCE QUALITY CONTROL

A. Inspection:

1. Grade marks:
   a. General: Identify lumber and plywood by official grade mark.
   b. Lumber grade stamp: Contain symbol of grading agency, mill number or name, grade of lumber, species or species grouping or combination designation, rules under which graded, where applicable, and condition of seasoning at time of manufacture.
   c. Plywood: Appropriate grade trademark of APA. Indicate type, grade, class and identification index, and inspection and testing agency mark.
   d. Treated lumber and plywood: Identify each piece with appropriate UL stamp indicating compliance with indicated requirements; verify stamp contains treatment name, manufacturer, and location; third party inspection agency: species; flame spread; AWPA classification; 30 minute test characteristics.
   e. Conceal grade marks on components exposed to view in finished Work.

PART 3 – EXECUTION

3.1 PREPARATION

A. General:

1. Install Work plumb, level, true, and straight without distortions; conceal shims.

2. Provide finish Work smooth, free from abrasion, tool marks, raised grain markings or similar defects on exposed surfaces.

3. Cut Work to fit unless specified to be shop fabricated or shop cut to exact size. Where carpentry and millwork abuts other finished Work, scribe and cut for accurate fit. Drill pilot holes at corners before making cutouts.

4. Distribute defects allowed in quality grade specified to best overall advantage when installing job assembled Work.

5. Install mill fabricated Work in accord with AWI Section 1700.

3.2 INSTALLATION

A. Interior standing and running trim:

1. Trim and moldings: Install in single, un-jointed lengths for openings and for runs less than 10'-0". Use only one piece less than 10' -0" long in longer straight runs Stagger joints in adjacent members. Cope at returns and miter at corners.

2. Attach and secure in place with uniform joints providing for thermal and building movements.

3. Nailing: Blind nail where possible. Use finishing nails where exposed. Set exposed nail heads for filling.

4. Anchoring: Secure Work to anchors or blocking built-in or directly attached to substrate.

B. Millwork:

1. Install in manner consistent with specified quality grade, plumb, level, true, and straight without distortions: shim as required using concealed shims.

2. Secure to grounds, stripping, and blocking with countersunk, concealed fasteners and blind nailing. Scribe and cut for accurate fit to other finished Work.

C. Hardware: Install where indicated in accord with particular hardware specialty manufacturer's installation instructions.

D. Countertops: Install countertops in accord with AWI Custom Grade.

3.3 CLEANING

A. Clean wood, metal, and accessory items using neutral cleaner. Check and correct operating mechanisms for proper operation. Adjust and lubricate hinges, catches, and other operating hardware.

3.4 PROTECTION

A. Protect finished and prefinished surfaces from Work of other trades.

B. Prior to Date of Substantial Completion examine Work for damage. Repair or replace damaged areas to original condition.

+ + + END OF SECTION 06200 + + +

SECTION 07840

FIRESTOPPING

1.1 DESCRIPTION OF WORK

A. This specification covers the furnishing and installation of materials for firestopping. Products shall be as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 GENERAL

A. System Description

1. Performance Requirements: Comply with following:
   a. Firestopping: Consist of material or combination of materials to form effective barrier against spread of flame, smoke, and gases, and maintain integrity of fire-resistance rated walls, partitions, floors, and ceiling-floor assemblies at penetrations.
      1) Penetrations: Include annular space around pipes, ducts, chimneys, tubes, conduit, wires, cables, and vents.

B. Submittals

1. Product Data:
   a. Composition and performance characteristics.
   b. List of FM, UL, or WH classification number of systems installed.

2. Quality Assurance/Control Submittals:
   a. Test Reports: If not FM, UL, or WH listed, submit certified test results for ASTM E 814 tests by UL, FM, WH, or other accredited independent laboratory demonstrating compliance of firestopping with specified requirements.
   b. Manufacturers installation instructions.

C. Quality Assurance

1. Regulatory Requirements: Comply with applicable building-code requirements for firestopping.

D. Delivery, Storage, And Handling

1. Packing, Shipping, Handling, and Unloading: Deliver in original, unopened containers with manufacturer's labels.
   a. Products: FM, UL, or WH labeled and FM, UL, or WHI listed.

2. Storage and Protection: Store firestopping materials in accordance with manufacturer's recommendations.

1.3 PRODUCTS

A. Fire-Rated Penetration Sealant Systems

1. Firestopping Materials: Commercially manufactured asbestos-free products complying with following minimum requirements:
   a. Material:
      1) Flame Spread: ASTM E 84 or UL 723, 25 or less.
      2) Smoke Developed Rating: ASTM E 84 or UL 723, 50 or less.
      3) Material: Approved firestopping material as listed in UL 05, FM P7825, or WH Certified Listing.
   b. Material Properties:
      1) Contain no flammable or toxic solvents and have no dangerous or flammable outgassing during the drying or curing of products.
      2) Non-toxic to human beings at all stages of application and during fire conditions.
      3) Water-resistant after drying or curing and unaffected by high humidity, condensation, or transient water exposure.
   c. Devices and systems requiring heat activation to seal opening created by burning or melting of penetrant shall exhibit demonstrated ability to function as required for floors and walls of construction and thickness similar to those to be firestopped.

2. Firestopping System Requirements: Materials from single manufacturer capable of maintaining effective barrier against flame, smoke, and gases in accordance with ASTM E 814 and UL 1479.
   a. Fire-Resistance Rating: Equal or greater than fire-resistance rating of assembly in which it is being placed.
   b. F Ratings: Equal to or greater than fire-resistance rating of assembly penetrated.
   c. T Ratings: Equal to or greater than fire-resistance rating of assembly penetrated at following locations:
      1) Penetrations located outside of wall cavities.
      2) Penetrations located outside of fire-resistive shaft enclosures.
      3) Penetrations located in enclosures with doors required to have temperature-rise rating.
      4) Penetrations with penetrating hems larger than 100 mm (4 inch) diameter nominal pipe or 10 320 sq. mm (16 square inches) in cross-sectional area.
   d. System: Listed in UL 05, FM 7825, or WH Certified Listing, or tested by approved laboratory in accordance with ASTM E 814.
   e. System: Suitable for firestopping of penetrations made by steel, glass, plastic and insulated pipe.
   f. Penetration by Insulated Pipe: Does not require removal of insulation.

1.4 EXECUTION

A. Examination

1. Verification of Conditions:

a. Existing Conditions: Examine penetrations before beginning installation.
b. Do not proceed with installation until conditions are satisfactory.

B. Installation

1. Fire-Rated Penetration Sealant Systems: Install in accordance with UL 05, FM P7825, or WH systems and manufacturers recommendations to maintain required fire-separation rating.
   a. Preparation: Clean surfaces in contact with firestopping materials that may affect proper fitting or required fire rating. Prime if required. Dam void if required.
   b. Penetrations: Completely fill void with sealant materials to smooth surface, flush with adjacent surfaces and in contact with surfaces formed by openings and penetrating items ensuring adhesion. Provide sealant in thickness to achieve required fire rating and smoke barrier.
   c. Firestopping at Voids 100 mm (4 inches) or More in Any Direction: Capable of supporting same load as floor is designed to support or protected by permanent barrier.
   d. Remove any excess sealant from adjacent surfaces.

2. Firestopping: Provide at following locations:
   a. Penetrations of duct, chimney, conduit, tubing, cable, and pipe through floors and through fire-resistance rated walls, partitions, and ceiling-floor assemblies.
   b. Penetrations of vertical shafts such as pipe chases, elevator shafts, and utility chutes.
   c. Gaps at intersection of fire-rated floor stabs and walls.
   d. Gaps at perimeter of fire-rated walls and partitions, such as between top of walls and bottom of floor or roof decks.
   e. Construction joints in fire-rated floors, walls, and partitions.
   f. Other locations where required to maintain fire-resistance rating of the construction.
   g. Other locations as indicated on Drawings (if any).

C. Field Quality Control

1. Inspection: Examine areas to be firestopped prior to concealing or enclosing to ensure proper installation.
   a. Keep areas of firestopping work accessible until inspection by authorities having jurisdiction over work.

END OF SECTION 07840

SECTION 07900

CAULKING AND SEALANTS

PART 1 - GENERAL

1. 1 SCOPE OF WORK

A. The Contractor shall furnish all materials, labor, equipment, and incidentals required to perform all caulking, and related work necessary for the proper completion of the project as required by the Drawings and as specified herein.

B. Contract drawings show only functional features and some of the required external connections. They do not show all components required for a complete installation nor exact dimensions particular to any manufacturer's equipment. Contractor shall supply all parts, devices and equipment necessary to meet the requirements of the Contract Documents and shall make all dimensional adjustments particular to the equipment being furnished. All costs associated with such changes and adjustments shall be considered as being included in the price bid for the Work shown and specified.

1.2 APPLICATION SCHEDULE

A. Caulk all exterior wall joints between frames in openings and adjacent materials, between masonry and cast in place concrete, expansion and control joints and all other joints shown on the Drawings or required for the completion of the work.

B. Caulk all interior joints between frames and masonry, at tops of masonry walls, between masonry and structural concrete and control joints, exterior window and door frames and all other joints shown on the drawings or required for the completion of the work.

C. Joints of similar nature to those indicated shall be sealed with same sealer, whether indicated on Drawings to be sealed or not.

