SECTION 02010 - EROSION AND SEDIMENT CONTROL

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. Related Documents: Documents affecting work of this section include but are not necessary limited to Kentucky Storm Water General Permit, Kentucky Erosion Prevention and Sediment Control Field Guide.

1.2 SUMMARY

A. In general, the section includes all of the sediment and erosion control items needed to satisfy the regulatory authorities and may include, but not be limited to the following:

1. Sign and obtain the Notice of Intent.
2. Prepare and maintain a Best Management Practice Plan (BMP).
3. Termination of the Notice of Intent.
4. Provide a copy in PDF format of the total BMP documentation for the project records at the end of the project.

B. Related Sections include the following:

1. Division 2 Section "Earthwork" for installation of the erosion and sediment control items.

1.3 PERFORMANCE REQUIREMENTS

A. Submit Notice of Intent: Fill out, sign and submit the Notice of Intent for the Division of Water. Sample form is attached. A site demolition project has an open Notice of Intent and this contract shall transfer this Notice of Intent within 10 days of Notice to Proceed.

B. Prepare a Best Management Practice Plan (BMP): Prepare and maintain, for the each construction phase, a BMP Plan. Update periodically as site conditions change. A guideline entitled "NPDES Best Management Practices Guideline Document" is available online at http://cfpub.epa.gov/npdes/stormwater/swppp.cfm.

C. Weekly inspection of all erosion and sediment control items. Inspection is also required after rainfalls of 0.5 inches or more. Sample inspection report forms are attached.

1.4 SUBMITTALS

A. NOI: Submit NOI to KPDES Branch, Division of Water, per attached instructions. A copy of the submitted NOI form shall be sent to the Architect and the Owner.

B. BMP: Submit BMP to appropriate regulatory agency. A copy shall be sent to the Architect and the Owner.

C. Subcontractor Signatures: Signatures of all subcontractors for approval stating that they have read, understand and that they intend to comply with the BMP. A copy of the signatures shall be submitted to the Architect and the Owner.

PART 2 - PRODUCTS

PART 3 - EXECUTION

A. Continuous Service: Some of the sediment and erosion control items have been installed under a separate contract. This Contractor shall inspect and repair as needed prior to the commencement of all other construction activities on site. Continuous maintenance shall be required until the completion of the project. To transfer the Notice of Intent, a letter is to be written and signed by the new contractor within 10 days of Notice to Proceed. Once this letter has been received and approved by the Division of Water the Contractor's responsibility shall be relieved.

B. Prepare Daily Field Reports per BMP requirements. A sample form is attached. Submit to regulatory agency as required.

C. Prepare Erosion and Sediment Control Inspection and Maintenance Report Form weekly per BMP requirements. A sample form is attached. Submit to regulatory agency as required.

D. Remove temporary erosion sediment control measures when site is 95% stabilized. Seed and protect any disturbed areas with permanent grass protect mixture.

STORMWATER POLLUTION PREVENTION PLAN
INSPECTION AND MAINTENANCE REPORT FORM

KPDES Permit No._____
Project_____
Inspected By: _____ Title: _____
Date: _____ Time: _____ Weather: _____ Temp. Range: _____

Storm Water Inspection Checklist. Applies to All Areas that are Impacted by Construction			
Condition Observed	**Locations(s) or "Not Observed"**	**Corrective Action**	**Responsible / Complétion Date**
Polluant Sources			
Are there evidence of spilled materials (oil, fuel, beverage product) on ground)?			
Are there any debris piles with petroleum cans, chemical containers or other sources of possible pollution?			
Evidence of spilled materials in storm water (sheen on water, odor, unusual color, foam, sediment).			
Are there leaking pipes, pumps, valves and/or hose connections on construction equipment?			
Are there evidence of tracking on spilled materials on ground?			
Other conditions:			
Erosion Control			
Are there any bare areas which require temporary or permanent stabilization? (seeding, mulch, other?_____)			
Are all finished cut and fill slopes adequately stabilized?			
Do any structural practices show evidence of overtopping, breaks or erosion?			

Are all earthen structures seeded and mulched? Is vegetation providing adequate protection?			
Do any seeded areas require fertilizer, reseeding or additional mulch?			
Other conditions:			
Sediment Control			
Are perimeter sediment trapping measures in place and functioning properly?			
Have sediment-trapping practices been installed in the proper location and before extensive grading begins?			
Silt fences and in place and functional with no breaches.			
Is sediment leaving the site and/or damaging adjacent property?			
Is there mud on public roads or at intersections with public roads?			
Other conditions:			
Runoff Conveyance and Control			
Are all on-site drainage channels and outlets adequately stabilized? (channel lining, seeding, other_____; outlet stabilization_____)			
Are all operational storm sewer inlets protected so that sediment will not enter the system?			
Is there evidence of increased off-site erosion since the project began?			
Is there clogged storm drain?			
Are downstream waterways and property adequately protected from increases in stormwater runoff?			
Are there debris, trash, sediment, or other materials in drain structures?			

Other conditions:			
Dust Control			
Are there evidence of dust on surrounding areas, building & cars ?			
Dust suppression applications this week?			
Other conditions:			
Hazardous Material Equipment Fueling			
Broken, cracked, or leaking secondary containment.			
Missing absorbent material or other spill cleanup materials near oil or chemical storage or dispensing areas.			
Are there chemical drums without secondary containment?			
Are there chemicals dispensed, poured or used outside without containment?			
Other conditions:			
Maintenance			
Leaking construction debris dumpsters/containers.			
Do any structural practices require repair or clean-out?			
Have temporary structural practices that are no longer needed been removed?			
Is any work occurring in streams? Is channel damage being minimized? Is stabilization or a temporary stream crossing needed?			
Are there open drums (no lids or bungs) ?			

Are utility trenches being backfilled and seeded properly?			
Vehicle or equipment maintenance performed outside without cover or secondary containment.			
Wash water from vehicle or equipment washing that has potential to flow to storm drain, ditch, or ground.			
Uncovered construction debris dumpster or roll off box (without lid or cover when not in use.			
Other conditions:			

Signature of Inspector: _____ **Date:** _____

NOI FORM

NOI INSTRUCTIONS

DAILY REPORT

WEEKLY REPORT

END OF SECTION 02010

SECTION 02060 - DEMOLITION

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. Building Demolition
2. Demolition and removal of site improvements.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 2 Section "Earthwork" for soil materials, excavating, backfilling, and site grading.

1.3 DEFINITIONS

A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.

B. Existing to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by the Architect, items may be removed to a suitable, protected storage location during demolition and then cleaned and reinstalled in their original locations.

1.4 MATERIALS OWNERSHIP

A. Except for items or materials indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.

1.5 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections, for information only, unless otherwise indicated.

1. ALL BIDDERS on the Demolition Contract must be required to disclose the exact geographic location within which they propose to dispose of all demolition debris.

2. The BIDDERS must also be required to provide Official/Notarized letters from both the owner of the disposal site as well as the local government having jurisdiction acknowledging agreement to accept the demolition material.

B. Proposed dust-control measures.

C. Proposed noise-control measures.

D. Schedule of demolition activities indicating the following:

1. Detailed sequence of demolition and removal work, with starting and ending dates for each activity.

E. Landfill records for record purposes indicating receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Engage an experienced firm that has successfully completed demolition Work similar to that indicated for this Project.

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

1.7 PROJECT CONDITIONS

A. Storage or sale of removed items or materials on-site will not be permitted.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Survey existing conditions and correlate with requirements indicated to determine extent of demolition required.

B. Survey the condition of the building to determine whether removing any element might result in a structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during demolition.

C. Perform surveys as the Work progresses to detect hazards resulting from demolition activities.

3.2 UTILITY SERVICES

A. Utility Services: Contractor shall not commence demolition operations until all utility services to each building are properly removed, capped or protected.

1. Contractor shall contact each utility company, or authority and make arrangements for shut-off and discontinuance of each utility service and pay all required charges.

3.3 PREPARATION

A. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, 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 governing regulations.

B. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area.

1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
2. Protect existing site improvements, appurtenances, and landscaping to remain.
3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees where indicated to remain.

3.4 EXPLOSIVES

A. Explosives: Use of explosives will not be permitted.

3.5 POLLUTION CONTROLS

A. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.

1. Do not create hazardous or objectionable conditions, such as ice, flooding, and pollution, when using water.

B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

D. On-site storage or sale of removed items is prohibited.

E. Continuously clean public roads, walks, etc., upon which equipment travels.

END OF SECTION 02060

SECTION 02230 - SITE CLEARING

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. Protecting existing trees and vegetation to remain.
2. Removing trees and other vegetation.
3. Clearing and grubbing.
4. Topsoil stripping.
5. Removing above-grade site improvements.
6. Disconnecting, capping or sealing, and abandoning site utilities in place.
7. Disconnecting, capping or sealing, and removing site utilities.

B. Related Sections include the following:

1. Division 1 Section "Field Engineering" for verifying utility locations and for recording field measurements.
2. Division 1 Section "Construction Facilities and Temporary Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and environmental protection measures during site operations.
3. Division 2 Section "Earthwork" for soil materials, excavating, backfilling, and site grading.
4. Division 2 Section "Landscaping" for finish grading, including placing and preparing topsoil for lawns and planting.

1.3 DEFINITIONS

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inches (25 mm) in diameter; and free of weeds, roots, and other deleterious materials.

1.4 MATERIALS OWNERSHIP

A. Except for materials indicated to be stockpiled or to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from the site.

1.5 SUBMITTALS

A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing. Provide a copy to the Architct.

B. Record drawings according to Division 1 Section "Contract Closeout."

1. Identify and accurately locate capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.7 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

C. Notify utility locator service for area where Project is located before site clearing.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 2 Section "Earthwork."

1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Locate and clearly flag trees and vegetation to remain or to be relocated.

D. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TREE PROTECTION

A. Erect and maintain a temporary fence around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete.

1. Do not store construction materials, debris, or excavated material within drip line of remaining trees.
2. Do not permit vehicles, equipment, or foot traffic within drip line of remaining trees.
3. Keep area inside fence trimmed and watered.

B. Do not excavate within drip line of trees, unless otherwise indicated.

C. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

1. Cover exposed roots with burlap and water regularly.
2. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
3. Coat cut faces of roots more than 1-1/2 inches (38 mm) in diameter with an approved coating formulated for use on damaged plant tissues.
4. Cover exposed roots with wet burlap to prevent roots from drying out. Backfill with soil as soon as possible.

D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.
1. Employ a qualified arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
2. Replace trees that cannot be repaired and restored to full-growth status, as determined by the qualified arborist.

3.3 UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing when requested by Contractor.

1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.

1. Owner will arrange to shut off indicated utilities when requested by Contractor.
2. Arrange to shut off indicated utilities with utility companies.

C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.

D. Excavate for and remove underground utilities indicated to be removed.

E. Removal of underground utilities is included in Division 15 mechanical or Division 16 electrical Sections.

3.4 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
3. Completely remove stumps, roots, obstructions, and debris extending to a depth of 18 inches (450 mm) below exposed subgrade.
4. Use only hand methods for grubbing within drip line of remaining trees.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding 8-inch (200-mm) loose depth, and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Strip surface soil of unsuitable topsoil, including trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Limit height of topsoil stockpiles to 72 inches (1800 mm).
2. Do not stockpile topsoil within drip line of remaining trees.
3. Dispose of excess topsoil as specified for waste material disposal.
4. Stockpile surplus topsoil and allow for respreading deeper topsoil.

3.6 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

3.7 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 02230

SECTION 02300 - EARTHWORK

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. Geotechnical Engineering Investigation prepared by American Engineers, Inc.

SUMMARY

C. Section Includes:

This Section includes all work; labor, machinery, disposal and replacement of unsuitable soil, removal of rock and any materials encountered to plan bottom depth/ subgrade for all earthwork related items. These items shall include, but are not limited to, earthwork procedures for drives, parking lots, pavements, building foundations, footings, caissons, building slabs, utility trenches, etc.