1.3 SUBMITTALS

A. Submit to the Construction Manager as provided in the General Conditions for shop drawings, detailed information on materials proposed and installation methods.

B. Product Data: Manufacturer's technical data for each joint sealer product required, including instructions for joint preparation and joint sealer application.

C. Samples for Color Selection: Manufacturer's standard bead samples consisting of strips of actual products showing full range of colors available, for each product exposed to view.

D. Samples for Color Verification: Samples of each type and color of joint sealer required. Install joint sealer samples in 1/2 inch wide joints formed between two 6 inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealers in the Work.

1.4 QUALITY ASSURANCE

A. Applicable standards: Standards of the following, as referenced herein:

1. ASTM C 920-87 Standard Specification for Elastomeric Joint Sealants.
2. ASTM C 962-86 Standard Guide for Use of Elastomeric Joint Sealants.

B. Preinstallation Meeting: The contractor shall arrange a meeting with installer, sealer manufacturers' representatives, and other trades whose work affects installation of sealers at project site to review procedures and time schedule proposed for installation of sealers which is coordinated with other related work.

1.5 WARRANTY

A. Provide a warranty against defective equipment and workmanship in accordance with the requirements of the General Conditions of the Contract Documents.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in original unopened containers or bundles with labels showing manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.

B. Store and handle materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of sealers under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by sealer manufacturer or below 40 degrees F (4.4 degrees C).
2. When substrates are wet due to rain, frost, condensation, or other causes.

B. Joint Dimension Conditions: Do not proceed with installation of sealers when joint dimensions are less than recommended by joint sealer manufacturer for application indicated.

PART 2 - PRODUCTS

2.1 CAULKING

A. Caulking Compound: One component, synthetic rubber base sealant, soft curing, nonstaining, conforming to F.S. TT-S-00230 and Thiokol's Building Trade Performance Specifications for Type 1 Class B sealants. Colors shall be selected by the Architect.

B. Primer: As recommended by caulking compound manufacturer.

C. Back-up Material: Closed cell foam polyethylene, or similar non-bituminous material as recommended by manufacturer of caulking compound and completely compatible with selected compound.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION AND INSTALLATION

A. Remove dirt, grease, mortar droppings and other foreign matter from substrate.

B. Require installer to inspect joints indicated to receive joint sealers for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not allow joint sealer work to proceed until unsatisfactory conditions have been corrected.

3.2 CAULKING

A. Surface Preparation: Clean metal surfaces free of grease, oil, wax lacquer, and other foreign residue by wiping with a clean cloth moistened with a suitable solvent. Scrape or brush masonry surfaces clean. Apply appropriate primer to contact surfaces.

B. Joint Preparation: Joints to be caulked having a depth in excess of 3/8-inch shall be packed with back-up material. Round back-up material shall be sized to require 20 percent to 50 percent compression upon insertion. In joints not of sufficient depth to allow packing, install polyethylene bond-breaking tape at back of joint. Avoid lengthwise stretching of back-up material. Cut all corners, avoid wrapping around corners.

C. Application: Apply compound with pressure flow gun with nozzle of proper size and shape to suit width of joint, promptly after mixing and with sufficient pressure to fill joint. Apply as a continuous operation horizontally in one direction, and vertically from bottom to top, except joints having excessive widths where compound might sag, the joints shall be built up with successive beads. Finish joints smooth and slightly coved.

3.3 PROTECTION AND CLEANING

A. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of substantial completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

B. Protect weep holes on window frames from being sealed over.

C. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of

products in which joints occur.

+ + + END OF SECTION 07900 + + +

SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Standard hollow metal doors and frames.

B. Related Sections

1. Division 8 Section 08710 for door hardware for doors.
2. Division 9 Sections 09912 for field painting hollow metal doors and frames.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification:

1. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.
2. For the following items, prepared on Samples about 12 by 12 inches to demonstrate compliance with requirements for quality of materials and construction:

   a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
   b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow metal panels and glazing if applicable.

E. Other Action Submittals:

1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252.

1. Temperature-Rise Limit: **At** vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.

C. Smoke-Control Door Assemblies: Comply with NFPA 105.

D. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to finish of factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

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

1.8 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Amweld Building Products, LLC.
2. Benchmark; a division of Therma-Tru Corporation.
3. Ceco Door Products; an Assa Abloy Group company.
4. Curries Company; an Assa Abloy Group company.
5. Deansteel Manufacturing Company, Inc.
6. Firedoor Corporation.
7. Fleming Door Products Ltd.; an Assa Abloy Group company.
8. Habersham Metal Products Company.
9. Karpen Steel Custom Doors & Frames.
10. Kewanee Corporation (The).
11. Mesker Door Inc.
12. Pioneer Industries, Inc.
13. Security Metal Products Corp.
14. Steelcraft; an Ingersoll-Rand company.
15. Windsor Republic Doors.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A60 metallic coating.

D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Powder-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 hollow metal frames of type indicated.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

I. Glazing: Comply with requirements in Division 8 Section 08800.

J. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL DOORS

A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

1. Design: Flush panel.
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.

a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 6.0 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.

1) Locations: Exterior doors and interior doors where indicated.

3. Vertical Edges for Single-Acting Doors: Manufacturer's standard.

a. Beveled Edge: 1/8 inch in 2 inches.

4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.

5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- thick, end closures or channels of same material as face sheets.
6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).

a. Width: As indicated on Drawings.

C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).

a. Width: As indicated on Drawings.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated from metallic-coated steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as face welded unless otherwise indicated.
3. Frames for Level 2 Steel Doors: 0.053-inch- thick steel sheet.

C. Interior Frames: Fabricated from cold-rolled steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as face welded unless otherwise indicated.
3. Frames for Level 2 Steel Doors: 0.053-inch thick steel sheet.
4. Frames for Wood Doors: 0.053-inch thick steel sheet.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.6 HOLLOW METAL PANELS

A. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal work.

2.7 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

D. Terminated Stops: Where indicated on interior door frames, terminate stops 6 inches above finish floor with a 90-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.

1. Provide terminated stops where indicated.

2.8 LOUVERS

A. Provide louvers for interior doors, where indicated, that comply with SDI 111C, with blades or baffles formed of 0.020-inch- thick, cold-rolled steel sheet set into 0.032-inch- thick steel frame.

1. Sightproof Louver: Stationary louvers constructed with inverted V-shaped or Y-shaped blades.

2. Lightproof Louver: Stationary louvers constructed with baffles to prevent light from passing from one side to the other, any angle.
3. Fire-Rated Automatic Louvers: Louvers constructed with movable blades closed by actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated by same testing and inspecting agency that established fire-resistance rating of door assembly.

2.9 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch- wide steel.

C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

2.10 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

C. Hollow Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Glazed Lites: Factory cut openings in doors.
3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.

D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
6. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

1) Two anchors per jamb up to 60 inches high.
2) Three anchors per jamb from 60 to 90 inches high.
3) Four anchors per jamb from 90 to 120 inches high.
4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

b. Compression Type: Not less than two anchors in each jamb.
c. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 16 Sections.

G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow metal work.
5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.11 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-protection-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable glazing stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

    a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
9. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors according to NFPA 105.

D. Glazing: Comply with installation requirements in Division 8 Section "Glazing" and with hollow metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08110

SECTION 08211

FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Sections:

1. Division 9 Section 09912 for field finishing doors.

1.3 SUBMITTALS

A. Product Data: For each type of door indicated. Include details of core and edge construction and trim for openings.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate requirements for veneer matching.
4. Indicate doors to be factory finished and finish requirements.
5. Indicate fire-protection ratings for fire-rated doors.

C. Samples for Verification:

1. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.

a. Provide samples for each species of veneer and solid lumber required.
b. Finish veneer-faced door samples with same materials proposed for factory-finished doors.

D. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Source Limitations: Obtain flush wood doors from single manufacturer.

C. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors.".

1. Provide WI-Certified Compliance Certificate indicating that doors comply with requirements of grades specified.

D. Forest Certification: Provide doors made with all wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

E. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252.

1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.

F. Preinstallation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags or cardboard cartons.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

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

B. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Algoma Hardwoods, Inc.
2. Ampco, Inc.
3. Buell Door Company Inc.
4. Chappell Door Co.
5. Eagle Plywood & Door Manufacturing, Inc.
6. Eggers Industries.
7. Graham; an Assa Abloy Group company.
8. Haley Brothers, Inc.
9. Ideal Architectural Doors & Plywood.
10. Ipik Door Company.
11. Lambton Doors.
12. Marlite.
13. Marshfield Door Systems, Inc.
14. Mohawk Flush Doors, Inc.; a Masonite company.
15. Oshkosh Architectural Door Company.
16. Poncraft Door Company.
17. Vancouver Door Company.
18. VT Industries Inc.

2.2 DOOR CONSTRUCTION, GENERAL

A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.

B. WDMA I.S.1-A Performance Grade: Heavy Duty.

C. WDMA I.S.1-A Performance Grade:

1. Heavy Duty unless otherwise indicated.

D. Structural-Composite-Lumber-Core Doors:

1. Structural Composite Lumber: WDMA I.S.10.

a. Screw Withdrawal, Face: 700 lbf.
b. Screw Withdrawal, Edge: 400 lbf.

E. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.

1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
2. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Comply with specified requirements for exposed edges.
3. Pairs: Provide formed-steel edges and astragals.

a. Finish steel edges and astragals with baked enamel same color as doors.
b. Finish steel edges and astragals to match door hardware (locksets or exit devices).

F. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware:

a. 5-inch top-rail blocking.

b. 5-inch bottom-rail blocking, in doors indicated to have protection plates.

c. 5-inch midrail blocking, in doors indicated to have armor plates.

d. 4-1/2-by-10-inch lock blocks, in doors indicated to have exit devices.

3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Custom Grade A faces.
2. Species: Select white birch.

3. Cut: Rotary cut.
4. Match between Veneer Leaves: Pleasing match.
5. Assembly of Veneer Leaves on Door Faces: Center-balance match.
6. Pair and Set Match: Provide for doors hung in same opening.
7. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 20 feet or more.
8. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
9. Exposed Vertical and Top Edges: Applied wood edges of same species as faces and covering edges of crossbands.
10. Core: Glued wood stave.
11. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering. Faces are bonded to core using a hot press.
12. WDMA I.S.1-A Performance Grade: Heavy Duty.

2.4 LOUVERS AND LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads as follows unless otherwise indicated.

1. Wood Species: Same species as door faces.
2. Profile: Manufacturer's standard shape.
3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

B. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Openings: Cut and trim openings through doors in factory.

1. Light Openings: Trim openings with moldings of material and profile indicated.

2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 8 Section "Glazing."
3. Louvers: Factory install louvers in prepared openings.

2.6 SHOP PRIMING

A. Doors for Transparent Finish: Shop prime doors with stain (if required), other required pretreatments, and first coat of finish as specified in Division 9 Section 09931. Seal all four edges, edges of cutouts, and mortises with first coat of finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

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

3.2 INSTALLATION

A. Hardware: For installation, see Division 8 Section "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.

1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.

a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
3. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08211

SECTION 08311

ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Access doors and frames for walls and ceilings.
2. Floor access doors and frames.

B. Product Data: For each type of access door and frame indicated. Include construction details, materials, individual components and profiles, and finishes.

C. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other work.

D. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.

E. Access Door and Frame Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

F. Ceiling Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim are shown and coordinated with each other.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of access door(s) and frame(s) through one source from a single manufacturer.

B. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. NFPA 252 for vertical access doors and frames.

C. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

1.4 COORDINATION

A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

PART 2 - PRODUCTS

2.1 STEEL MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

1. ASTM A 123/A 123M, for galvanizing steel and iron products
2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

C. Steel Sheet: Electrolytic zinc-coated, ASTM A 591/A 591M with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS) with A60 zinc-iron-alloy (galvannealed) coating or G60 mill-phosphatized zinc coating; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified thickness according to ASTM A 924/A 924M.

E. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
2. Surface Preparation for Metallic-Coated Steel Sheet: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.
    a. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
3. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

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. Acudor Products, Inc.
2. Babcock-Davis; A Cierra Products Co.
3. Bar-Co, Inc. Div.; Alfab, Inc.
4. Cendrex Inc.
5. Dur-Red Products.
6. Elmdor/Stoneman; Div. of Acorn Engineering Co.
7. Jensen Industries.
8. J. L. Industries, Inc.
9. Karp Associates, Inc.
10. Larsen's Manufacturing Company.
11. MIFAB, Inc.
12. Milcor Inc.
13. Nystrom, Inc.
14. Williams Bros. Corporation of America (The).

C. Flush Access Doors and Frames with Exposed Trim: Fabricated from steel sheet.

1. Locations: Wall surfaces.
2. Door: Minimum 0.060-inch thick sheet metal, set flush with exposed face flange of frame.
3. Frame: Minimum 0.060-inch thick sheet metal with 1-1/4-inch wide, surface-mounted trim.
4. Hinges: Continuous piano.
5. Latch: Cam latch operated by screwdriver with interior release.
6. Lock: Cylinder.
    a. Lock Preparation: Prepare door panel to accept cylinder specified in Division 8 Section "08710".

2.3 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.

1. Exposed Flanges: Nominal 1 to 1-1/2 inches wide around perimeter of frame.
2. Provide mounting holes in frame for attachment of masonry anchors. Furnish adjustable metal masonry anchors.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

1. For cylinder lock, furnish two keys per lock and key all locks alike.
2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.

C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING AND CLEANING

A. Adjust doors and hardware after installation for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08311

SECTION 08410

STOREFRONT FRAME

1.1 GENERAL

A. DESCRIPTION OF WORK: Furnish entrances and storefronts, complete. Supplying of fastenings, connections to building structure and other items not mentioned specifically herein, but which are necessary to make a complete installation shall be included.

B. GENERAL:

1. Structural Performance: Provide systems, including anchorage, capable of withstanding loads indicated.
   a. Main-Framing-Member Deflection: Limited to 1/175 of clear span or 3/4 inch (19 mm) whichever is smaller.
   b. Structural-Testing: Systems tested according to ASTM E 330 at 150 percent of inward and outward wind-load design pressures do not evidence material failures, structural distress, deflection failures, or permanent deformation of main framing members exceeding 0.2 percent of clear span.

2. Air Infiltration: Limited to 0.06 cfm/sq. ft. (0.3 L/s per sq. m) of system surface area when tested according to ASTM E 283.

3. Water Penetration: Systems do not evidence water leakage when tested according to ASTM E 331 at minimum differential pressure of 20 percent of inward acting wind load design pressure but not less than 6.24 psf.

4. Average U-Value: Not more than .65Btu/hr/sf/degree F per AAMA 1503.1.

5. Submittals: Product Data, Shop Drawings, and color Samples.
   a. For entrance systems, include hardware schedule and locations.

1.2 PRODUCTS

A. Aluminum Framed Storefronts

1. Aluminum strorefront system doors and frames as manufactured by YKK, Kawner or Vista Wall are acceptable or products of equal quality, performance and appearance.

B. Aluminum: ASTM B 209 (ASTM B 209M) sheet; ASTM B 221 (ASTM B 221M) extrusions.

C. Glazing: Specified in Division 8 Section "Glazing."

D. Sealants and Joint Fillers: For joints at perimeter of systems as specified in Division 7 Section "Joint Sealants."

E. Doors: 1-3/4-inch- (44.5-mm-) thick glazed doors with minimum 0.125-inch- (3.2-mm-) thick, extruded tubular rail and stile members, mechanically fastened corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie-rods, snap-on extruded-aluminum glazing stops, and preformed gaskets. Medium style doors shall be provided.

1. Interior Doors: Provide ANSI/BHMA A156.16 silencers, three on strike jamb of single-door frames and two on head of double-door frames.

2. Exterior Doors: Provide compression weather stripping at fixed stops. At other locations, provide sliding weather stripping retained in adjustable strip mortised into door edge.

3. Hardware: As specified in Division 8 Section "Door Hardware."

F. Fasteners and Accessories: Compatible with adjacent materials, corrosion-resistant, non-staining, and non-bleeding. Use concealed fasteners except for application of door hardware.

G. Fabrication: The framing system shall provide for flush glazing on all sides with no projecting stops. Vertical and horizontal framing members shall have a nominal face dimension of 2". Overall depth shall be 4-1/2". Fabricate framing in profiles indicated for flush glazing (without projecting stops). Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system. Factory assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.

H. Door Framing: Reinforce to support imposed loads. Factory assemble door and frame units and factory install hardware to greatest extent possible. Reinforce door and frame units for hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.

I. Aluminum Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products. "Clear anodic, Architectural Class I: AA-M12C22A41 or if color is required to match existing then Color anodic, Architectural Class I: AA-M12C22A42/A44

1. Color: To match existing store fronts.

1.3 EXECUTION

A. INSTALLATION

1. Isolate metal surfaces in contact with incompatible metal or corrosive substrates, including wood, by painting contact surfaces with bituminous coating or primer, or by applying sealant or tape recommended by manufacturer.

2. Install components to provide a weatherproof system.

3. Install framing components true in alignment with established lines and grades to the following tolerances:
   a. Variation from Plane: Limit to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.
   b. Alignment: For surfaces abutting in line, limit offset to 1/16 inch (1.5 mm). For surfaces meeting at corners, limit offset to 1/32 inch (0.8 mm).
   c. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).
   d. Install doors without warp or rack. Adjust doors and hardware to provide tight fit at contact points and smooth operation.

END OF SECTION 08410

SECTION 08520

ALUMINUM WINDOWS

1.1 GENERAL

A. Description of Work

1. This specification covers the furnishing and installation of material for fixed aluminum framed windows for interior and exterior locations. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes fixed aluminum-framed windows.

C. Definitions

1. Performance class designations according to AAMA/WDMA 101/I.S.2/NAFS:
   a. C: Commercial.

2. Performance grade number according to AAMA/WDMA 101/I.S.2/NAFS:
   a. Design pressure number in pounds force per square foot (pascals) used to determine the structural test pressure and water test pressure.

3. Structural Test Pressure: For uniform load structural test, is equivalent to 150 percent of the design pressure.

4. Minimum Test Size: Smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

D. Performance Requirements

1. General: Provide aluminum windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of minimum test size indicated below:
   a. Size required by AAMA/WDMA 101/I.S.2/NAFS for gateway performance.
   b. Size indicated on Drawings.