All excavation, fill work shall be considered as unclassified with regard to type and condition with costs reflecting all expenses necessary to achieve plan bottom depth/ subgrade and all grading effort as shown on the drawings.

No change in the contract price will be considered for any materials encountered and/or required to be removed, or replaced to achieve plan bottom depth/ subgrade the earthwork requirements.

The following is a list of the items, which are included as a part of this work:

1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns, and plantings.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for slabs-on-grade.
4. Subbase course for concrete walks and pavements.
5. Base course for asphalt paving.
6. Subsurface drainage backfill for walls and trenches.
7. Excavating and backfilling trenches within building lines.
8. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.
9. Excavating and backfilling for exterior storm drainage beyond the building limits.
10. Placement of topsoil as shown on the plans.

D. Related Sections:

1. Division 1 Section "Unit Prices" for a schedule of unit prices.
2. Division 1 Section "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities; also for temporary site fencing if not in another Section.

3. Division 2 Section "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities, and protecting trees to remain.
4. Division 2 Section "Dewatering" for lowering and disposing of ground water during construction.
5. Division 2 Section "Storm Drainage" for drainage of foundations slabs-on-grade walls and landscaped areas.
6. Division 2 Section "Landscaping" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.
7. Division 2 Section "Landscaping" for finish grading in planting areas and tree and shrub pit excavation and planting.
8. Division 3 Section "Cast-in-Place Concrete" for granular course if placed over vapor retarder and beneath the slab-on-grade.
9. Divisions 2, 15, and 16 Sections for installing underground mechanical and electrical utilities and buried mechanical and electrical structures.

1.2 UNIT PRICES

A. Work of this Section can be affected by unit prices for items added or deleted from the base bid scope refer to Division 1 Section "Allowances" for quantity allowances for earth moving (if applicable)

B. Rock Measurement: Volume of rock actually removed, measured in original position, but not to exceed the following. Unit prices for rock excavation include replacement with approved materials. Refer to paragraph in bold text under Summary on page one of this section. Rock measurement is only for additions or deductions to the contract.

1. 24 inches (600 mm) outside of concrete forms other than at footings.
2. 12 inches (300 mm) outside of concrete forms at footings.
3. 6 inches (150 mm) outside of minimum required dimensions of concrete cast against grade.
4. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
5. 6 inches (150 mm) beneath bottom of concrete slabs-on-grade.
6. 6 inches (150 mm) beneath pipe in trenches, and the greater of 24 inches (600 mm) wider than pipe or 42 inches (1065 mm) wide.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. SubBase Course: Aggregate layer placed between the subgrade course base courses. Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water

D. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

E. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

F. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

G. Excavation: Removal of material encountered above plan bottom depth/subgrade elevations and to lines and dimensions indicated. For clarification, this section is only for additions or deductions to the contract.

1. Authorized Additional Excavation: Excavation below plan bottom depth/subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices changes in the Work.
2. Bulk Excavation: Excavation more than 10 feet (3 m)in width and more than 30 feet (9 m) in length.
3. Unauthorized Excavation: Excavation below plan bottom depth/subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
4. Additional Excavation: Excavation below plan bottom depth/subgrade elevations as directed by Architect. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

H. Plan bottom depth: Plan bottom depth is defined as the lowest elevation of excavation indicated on the drawings or otherwise noted. This includes bottom of excavations for foundations, utilities, roads, parking, sidewalks or required undercutting as indicated or noted on drawings or geotechnical report. Contractor shall include in bid all labor and materials required to achieve plan bottom depths as indicated.

I. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. (0.76 cu. m) for bulk excavation or 3/4 cu. yd. (0.57 cu. m) for footing, trench, and pit excavation that that exceed a standard penetration resistance of [100 blows/2 inches (97 blows/50 mm)] when tested by a geotechnical testing agency, according to ASTM D 1586 and cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- (1065-mm-) wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp (103-kW) flywheel power with bucket-curling force of not less than 28,700 lbf (128 kN) and stick-crowd force of not less than 18,400 lbf (82 kN) with extra-long reach boom; measured according to SAE J-1179.
2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp (172-kW) flywheel power and developing a minimum of 47,992-lbf (213.3-kN) breakout force with a general-purpose bare bucket; measured according to SAE J-732.

J. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

K. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

L. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, structures, drainage fill, drainage course, or topsoil materials.

M. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

N. Topsoil: ASTM D 5268, pH range of 5.5 to 7, 4 percent organic material minimum, free of stones 1 inch (25 mm) or larger in any dimension, and other extraneous materials harmful to plant growth.

1. Topsoil Source: Reuse surface soil stockpiled on the site and /or amend existing surface soil to produce topsoil. Supplement with imported topsoil when quantities are insufficient to achieve the grading effort as shown on the drawings. Clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.

O. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

A. Samples for Verification: For the following products, in sizes indicated below:

1. Geotextile: 12 by 12 inches (300 by 300 mm).
2. Warning Tape: 12 inches (300 mm) long; of each color.

B. Qualification Data: For qualified testing agency.

C. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D 2487.
2. Laboratory compaction curve according to ASTM D 698 or ASTM D 1557 as required by Geotechnical Report.
3. All reports are to be signed by a Professional Engineer with licenses to practice in the state of this project

1.5 QUALITY ASSURANCE

A. Blasting: Not allowed on this project.

B. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

C. Preexcavation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

D. Codes and Standards: Perform excavation work in compliance with aplicable requirements of authorities having jurisdiction. Prepared aggregate subbase shall comply with the Kentucky Transportation Cabinet (KTC) standard specifications, latest edition and with the local governing regulations, if more stringent than herein specified.

1.6 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until authorized by Architect.

C. Utility Locator Service: Notify "Call 811 Before You Dig" for the area where Project is located before beginning earth moving operations.

D. Do not commence earth-moving operations until temporary erosion- and sedimentation-control measures, specified in Division 2 Section 02010 "Erosion and Sediment Control " and shown on Erosion Sediment Control Plan are in place.

E. Do not commence earth-moving operations until plant-protection measures specified in Division 2 Section "Tree Protection and Trimming" are in place.

F. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.
3. Contact utility-locator service for area where Project is located before excavating.
4. Locate existing underground utilities in areas of excavation work. If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.
5. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the utility owner immediately for directions. Cooperate with Owner

and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the utility owner's satisfaction at no cost to the Owner.

G. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

H. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

I. The following practices are prohibited within tree protection zones and any areas outside construction limits:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other is digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

J. Do not direct vehicle or equipment exhaust towards protection zones.

K. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487 or a combination of these groups; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. CL and CH soils placed as recommended by Geotechnical Exploration Investigation prepared by American Engineers, Inc.

1. CL and CH with a dry density above 100, a liquid limit less than 50 and a plastic index under 30 will also be considered satisfactory.

2. Soils not meeting condition 1 shall be restricted from use as fill in the upper 3 feet of building pad/structural components.

D. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups not approved or recommended by on-site Geotechnical Engineer.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

2. All unsatisfactory soil beneath pavement, building floor slabs, and interior/exterior footings shall be remediated in accordance with the construction drawings and the Geotechnical Reports recommendations. All soil remediation actions including excavation, proof rolling, soil placement, the on-site Geotechnical Engineer shall monitor compaction, and lime modification.

E. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

F. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

G. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

H. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

I. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

J. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.

K. Sand: ASTM C 33; fine aggregate.

L. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 GEOTEXTILES

A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 157 lbf (700 N); ASTM D 4632.
3. Sewn Seam Strength: 142 lbf (630 N); ASTM D 4632.
4. Tear Strength: 56 lbf (250 N); ASTM D 4533.
5. Puncture Strength: 56 lbf (250 N); ASTM D 4833.
6. Apparent Opening Size: No. 40 (0.425-mm) sieve, maximum; ASTM D 4751.

7. Permittivity: 50 gpm per sqft per, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 247 lbf (1100 N); ASTM D 4632.
3. Sewn Seam Strength: 222 lbf (990 N); ASTM D 4632.
4. Tear Strength: 90 lbf (400 N); ASTM D 4533.
5. Puncture Strength: 90 lbf (400 N); ASTM D 4833.
6. Apparent Opening Size: No. 30 (0.6-mm) sieve, maximum; ASTM D 4751.
7. Permittivity: 0.02 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.3 CONTROLLED LOW-STRENGTH MATERIAL

A. Controlled Low-Strength Material: Self-compacting, flowable concrete material produced from the following:

1. Portland Cement: ASTM C 150, Type I.
2. Fly Ash: ASTM C 618, Class C or F.
3. Normal-Weight Aggregate: ASTM C 33, 3/8-inch (10-mm)] nominal maximum aggregate size.
4. Foaming Agent: ASTM C 869.
5. Water: ASTM C 94/C 94M.
6. Air-Entraining Admixture: ASTM C 260.

B. Produce low-density, controlled low-strength material with the following physical properties:

1. As-Cast Unit Weight: 30 to 36 lb/cu. ft. (480 to 576 kg/cu. m)) at point of placement, when tested according to ASTM C 138/C 138M.
2. Compressive Strength: 80 psi (550 kPa) 10 psi (965 kPa), when tested according to ASTM C 495.

2.4 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

B. Protect and maintain erosion and sedimentation controls during earth moving operations.

C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

D. Protect subgrades and foundation soils from freezing temperatures and frost. Provide protective insulating materials as necessary.

E. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

1. Explosives: Not Allowed on this project

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions to subgrade elevation.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:

    a. 24 inches (600 mm) outside of concrete forms other than at footings.
    b. 12 inches (300 mm) outside of concrete forms at footings.
    c. 6 inches (150 mm) outside of minimum required dimensions of concrete cast against grade.
    d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
    e. 6 inches (150 mm beneath bottom of concrete slabs-on-grade.
    f. 6 inches (150 mm) beneath pipe in trenches, and the greater of [24 inches (600 mm) wider than pipe or 42 inches (1065 mm) wide.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Pile Foundations: Stop excavations 6 to 12 inches (150 to 300 mm) above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch (25 mm). Do not disturb bottom of excavations intended as bearing surfaces.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Cut and protect roots according to requirements in Division 2 Section "Tree Protection and Trimming."

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 12 inches (300 mm) each side of pipe or conduit

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. For pipes and conduit less than 6 inches (150 mm) in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
2. For pipes and conduit 6 inches (150 mm) or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
4. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trench Bottoms: Excavate trenches 6 inches (100 mm) deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.

1. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

E. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
3. Cut and protect roots according to requirements in Division 2 Section "Tree Protection and Trimming."

3.8 SUBGRADE INSPECTION

A. Notify Architect and Geotechnical Engineer when excavations have reached required subgrade.

B. If Architect and Geotechnical Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed on site geotechnical engineer representative.

C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 25 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph (5 km/h).
2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
3. Do not proof roll wet or saturated subgrades.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Architect.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

2. No changes to contract will occur as a result of unauthorized excavation.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches (450 mm) of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 3 Section "Cast-in-Place Concrete."

D. Trenches under Roadways: Provide 6-inch- (100-mm-) thick, concrete-base slab support for piping or conduit less than 30 inches (750 mm) below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches (100 mm) of concrete before backfilling or placing roadway subbase course. Concrete is specified in Division 3 Section "Cast-in-Place Concrete.

E. Backfill voids with satisfactory soil while removing shoring and bracing.

F. Place and compact initial backfill of subbase material free of particles larger than 1 inch (25 mm) in any dimension, to a height of 12 inches (300 mm) over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

G. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches (300 mm) over the pipe or conduit.

H. Coordinate backfilling with utilities testing.

I. Place and compact final backfill of satisfactory soil to final subgrade elevation.

J. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.

K. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.13 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Refer to geotechnical report by American Engineers, Inc.

C. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.
5. Under footings and foundations, use engineered fill.
6. This does not relieve the contractor from meeting topsoil requirements. Refer to landscape specifications.

D. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.14 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698

1. Under building, scarify and re-compact top 12 inches (150 mm). Compact subgrade and fill material as follows; compact all soil materials placed beneath floor slabs and above bottom of footing elevation to **98** percent standard proctor. The moisture content shall be maintained between minus 2, plus 1 percent of optimal moisture.

2. Under, walkways, pavements and sportsfields scarify and re-compact top 6 inches (150 mm) of existing subgrade. Any soil fill placed within base of pavement section shall be

compacted to **95** percent standard proctor. The moisture content shall be maintained between minus 2, plus 1 percent of the optimal moisture

3. Under turf or unpaved areas, scarify and re-compact the top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material to 92 percent standard proctor.

D. Refer to geotechnical report.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Turf or Unpaved Areas: Plus or minus 0.1 ft.
2. Walks: Plus or minus 0.05 ft.
3. Pavements: Plus or minus 0.05 ft.
4. Sports fields : refer to sports fields specifications

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

3.17 SUBSURFACE DRAINAGE

A. Subdrainage Pipe: Specified in Division 2 Section "Subdrainage."

B. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch (150-mm) course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches (300 mm) of filter material, placed in compacted layers 6 inches (150 mm) thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches (150 mm).

1. Compact each filter material layer to 95 percent of maximum dry unit weight according to ASTM D 698 with a minimum of two passes of a plate-type vibratory compactor.

C. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches (300 mm) of final subgrade, in compacted layers 6 inches (150 mm) thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches (150 mm).

1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698 with a minimum of two passes of a plate-type vibratory compactor.

2. Place and compact impervious fill over drainage backfill in 6-inch- (150-mm-) thick compacted layers to final subgrade.

3.18 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Install separation fabric on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends where indicated on construction drawings.

B. Under pavements and walks, place subbase course on separation fabric according to fabric manufacturer's written instructions.

C. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

D. On prepared subgrade, place subbase course under pavements and walks as follows:

1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends where indicated on construction drawings.
2. Place base course material over subbase course under hot-mix asphalt pavement.
3. Shape subbase course to required crown elevations and cross-slope grades.
4. Place subbase course 6 inches (150 mm) or less in compacted thickness in a single layer.
5. Place subbase course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
6. Compact subbase course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

E. Pavement Shoulders: Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders, at least 12 inches (300 mm) wide, of satisfactory soil materials and compact simultaneously with each subbase layer to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.19 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Install sub drainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends where indicated on construction drwg's.
2. Place drainage course 6 inches (150 mm) or less in compacted thickness in a single layer.
3. Place drainage course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 100 percent of maximum dry unit weight according to ASTM D 698.

3.20 FIELD QUALITY CONTROL

A. Special Inspections and Quality Assurance: The Owner will engage a qualified testing agency perform the following special inspections:

1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
2. Determine that fill material and maximum lift thickness comply with requirements.
3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of controlled fill.
5. Prior to placement of controlled fill, observe subgrade and verify that site has been prepared properly.
6. Requirements of 2007 KBC chapter 17.

B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design-bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

E. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D698, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. (186 sq. m)or less of paved area or building slab, but in no case fewer than three tests.
2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet (30 m) or less of wall length, but no fewer than two tests.
3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet (46 m) or less of trench length, but no fewer than two tests.
4. All column footings interior and along exterior wall shall be individually tested for acceptance for bearing capacity using the dynamic cone penatration.
5. The foundation wall footings shall be tested using the dynamic cone penetration test at an interval of not less than 30'.

F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; re-compact and retest until specified compaction is obtained.

3.21 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Shall be hauled off site at the contractor's expense.

END OF SECTION 02300

SECTION 02920 – LAWNS AND GRASSES

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. Lawns
2. Topsoil and soil amendments
3. Fertilizers

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 2 Section "Earthwork"

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product certificates signed by manufacturers certifying that their products comply with specified requirements.