2. Structural Performance: Provide aluminum windows capable of withstanding the effects of the following loads, based on testing units representative of those indicated for Project that pass AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Structural Test:
   a. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour (meters per second) at

33 feet (10 m) above grade, according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
1) Basic Wind Speed: 90 mph.

b. Deflection: Design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length or 3/4 inch (19 mm), whichever is less, at design pressure based on testing performed according to AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Deflection Test or structural computations.

3. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   a. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C) material surfaces.

E. Submittals

1. Product Data: For each type of aluminum window indicated.

2. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, and installation details

3. Samples: For each exposed finish.

4. Product Schedule: Use same designations indicated on Drawings.

5. Field quality-control test reports.

6. Product test reports.

7. Maintenance data.

F. Quality Assurance

1. Installer: A qualified installer, approved by manufacturer to install manufacturer's products.

2. Fenestration Standard: Comply with AAMA/WDMA 101/I.S.2/NAFS, "North American Fenestration Standard Voluntary Performance Specification for Windows, Skylights and Glass Doors," for definitions and minimum standards of performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.
   a. Provide AAMA, certified aluminum windows with an attached label.

3. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.

4. Preinstallation Conference: Conduct conference at Project site.

G. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
   a. Failures include, but are not limited to, the following:
      1) Failure to meet performance requirements.
      2) Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
      3) Deterioration of metals, other materials, and metal finishes beyond normal weathering.
      4) Failure of insulating glass.
   b. Warranty Period:
      1) Window: Three, years from date of Substantial Completion.
      2) Glazing: Five years from date of Substantial Completion.
      3) Metal Finish: Five 10 years from date of Substantial Completion.

1.2 PRODUCTS

A. Materials

1. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi (150-MPa) ultimate tensile strength, not less than 16,000-psi (110-MPa) minimum yield strength, and not less than 0.062-inch (1.6-mm) thickness at any location for the main frame and sash members.

2. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.
   a. Reinforcement: Where fasteners screw anchor into aluminum less than 0.125 inch (3.2 mm) thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, splined grommet nuts.
   b. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.

3. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

4. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe

service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

5. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action and for complete concealment when aluminum window is closed.
   a. Weather-Stripping Material: Elastomeric cellular preformed gaskets complying with ASTM C 509.
   b. Weather-Stripping Material: Dense elastomeric gaskets complying with ASTM C 864.
   c. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/WDMA 101/I.S.2/NAFS.

6. Replaceable Weather Seals: Comply with AAMA 701/702.

7. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

B. Window

1. Window Type: As indicated on Drawings.

2. AAMA/WDMA Performance Requirements: Provide aluminum windows of performance indicated that comply with AAMA/WDMA 101/I.S.2/NAFS.
   a. Performance Class and Grade: C30.

3. Sound Transmission Class (STC): Provide glazed windows rated for not less than 35, STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.

C. Glazing

1. Glass: Interior windows: Clear, insulating-glass units.

2. Glass: Exterior windows: Clear, insulating-glass units, argon gas filled, with low-E coating sputtered on second surface.

3. Glazing System: Manufacturer's standard factory-glazing system that produces weather tight seal.

D. Fabrication

1. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

2. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due

to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.

3. Factory-Glazed Fabrication: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 08 Section "Glazing" and with AAMA/WDMA 101/I.S.2/NAFS.

4. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.

E. Finishes, General

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

F. Aluminum Finishes

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

2. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611, to match existing.

1.3 EXECUTION

A. Installation

1. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.

2. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

3. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.

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

B. Field Quality Control

1. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
   a. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

C. Adjusting, Cleaning, And Protection

1. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

2. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

3. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

5. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

END OF SECTION 08520

SECTION 08710

DOOR HARDWARE

PART 1 - - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Commercial door hardware for the following:

   a. Swinging doors
   b. Other doors to the extent indicated.

2. Cylinders for doors specified in other Section

B. Related Sections include the following:

1. Division 8 Section 08110.
2. Division 8 Section 08210.
3. Division 8 Section 08311.

C. Installation: General types and approximate quantities of door hardware are indicated in the list of door hardware sets to provide a basis for the cost of installation and other Work that is part of the Contract Sum but not included in door hardware allowance.

1.3 SUBMITTALS

A. Product Data: Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Samples for Verification: Submit minimum Samples of each type of finish required, except primed finish.

C. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.

D. Warranty: Special warranty specified in this Section.

E. Other Action Submittals:

1. Door Hardware Sets: Prepared by or under the supervision of Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

    a. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule." Double space entries, and number and date each page.
    b. Content: Include the following information:

        1) Identification number, location, hand, fire rating, and material of each door and frame.
        2) Type, style, function, size, quantity, and finish of each door hardware item.
        3) Complete designations of every item required for each door or opening including name and manufacturer.
        4) Fastenings and other pertinent information.
        5) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
        6) Explanation of abbreviations, symbols, and codes contained in schedule.
        7) Mounting locations for door hardware.
        8) Door and frame sizes and materials.
        9) List of related door devices specified in other Sections for each door and frame.

    c. Submittal Sequence: Submit initial draft of final schedule along with essential Product Data to facilitate the fabrication of other work that is critical in Project construction schedule. Submit the final door hardware sets after Samples, Product Data, coordination with Shop Drawings of other work, delivery schedules, and similar information has been completed and accepted.

2. Keying Schedule: Prepared by or under the supervision of Architectural Hardware Consultant detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by lock manufacturer.

1. Installer's responsibilities include supplying and installing door hardware and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Construction manager, and Owner about door hardware and keying.
2. Installer shall have warehousing facilities in Project's vicinity.
3. Scheduling Responsibility: Preparation of door hardware and keying schedules.

B. Architectural Hardware Consultant Qualifications: A person who is currently certified by DHI as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

C. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

Test Pressure: After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches or less above the sill.

E. Keying Conference: Conduct conference at Project site to comply with requirements conference participants shall include Installer's Architectural Hardware Consultant and Owner's security consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
2. Preliminary key system schematic diagram.
3. Address for delivery of keys.

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.

C. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirement

D. Existing Openings: Where new hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide for proper operation.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including excessive deflection, cracking, or breakage.
b. Faulty operation of operators and door hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Two years from date of Substantial Completion, except as follows:
a. Exit Devices: Two years from date of Substantial Completion.
b. Manual Closers: 10 years from date of Substantial Completion.

1.7 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in this Section and door hardware sets indicated .

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Sets" Article. Products are identified by using door hardware designations, as follows:
1. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.

C. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 HINGES, GENERAL

A. Quantity: Provide the following, unless otherwise indicated:

1. Two Hinges: For doors with heights up to 60 inches .

2. Three Hinges: For doors with heights 61 to 90 inches.
3. Four Hinges: For doors with heights 91 to 120 inches.
4. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

B. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

C. Hinge Weight: Unless otherwise indicated, provide the following:
1. Doors with Closers: Antifriction-bearing hinges.
2. Interior Doors: Standard-weight hinges.

D. Hinge Base Metal: Unless otherwise indicated, provide the following:

1. Exterior Hinges: Stainless steel, with stainless-steel pin
2. Interior Hinges: Steel, with steel pin
3. Hinges for Fire-Rated Assemblies: Steel, with steel pin

E. Hinge Options: Where indicated in door hardware sets or on Drawings:
1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for outswinging exterior doors
2. Corners: Square

F. Fasteners: Comply with the following:

1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
2. Wood Screws: For wood doors and frames.
3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
4. Screws: Phillips flat-head; machine screws (drilled and tapped holes) for metal doors wood screws for wood doors and frames Finish screw heads to match surface of hinges.

2.3 HINGES

A. Butts and Hinges: BHMA A156.1. Listed under Category A in BHMA's "Certified Product Directory."

B. Template Hinge Dimensions: BHMA A156.7.

C. Manufacturers:

1. Hager Companies (HAG).
2. McKinney Products Company; an ASSA ABLOY Group company
3. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
4. Ives(IVE)

2.4 SPRING HINGES

A. Self-Closing Hinges: BHMA A156.17 Listed under Category A in BHMA's "Certified Product Directory."

B. Manufacturers:

1. Bommer Industries, Inc. (BI).
2. Hager Companies (HAG).
3. McKinney Products Company; an ASSA ABLOY Group company (MCK)
4. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
5. Ives(IVE)>

2.5 CONTINUOUS HINGES

A. General: Minimum 0.120-inch- thick, hinge leaves with minimum overall width of 4 inches; fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete.

1. Fire Pins: Steel pins to hold labeled fire doors in place if required by tested listing.

B. Continuous, Gear-Type Hinges: Extruded-aluminum, pinless, geared hinge leaves; joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings.

1 Manufacturer
   a. Pemko Manufacturing Co. (PEM).
   b. Select Products Limited (SPL).
   c. Zero International (ZRO).
   d. Ives(IVE)

2.6 LOCKS AND LATCHES, GENERAL

A. Accessibility Requirements: Where indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA),

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.

B. Latches and Locks for Means of Egress Doors: Comply with NFPA 101. Latches shall not require more than 15 lbf to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.
1. Dummy Trim: Match lock trim and escutcheons.
2. Lockset Designs: Schlage 93A

C. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
1. Mortise Locks: Minimum 3/4-inch latchbolt throw.
2. Deadbolts: Minimum 1-inch bolt throw.

D. Backset: 2-3/4 inches, unless otherwise indicated.

E. Strikes: Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, and as follows:

2.7 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: Function numbers and descriptions indicated in door hardware sets comply with the following:
   1. Mortise Locks: BHMA A156.

B. Mortise Locks: Stamped steel case with steel or brass parts; BHMA A156.13 Grade 1.

   1. Manufacturers:
      a. Best Access Systems; Div. of The Stanley Works (BAS). To conform to County's standard locks.

2.8 AUXILIARY LOCKS AND LATCHES

A. Auxiliary Locks: BHMA A156.5 Grade 1 .

   1. Manufacturers:
      a. Best Access Systems; Div. of The Stanley Works (BAS). To conform to County's standard locks.

2.9 DOOR BOLTS

A. Bolt Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows
   1. Fire-Rated Surface Bolts: Minimum 1-inch throw; listed and labeled for fire-rated doors.
   2. Mortise Flush Bolts: Minimum 3/4-inch throw.

B. Dustproof Strikes: BHMA A156.16, Grade 1.

C. Manual Flush Bolts: BHMA A156.16, Grade 1 designed for mortising into door edge.

   1. Manufacturer
      a. Door Controls International (DCI).
      b. Glynn-Johnson; an Ingersoll-Rand Company (GJ).
      c. Hager Companies (HAG).
      d. IVES Hardware; an Ingersoll-Rand Company (IVS).

D. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1 designed for mortising into door edge.

   1. Manufacturers:
      a. Door Controls International (DCI).
      b. Glynn-Johnson; an Ingersoll-Rand Company (GJ).
      c. Hager Companies (HAG).
      d. IVES Hardware; an Ingersoll-Rand Company (IVE)

2.10 EXIT DEVICES

A. Exit Devices: BHMA A156., Grade 1

B. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf

C. Exit Devices for Means of Egress Doors: Comply with NFPA 101. Exit devices shall not require more than 15 lbf to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

D. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

E. Fire Exit Devices: Devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.

F. Removable Mullions: BHMA A156.3.

G. Outside Trim: material and finish to match locksets, unless otherwise indicated.

1. Match design for locksets and latchsets, unless otherwise indicated.

H. Through Bolts: For exit devices and trim .

2.11 LOCK CYLINDERS

A. Standard Lock Cylinders: BHMA A156.5, Grade 2,

B. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:

1. Number of Pins: Six
2. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
3. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.

C. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:

D. Construction Keying: Comply with the following:

1. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

E. Manufacturers:
1. Best Access Systems; Div. of The Stanley Works (BAS). To conform to County's standard cores.

2.12 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference, and as follows:
1. Master Key System: Cylinders are operated by a change key and a master key.

B. Keys: Nickel silver.

1. Stamping: Permanently inscribe each key with a visual key control number .

2. Quantity: In addition to one extra key blank for each lock, provide the following:

a. Cylinder Change Keys: Three.
b. Master Keys: Five.

2.13 KEY CONTROL SYSTEM

A. Key Control Cabinet: BHMA A156.5, Grade 1; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, 2 sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 20 keys
1. Wall-Mounted Cabinet: Cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.

B. Cross-Index System: Multiple-index system for recording key information. Include three receipt forms for each key-holding hook. Set up by Owner.

Manufacturers:

a. Key Control Systems, Inc. (KCS).
b. Lund Equipment Co., Inc. (LUN).
c. MMF Industries (MMF).
d. Sunroc Corporation (SUN).Key Lock Boxes:
e. Knox Company (KNX).

2.14 CLOSERS

A. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act.

1. Comply with the following maximum opening-force requirements:

a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.

c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

B. Door Closers for Means of Egress Doors: Comply with NFPA 101. Door closers shall not require more than 30 lbf to set door in motion and not more than 15 lbf to open door to minimum required width.

C. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

D. Surface Closers: BHMA A156.4, Grade 1 Provide type of arm required for closer to be located on non-public side of door, unless otherwise indicated.

1. Manufacturers:
   a. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company (C
   b. LCN Closers; an Ingersoll-Rand Company (LCN).
   c. Norton Door Controls; an ASSA ABLOY Group company (NDC).
   d. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).

E. Coordinators: BHMA A156.3.

2.15 PROTECTIVE TRIM UNITS

A. Size: 1-1/2 inches less than door width on push side and 1/2 inch less than door width on pull side, by height specified in door hardware sets.

B. Fasteners: Manufacturer's standard machine or self-tapping screws.

C. Metal Protective Trim Units: BHMA A156.6; beveled top and 2 sides; fabricated from the following material:

1. Material: 0.050-inch- thick stainless steel.
2. Manufacturers:
   a. Baldwin Hardware Corporation (BH).
   b. Burns Manufacturing Incorporated (BM)
   c. Hager Companies (HAG
   d. IVES Hardware; an Ingersoll-Rand Company (IVS).
   e. Rockwood Manufacturing Company (RM)

2.16 STOPS AND HOLDERS

A. Stops and Bumpers: BHMA A156.16, Grade 1

1. Provide floor stops for doors unless wall or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic. Where floor or wall stops are not appropriate, provide overhead holders.

B. Mechanical Door Holders: BHMA A156.16, Grade 1.

C. Silencers for Metal Door Frames: BHMA A156.16, Grade 1; neoprene or rubber, minimum diameter 1/2 inch ; fabricated for drilled-in application to frame.

D. Manufacturers:
1. Baldwin Hardware Corporation (BH).
2 Glynn-Johnson; an Ingersoll-Rand Company (GJ).
2. Hager Companies (HAG)
3. IVES Hardware; an Ingersoll-Rand Company (IVS).
4. Rockwood Manufacturing Company (RM).

2.17 DOOR GASKETING

A. Standard: BHMA A156.22. Listed under Category J in BHMA's "Certified Product Directory."

B. General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

C. Air Leakage: Not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283.

D. Smoke-Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke-control ratings indicated, based on testing according to UL 1784.

1. Provide smoke-labeled gasketing on 20-minute-rated doors and on smoke-labeled doors.

E. Fire-Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

1. Test Pressure: After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches or less above the sill

F. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

G. Gasketing Materials: ASTM D 2000 and AAMA 701/702.

H. Manufacturers:

1. Hager Companies (HAG).
2. National Guard Products (NGP).
3. Pemko Manufacturing Co. (PEM).
4. Reese Enterprises (REE)

2.18 THRESHOLDS

A. Standard: BHMA A156.21. Listed under Category J in BHMA's "Certified Product Directory."

B. Accessibility Requirements: Where thresholds are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA).

1. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.

C. Thresholds for Means of Egress Doors: Comply with NFPA 101. Maximum 1/2 inch high.

D Manufacturers:

1. Hager Companies (HAG).
2. National Guard Products (NGP).
3. Pemko Manufacturing Co. (PEM).
4. Reese Enterprises (RE).

2.19 MISCELLANEOUS DOOR HARDWARE

A. Boxed Power Supplies: Modular unit in NEMA ICS 6, Type 4 enclosure; filtered and regulated; voltage rating and type matching requirements of door hardware served; and listed and labeled for use with fire alarm systems.

B. Auxiliary Hardware: BHMA A156.16, Grade 1.

1. Manufacturers:

a. Baldwin Hardware Corporation (BH).
b. Rockwood Manufacturing Company (RM).
c. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
d. Ives

2.20 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Construction Manager.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Steel Machine or Wood Screws: For the following fire-rated applications:

   a. Mortise hinges to doors.
   b. Strike plates to frames.
   c. Closers to doors and frame
3. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."

2.21 FINISHES

A. Standard: BHMA A156.18, as indicated in door hardware sets.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

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

3.2 PREPARATION

A. Steel Doors and Frames: Comply with DHI A115 Series.

1. Surface-Applied Door Hardware: Drill and tap doors and frames according to ANSI A250.6.

B. Wood Doors: Comply with DHI A115-W Series.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights indicated as follows unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

3.4 FIELD QUALITY CONTROL

A Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.

2. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 HARDWARE SCHEDULE

END OF SECTION 08710

SECTION 09250

GYPSUM BOARD

PART 1 - - GENERAL

1.1 DESCRIPTION

A. SCOPE

1. This Section specifies interior gypsum board, exterior gypsum board for ceilings and soffits and tile backing panels.

B. RELATED SECTIONS

1. Division 9 Section 09310 for cementitious backer units installed as substrates for ceramic tile.
2. Division 9 Section 09911 for primers applied to gypsum board surfaces.

1.2 SUBMITTALS

The following information shall be provided in accordance with Section 01300.

1. A copy of this specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check marks (✓) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The Construction Manager shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined shall signify compliance on the part of the Contractor with the specifications. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.
2. Product data for each type of product indicated

1.3 STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - - PRODUCTS

2.1 PANELS, GENERAL

A. RECYCLED CONTENT

1. Provide gypsum panel products with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 50 percent by weight.

B. SIZE

1. Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

A. GENERAL

1. Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.

2. 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:

a. American Gypsum Co.
b. BPB America Inc.
c. G-P Gypsum.
d. Lafarge North America Inc.
e. National Gypsum Company.
f. PABCO Gypsum.
g. Temple.
h. USG Corporation.

C. REGULAR TYPE

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

D. TYPE X

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

E. CEILING TYPE

Manufactured to have more sag resistance than regular-type gypsum board.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

2.3 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

A. EXTERIOR GYPSUM SOFFIT BOARD

1. ASTM C 931/C 931M or ASTM C 1396/C 1396M, with manufacturer's standard edges.

2. 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:

   a. American Gypsum Co.
   b. BPB America Inc.
   c. G-P Gypsum.
   d. Lafarge North America Inc.
   e. National Gypsum Company.
   f. PABCO Gypsum.
   g. Temple.
   h. USG Corporation.

3. Core: As indicated.

2.4 TILE BACKING PANELS

A. CEMENTITIOUS BACKER UNITS

1. ANSI A118.9.

2. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

   a. Custom Building Products; Wonderboard.

b. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
c. USG Corporation; DUROCK Cement Board.

3. Thickness: 1/2 inch.

2.5 TRIM ACCESSORIES

A. INTERIOR TRIM

1. ASTM C 1047.

2. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.

3. Shapes:

a. Cornerbead.
b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. L-Bead: L-shaped; exposed long flange receives joint compound.
d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
e. Expansion (control) joint.

B. EXTERIOR TRIM

1. ASTM C 1047.

2. Material: Hot-dip galvanized steel sheet, plastic, or rolled zinc.
3. Shapes:

a. Cornerbead.
b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

2.6 JOINT TREATMENT MATERIALS

A. GENERAL

1. Comply with ASTM C 475/C 475M.

B. JOINT TAPE

1. Interior Gypsum Wallboard: Paper.

2. Exterior Gypsum Soffit Board: Paper.

3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.

4. Tile Backing Panels: As recommended by panel manufacturer.

C. JOINT COMPOUND FOR INTERIOR GYPSUM WALLBOARD

1. For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
2. Prefilling: At open joints, and damaged surface areas, use setting-type taping compound.
3. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
   a. Use setting-type compound for installing paper-faced metal trim accessories.
4. Fill Coat: For second coat, use drying-type, all-purpose compound.
5. Finish Coat: For third coat, use drying-type, all-purpose compound.

D. JOINT COMPOUND FOR EXTERIOR APPLICATIONS

1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

E. JOINT COMPOUND FOR TILE BACKING PANELS

1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.7 AUXILIARY MATERIALS

A. GENERAL

1. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. LAMINATING ADHESIVE

1. Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
2. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. STEEL DRILL SCREWS

1. ASTM C 1002, unless otherwise indicated.
2. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
3. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

PART 3 - - EXECUTION

3.1 EXAMINATION

A. AREAS AND SUBSTRATES:

1. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.

B. PRIOR TO INSTALLATION:

1. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. INSTALLATION:

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

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. GENERAL:

1. Comply with ASTM C 840.

B. CEILING PANELS:

1. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

2. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

C. JOINTS:

1. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

D. CONTROL JOINTS:

1 Form control and expansion joints with space between edges of adjoining gypsum panels.

E. CONCEALED SPACES:

Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

F. ISOLATION:

1. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

G. ATTACHMENT TO STEEL FRAMING:

1. Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. GENERAL:

Install interior gypsum board in the following locations:

1. Regular Type: As indicated on Drawings.
2. Type X: As indicated on Drawings.
3. Ceiling Type: As indicated on Drawings.

B. SINGLE-LAYER APPLICATION:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
   a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
   b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. MULTILAYER APPLICATION:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws

3.4 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

A. GENERAL:

1. Apply panels perpendicular to supports, with end joints staggered and located over supports.
2. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
3. Fasten with corrosion-resistant screws.

3.5 APPLYING TILE BACKING PANELS

A. CEMENTITIOUS BACKER UNITS:

1. ANSI A108.11, at showers, tubs, and where indicated locations indicated to receive tile.

B. AREAS NOT SUBJECT TO WETTING:

1. Install regular-type gypsum wallboard panels to produce a flat surface except at showers, tubs, and other locations indicated to receive water-resistant panels.

C. ABUTTING PANELS:

1. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.6 INSTALLING TRIM ACCESSORIES

A. GENERAL:

1. For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. CONTROL JOINTS:

1. Install control joints at according to ASTM C 840 and in specific locations approved by Construction Manager for visual effect.

C. INTERIOR TRIM:

Install in the following locations:

1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges.
3. L-Bead: Use where indicated.

D. EXTERIOR TRIM:

Install in the following locations:

1. Cornerbead: Use at outside corners.

3.7 FINISHING GYPSUM BOARD

A. GENERAL:

1. Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. JOINTS:

1. Prefill open joints, beveled edges, and damaged surface areas.

C. TAPING JOINTS:

1. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. GYPSUM BOARD FINISH LEVELS

Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 4: At panel surfaces that will be exposed to view.
   a. Primer and its application to surfaces are specified in other Division 9 Sections.

E. CEMENTITIOUS BACKER UNITS:

1. Finish according to manufacturer's written instructions.

3.8 PROTECTION

A. GENERAL:

1. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. DAMAGED PANELS:

1. Remove and replace panels that are wet, moisture damaged, and mold damaged.
2. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
3. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 09250a

GYPSUM BOARD SHAFT-WALL ASSEMBLIES

1.1 GENERAL

A. Description of Work

1. This specification covers the furnishing and installation of materials for gypsum board shaft-wall assemblies. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes gypsum board shaft-wall assemblies for the following:
   a. Shaft-wall enclosures.
   b. Chase enclosures.
   c. Horizontal enclosures.

C. Submittals
1. Product Data: For each gypsum board shaft-wall assembly indicated.

D. Quality Assurance

1. Fire-Resistance Ratings: Provide materials and construction identical to those of assemblies with fire-resistance ratings determined according to ASTM E 119 by a testing and inspecting agency.

2. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspecting agency.

3. Preinstallation Conference: Conduct conference at Project site.

E. Delivery, Storage, And Handling

1. Deliver materials in original packages, containers, and bundles bearing brand name and identification of manufacturer or supplier.

2. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

3. Stack panels flat on leveled supports off floor or slab to prevent sagging.

F. Project Conditions

1. Environmental Limitations: Comply with ASTM C 840 requirements or with gypsum board manufacturer's written recommendations, whichever are more stringent.

2. Do not install interior products until installation areas are enclosed and conditioned.

3. Do not install panels that are wet, moisture damaged, or mold damaged.
   a. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
   b. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration

PART 2 – PRODUCTS

A. Gypsum Board Shaft-Wall Assemblies, General

1. Provide materials and components complying with requirements of fire-resistance-rated assemblies indicated.
   a. Provide panels in maximum lengths available to eliminate or minimize end-to-end butt joints.
   b. Provide auxiliary materials complying with gypsum board shaft-wall assembly manufacturer's written recommendations.

B. Panel Products

1. Recycled Content: Provide gypsum panel products with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 25 percent by weight.

2. Gypsum Liner Panels: Comply with ASTM C 442/C 442M.
   a. Type X: Manufacturer's proprietary liner panels with moisture-resistant paper faces.
      1) Core: 1 inch (25.4 mm) thick.
      2) Long Edges: Double bevel.
   b. Moisture- and Mold-Resistant Type X: Manufacturer's proprietary liner panels with moisture- and mold-resistant core and surfaces; comply with ASTM D 3273.
      1) Core: 1 inch (25.4 mm) thick.
      2) Long Edges: Double bevel.

3. Gypsum Board: As specified in Division 09 Section "Gypsum Board".
4. Water-Resistant Gypsum Backing Board: As specified in Division 09 Section "Gypsum Board".

C. Non-Load-Bearing Steel Framing

1. Framing Members: Comply with ASTM C 754 for conditions indicated.

2. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
   a. Recycled Content: Provide steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
   b. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized.

D. Auxiliary Materials

1. General: Provide auxiliary materials that comply with referenced product standards and manufacturer's written recommendations.

2. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes specified in Division 09 Section "Gypsum Board", that comply with gypsum board shaft-wall assembly manufacturer's written recommendations for application indicated.

3. Gypsum Board Joint-Treatment Materials: As specified in Division 09 Section "Gypsum Board".

4. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
   a. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

5. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
   a. 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 testing agency.
   b. 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 testing agency.

6. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing), produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
   a. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

7. Acoustical Sealant: As specified in Division 07 Section "Building Insulation".
   a. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. Gypsum Board Shaft-Wall Assemblies

1. Basis-of-Design Product: As indicated on Drawings by design designation of a qualified testing agency.

2. Fire-Resistance Rating: As indicated

3. STC Rating: As indicated 51.

4. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.
   a. Depth: As indicated
   b. Minimum Base-Metal Thickness: As indicated.

5. Runner Tracks: Manufacturer's standard J-profile track with long-leg length as standard with manufacturer, but at least 2 inches (51 mm) long and in depth matching studs.
   a. Minimum Base-Metal Thickness: As indicated.

6. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

7. Jamb Struts: Manufacturer's standard J-profile strut with long-leg length of 3 inches (76 mm), in depth matching studs, and not less than 0.0329 inch (0.84 mm) thick.

8. Room-Side Finish: As indicated.

9. Shaft-Side Finish: As indicated by fire-resistance-rated assembly design designation,

10. Insulation: Sound attenuation blankets.

2.2 EXECUTION

A. Installation

1. General: Install gypsum board shaft-wall assemblies to comply with requirements of fireresistance-rated assemblies indicated, manufacturer's written installation instructions, and the following:
   a. ASTM C 754 for installing steel framing except comply with framing spacing indicated.
   b. Division 09 Section(s) "Gypsum Board", for applying and finishing panels.
   c. Division 09 Section "Ceramic Tile" for cementitious backer units.

2. Do not bridge architectural or building expansion joints with shaft-wall assemblies; frame both sides of expansion joints with furring and other support.

3. At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire

protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.

4. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.

5. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

6. Control Joints: Install control joints at locations indicated on Drawings or according to ASTM C 840, while maintaining fire-resistance rating of gypsum board shaft-wall assemblies.

7. Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly. Install acoustical sealant to withstand dislocation by air-pressure differential between shaft and external spaces; maintain an airtight and smoke-tight seal; and comply with ASTM C 919 requirements or with manufacturer's written instructions, whichever are more stringent.

B. Protection

1. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

2. Remove and replace panels that are wet, moisture damaged, or mold damaged.
   a. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
   b. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09250a

SECTION 09310

CERAMIC TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Ceramic tile.
2. Waterproof membrane.
3. Crack isolation membrane.
4. Tile backing panels.

B. Related Sections:

1. Division 7 Section 07141 for waterproofing under thickset mortar beds.
2. Division 7 Section 07920 for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
3. Division 9 Section 09250 for cementitious backer units.
4. Division 9 Section "Stone Flooring" for stone thresholds.

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 "American National Standard Specifications for Installation of Ceramic Tile."

C. Module Size: As indicated by Architect

1.4 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:

1. Level Surfaces: > .60 Wet, >.70 Dry

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. 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.

C. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

D. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
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 square, but not fewer than 4 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.

E. Qualification Data: For qualified Installer.

F. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

G. Product Certificates: For each type of product, signed by product manufacturer.

H. Material Test Reports: For each tile-setting and -grouting product.

1.6 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain tile of each type and color or finish from one 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 one manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:

1. Stone thresholds.

2. Waterproof membrane.
3. Crack isolation membrane.
4. Joint sealants.
5. Cementitious backer units.

D. 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. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Preinstallation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.7 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.

1.8 PROJECT 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.

1.9 EXTRA MATERIALS

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.

PART 2 - PRODUCTS

2.1 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 unless otherwise indicated.

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 TCA 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.

E. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.2 TILE PRODUCTS

A. Tile Type CT-1 & CT-2: Porcelain floor tile.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.
2. Basis-of-Design Product: Subject to compliance with requirements, provide Daltile CT-1 Artico P196 and CT-2 Diamante P202 or comparable product by one of the following:

a. American Marazzi Tile, Inc.
b. American Olean; Division of Dal-Tile International Inc.
c. Daltile; Division of Dal-Tile International Inc.
d. Deutsche Steinzeug America, Inc.
e. Florida Tile Industries, Inc.
f. Florim USA.
g. Laufen.
h. Grupo Porcelanite.
i. Portobello America, Inc.
j. Seneca Tiles, Inc.
k. United States Ceramic Tile Company.

3. Module Size: 4-1/4 by 4-1/4 inches.
4. Thickness: ¼" inch.
5. Face: Pattern of design indicated, with manufacturer's standard edges.
6. Finish: Bright, opaque polished.
7. Tile Color and Pattern: As indicated on drawings.
8. Grout Color: Black.
9. Mounting: Factory, back mounted.
10. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

a. Base for Portland Cement Mortar Installations: Coved, module size 4-1/4 by 4-1/4 inches.
b. Base for Thin-Set Mortar Installations: Straight, module size 4-1/4 by 4-1/4 inches.
c. Wainscot Cap for Portland Cement Mortar Installations: Bullnose cap, module size 4-1/4 by 4-1/4 inches.
d. Wainscot Cap for Thin-Set Mortar Installations: Surface bullnose, module size 4-1/4 by 4-1/4 inches.
e. Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above it, same size as adjoining flat tile.
f. External Corners for Portland Cement Mortar Installations: Bullnose shape with radius of at least ¾ inch unless otherwise indicated.
g. External Corners for Thin-Set Mortar Installations: Surface bullnose, same size as adjoining flat tile.
h. Internal Corners: Field-butted square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.

2.3 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, in maximum lengths available to minimize end-to-end butt joints.

1. Products: Subject to compliance with requirements, provide one of the following:

a. C-Cure; C-Cure Board 990.
b. Custom Building Products; Wonderboard.

c. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
d. USG Corporation; DUROCK Cement Board.

2. Thickness: ½ inch.

2.4 WATERPROOF MEMBRANE

A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; 0.008-inch nominal thickness.

1. Products: Subject to compliance with requirements, provide the following:

a. Schluter Systems L.P.; KERDI.

C. Latex-Portland Cement: Flexible mortar consisting of cement-based mix and latex additive.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Boiardi Products; a QEP company; Elastiment 323 Cement Based Waterproofing, Anti-Fracture/Crack Suppression Membrane.
b. C-Cure; UltraCure 971.
c. MAPEI Corporation; Mapelastic (PRP 315).
d. Southern Grouts & Mortars, Inc.; Southcrete 1100.
e. TEC; a subsidiary of H. B. Fuller Company; Triple Flex Waterproofing, Crack Isolation Membrane & Mortar.

2.5 CRACK ISOLATION MEMBRANE

A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Corrugated Polyethylene: Corrugated polyethylene with dovetail-shaped corrugations and with anchoring webbing on the underside; 3/16-inch nominal thickness.

1. Products: Subject to compliance with requirements, provide the following:

a. Schluter Systems L.P.; DITRA.

2.6 SETTING MATERIALS

A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.

1. Cleavage Membrane: Asphalt felt, ASTM D 226, Type I (No. 15); or polyethylene sheeting, ASTM D 4397, 4.0 mils thick.
2. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2 by 2 inches by 0.062-inch diameter; comply with ASTM A 185 and ASTM A 82 except for minimum wire size.
3. Expanded Metal Lath: Diamond-mesh lath complying with ASTM C 847.

    a. Base Metal and Finish for Interior Applications: Uncoated or zinc-coated (galvanized) steel sheet, with uncoated steel sheet painted after fabrication into lath.
    b. Base Metal and Finish for Exterior Applications: Zinc-coated (galvanized) steel sheet.
    c. Configuration over Studs and Furring: Flat.
    d. Configuration over Solid Surfaces: Self furring.
    e. Weight: 3.4 lb/sq. yd.

4. 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.

B. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Boiardi Products; a QEP company.
b. Bonsal American; an Oldcastle company.
c. Bostik, Inc.
d. C-Cure.
e. Custom Building Products.
f. Jamo Inc.
g. Laticrete International, Inc.
h. MAPEI Corporation.
i. Southern Grouts & Mortars, Inc.
j. Summitville Tiles, Inc.
k. TEC; a subsidiary of H. B. Fuller Company.

2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.1.

C. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

1. Manufacturers: Subject to compliance with requirements,

    a. Boiardi Products; a QEP company.
    b. Bonsal American; an Oldcastle company.
    c. Bostik, Inc.
    d. C-Cure.
    e. Custom Building Products.
    f. Jamo Inc.
    g. Laticrete International, Inc.

h. MAPEI Corporation.
i. Mer-Kote Products, Inc.
j. Southern Grouts & Mortars, Inc.
k. Summitville Tiles, Inc.
l. TEC; a subsidiary of H. B. Fuller Company.

2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
3. Provide prepackaged, dry-mortar mix combined with acrylic resin liquid-latex additive at Project site.
4. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

D. Organic Adhesive: ANSI A136.1, Type I[, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Bonsal American; an Oldcastle company.
b. Bostik, Inc.
c. C-Cure.
d. Custom Building Products.
e. DAP Inc.
f. Jamo Inc.
g. Laticrete International, Inc.
h. MAPEI Corporation.
i. Southern Grouts & Mortars, Inc.
j. Summitville Tiles, Inc.
k. TEC; a subsidiary of H. B. Fuller Company.

2.7 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce color indicated.

B. Polymer-Modified Tile Grout: ANSI A118.7.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Boiardi Products; a QEP company.
b. Bonsal American; an Oldcastle company.
c. Bostik, Inc.
d. C-Cure.
e. Custom Building Products.
f. Jamo Inc.
g. Laticrete International, Inc.
h. MAPEI Corporation.
i. Southern Grouts & Mortars, Inc.

j. Summitville Tiles, Inc.
k. TEC; a subsidiary of H. B. Fuller Company.

2. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.
3. Polymer Type: Acrylic resin in liquid-latex form for addition to prepackaged dry-grout mix.

C. Grout for Pregrouted Tile Sheets: Same product used in factory to pregrout tile sheets.

2.8 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Division 7 Section 07920.

1. Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

1. Products: Subject to compliance with requirements, provide one of the following:

a. DAP Inc.; 100 percent Silicone Kitchen and Bath Sealant.
b. Dow Corning Corporation; Dow Corning 786.
c. GE Silicones; a division of GE Specialty Materials; Sanitary 1700.
d. Laticrete International, Inc.; Latasil Tile & Stone Sealant.
e. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
f. Tremco Incorporated; Tremsil 600 White.

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. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.

1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F per ASTM D 87.
2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.

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 and that does not change color or appearance of grout.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Bonsal American; an Oldcastle company; Grout Sealer.
b. Bostik, Inc.; CeramaSeal Grout & Tile Sealer.
c. C-Cure; Penetrating Sealer 978.
d. Custom Building Products; Grout Sealer.
e. Jamo Inc.; Matte Finish Penetrating Sealer.
f. MAPEI Corporation; KER 003, Silicone Spray Sealer for Cementitious Tile Grout.
g. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
h. Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.
i. TEC; a subsidiary of H. B. Fuller Company; TA-256 Penetrating Silicone Grout Sealer.

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 installed tile.

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 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. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped ¼ inch per foot toward drains.

C. 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.

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

3.3 TILE INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA 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 TCA 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 walls in wet areas.

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. 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.

E. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

   1. Porcelain FloorTile: ¼ inch.
   2. Porcelain Wall Tile: ¼ inch.

F. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

G. 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 Division 7 Section 07920.

3.4 TILE BACKING PANEL INSTALLATION

A. Install cementitious backer units and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland

cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.5 WATERPROOFING INSTALLATION

A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and 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.

3.6 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.

3.7 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove latex-portland cement 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. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.

B. 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.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.8 INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

1. Tile Installation F112: Cement mortar bed (thickset) bonded t concrete;

   a. Tile Type: As indicated by Architect
   b. Thin-Set Mortar for Cured-Bed Method: latex portland cement mortar.
   c. Grout: Standard sanded cement grout.

   Tile Installation F113: Thin-set mortar; TCA F113.

   a. Tile Type: As indicated by Architect
   b. Thin-Set Mortar: Latex-portland cement mortar.
   c. Grout: Standard sanded cement grout.

3. Tile Installation F122: Thin-set mortar on waterproof membrane; TCA F122.

   a. Tile Type: As indicated by Architect
   b. Thin-Set Mortar: Latex-portland cement mortar.
   c. Grout: Polymer-modified sanded grout.

4. Tile Installation F125A: Thin-set mortar on crack isolation membrane; TCA F125A.

   a. Tile Type: As indicated by Architect
   b. Thin-Set Mortar: Latex-portland cement mortar.
   c. Grout: Polymer-modified sanded grout.

END OF SECTION 09310

SECTION 09511
ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes acoustical panels and exposed suspension systems for ceilings.

B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete at ceilings.

1.03 DEFINITIONS

A. AC: Articulation Class.

B. CAC: Ceiling Attenuation Class.

C. LR: Light Reflectance coefficient.

D. NRC: Noise Reduction Coefficient.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Ceiling suspension system members.
2. Method of attaching hangers to building structure.
   a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
4. Minimum Drawing Scale: 1/8 inch = 1 foot.

C. Samples for Initial Selection: For components with factory-applied color finishes.

D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.

1. Acoustical Panel: Set of 6-inch- square Samples of each type, color, pattern, and texture.
2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch- long Samples of each type, finish, and color.

E. Qualification Data: For testing agency.

F. Field quality-control test reports.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.

H. Research/Evaluation Reports: For each acoustical panel ceiling and components and anchor and fastener type.

I. Maintenance Data: For finishes to include in maintenance manuals.

1.05 QUALITY ASSURANCE

A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing indicated. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.

B. Source Limitations:

1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
2. Suspension System: Obtain each type through one source from a single manufacturer.

C. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.

D. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:

1. Fire-Resistance Characteristics: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
   a. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
   b. Identify materials with appropriate markings of applicable testing and inspecting agency.
2. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class [A] [B] [C] materials as determined by testing identical products per ASTM E 84:
   a. Smoke-Developed Index: 450 or less.

E. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:

1. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
2. Seismic Zones 3 & 4."
3. UBC Standard 25-2, "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings."
4. ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.07 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings 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.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

1.08 COORDINATION

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

1.09 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.
2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.
3. Hold-Down Clips: Equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.01 ACOUSTICAL PANELS, GENERAL

A. Recycled Content: Provide acoustical panels with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 25% percent by weight.

B. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.

C. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

D. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.02 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong world Industries, "Optima, Open Plan Tegular", or a comparable product by one of the following:

1. Armstrong World Industries, Inc.
2. BPB USA.
3. Chicago Metallic Corporation.
4. Ecophon CertainTeed, Inc.
5. Tectum Inc.
6. USG Interiors, Inc.

B. Classification: Provide fire-resistance-rated panels complying with ASTM E 1264 for type, form, and pattern as follows:

1. Type and Form: Type XII, mineral base with washable finish; Form 2, nodular.
2. Pattern: fine textured, nondirectional.
3. Color: White.
4. LR: 0.9.
5. NRC: 0.95
6. CAC: NA
7. AC: 190
8. Edge/Joint Detail: Square.
9. Thickness: 1 inch.
10. Modular Size: 24 by 24 inches.
11. Antimicrobial Treatment: Inherent.

2.03 METAL SUSPENSION SYSTEMS, GENERAL

A. Recycled Content: Provide products made from steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

C. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

D. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1. 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 five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.

a. Type: Postinstalled expansion anchors.

b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.

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 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

E. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304, nonmagnetic.
3. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.

F. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

G. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch- diameter bolts.

H. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

I. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

J. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.

K. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees.

L. Impact Clips: Where indicated, provide manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.

2.04 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong, Suprafine XL FireGuard Exposed Tee or a comparable product by one of the following:

1. Armstrong World Industries, Inc.
2. BPB USA;
3. Chicago Metallic Corporation.
4. Ecophon CertainTeed, Inc.
5. USG Interiors, Inc.

B. Wide-Face, Capped, Double-Web, Fire-Rated, Hot-Dip Galvanized, G60, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, hot-dip galvanized according to ASTM A 653/A 653M, G60 coating designation, with prefinished, cold-rolled, 9/16-inch- wide.

1. Structural Classification: Heavy Duty system.
2. Face Design: Flat, flush.
3. Face Finish: Painted white.

2.05 METAL EDGE MOLDINGS AND TRIM

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

B. Products: Subject to compliance with requirements, provide one of the following:

1. Armstrong World Industries, Inc.
2. BPB USA.
3. Chicago Metallic Corporation;
4. Fry Reglet Corporation;
5. Gordon, Inc.;
6. USG Interiors, Inc.

C. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.

2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel 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 acoustical panel ceilings.

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

3.02 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.03 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.

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. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
4. 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.
5. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
6. 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 will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
7. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
8. 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.
9. Do not attach hangers to steel deck tabs.
10. Do not attach hangers to steel roof deck. Attach hangers to structural members.
11. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
12. 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. Suspend bracing from building's structural members as required for hangers, 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 of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. Arrange directionally patterned acoustical panels as follows:
   a. direction parallel to long axis of space.
2. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
4. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated.
5. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.04 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections and prepare reports:

1. Suspended ceiling system.
2. Hangers, anchors and fasteners.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.

C. Tests and Inspections: Testing and inspecting of completed installations of acoustical panel ceiling hangers and anchors and fasteners shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.

1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed.
   a. Within each test area, testing agency will select 1 of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every 2 postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf 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. Remove and replace acoustical panel ceiling hangers and anchors and fasteners that do not pass tests and inspections and retest as specified above.

3.05 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. 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.

END OF SECTION 09511

SECTION 09620

RESILIENT FLOOR TILE

PART 1.1 GENERAL

A. Description of Work

1. This specification covers the furnishing and installation of materials for resilient floor tile. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
   a. Solid vinyl floor tile.

C. Submittals

1. Product Data: For each type of product indicated.

2. Submittals:
   a. Product Data: For adhesives, sealants and chemical-bonding compounds, including printed statement of VOC content.

3. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
   a. Show details of special patterns.

4. Samples: Full-size units of each color and pattern of floor tile required.

5. Seam Samples: For seamless-installation technique indicated and for each flooring product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch (150-by-230-mm) Sample applied to a rigid backing and prepared by Installer for this Project.

6. Maintenance data.

D. Quality Assurance

1. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
   a. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

E. Delivery, Storage, and Handling

1. 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 (10 deg C) or more than 90 deg F (32 deg C). Store floor tiles on flat surfaces.

F. Project Conditions

1. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive floor tile during the following time periods:
   a. 48 hours before installation.
   b. During installation.
   c. 48 hours after installation.

2. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

3. Close spaces to traffic during floor tile installation.

4. Close spaces to traffic for 48 hours after floor tile installation.

5. Install floor tile after other finishing operations, including painting, have been completed.

PART 1.2 PRODUCTS

A. Solid Vinyl Floor Tile

1. Tile Standard: ASTM F 1700.
a. Class: Class I, monolithic vinyl tile.
b. Type: Type A, smooth surface.

2. Thickness: 0.080 inch (2.0 mm) **OR** 0.100 inch (2.5 mm) **OR** 0.120 inch (3.0 mm) **OR** 0.125 inch
(3.2 mm), **as directed**.

3. Size: 12 by 12 inches (305 by 305 mm)

4. Colors and Patterns: As selected from full range of industry colors.

B. Installation Materials

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

2. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.
a. Use adhesives that comply with the following limits for VOC content when calculated