1. Manufacturer's certified analysis for standard products.
2. Analysis for other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
3. Label data substantiating that plants, trees, shrubs, and planting materials comply with specified requirements.

C. Certification of grass seed from seed vendor for each grass-seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for sod, identifying sod source, including name and telephone number of supplier.

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

E. Material test reports from qualified independent testing agency indicating and interpreting test results relative to compliance of the following materials with requirements indicated.

1. Analysis of existing surface soil.
2. Analysis of imported topsoil.

F. Planting schedule indicating anticipated dates and locations for each type of planting.

G. Maintenance instructions recommending procedures to be established by Owner for maintenance of landscaping during an entire year. Submit before expiration of required maintenance periods.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer with a minimum of three years experience, who has completed landscaping work similar in material, design, and extent to that indicated for this Project and with a record of successful landscape establishment.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on the Project site during times that landscaping is in progress.

B. Testing Agency Qualifications: To qualify for acceptance, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

C. Topsoil Analysis: Furnish a soil analysis made by a qualified independent soil-testing agency stating percentages of organic matter, inorganic matter (silt, clay, and sand), deleterious material, pH, and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for growth of applicable planting material. State recommended quantities of nitrogen, phosphorus, and potash nutrients and any limestone, aluminum sulfate, or other soil amendments to be added to produce a satisfactory topsoil.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.

B. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

C. Sod: Harvest, deliver, store, and handle sod according to the requirements of the American Sod Producers Association's (ASPA) "Specifications for Turfgrass Sod Materials and Transplanting/Installing."

1.6 PROJECT CONDITIONS

A. Utilities: Determine location of above grade and underground utilities and perform work in a manner which will avoid damage. Hand excavate, as required.

B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Architect before planting.

1.7 COORDINATION AND SCHEDULING

A. Coordinate installation of planting materials during normal planting seasons (March 1st- April 15th and Sept 1st- Dec. 15th.), unless authorized in writing from the owner. Sod shall be installed prior to final completion and maintained as indicated in this specification.

1.8 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

1.9 LAWN MAINTENANCE

A. Begin maintenance of lawns immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:

1. Seeded Lawns: 60 days after date of Substantial Completion.

a. When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established at that time, continue maintenance during next planting season.

2. Sodded Lawns: 60 days after date of Substantial Completion.

B. Maintain and establish lawns by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.

C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawns uniformly moist to a depth of 4 inches (100 mm). Temporary irrigation will not be in place for more than 18 months.

1. Water lawn at the minimum rate of 1 inch (25 mm) per week. Supplement natural rainfall to achieve this requirement.

2. Contractor shall pay for water based on meter usage. Owner will not pay for water.

D. Mow lawns as soon as there is enough top growth to cut with mower set at specified height for principal species planted. Repeat mowing as required to maintain specified height without cutting more than 40 percent of the grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Do not mow grass to a height less than 3" tall.

E. Postfertilization: Apply fertilizer to lawn after first mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb per 1000 sq. ft. (0.5 kg per 100 sq. m) of lawn area.

PART 2 - PRODUCTS

2.1 GRASS MATERIALS

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with the Association of Official Seed Analysts' "Rules for Testing Seeds" for purity and germination tolerances.

1. Seed Mixture: Provide seed of grass species and varieties, proportions by weight, and minimum percentages of purity, germination, and maximum percentage of weed seed as indicated on Schedules at the end of this Section.

B. Sod: Certified turfgrass sod complying with ASPA specifications for machine-cut thickness, size, strength, moisture content, and mowed height, and free of weeds and undesirable native grasses. Provide viable sod of uniform density, color, and texture of the following turfgrass species, strongly rooted, and capable of vigorous growth and development when planted.

1. Species: Provide sod of grass species and varieties, proportions by weight, and minimum percentages of purity, germination, and maximum percentage of weed seed as indicated on Schedules at the end of this Section.
2. Provide - provide minimum 3 sq-ft sample 48 hours prior to delivery for owner/SCB to inspect for acceptance.

2.2 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, 4 percent organic material minimum, free of stones 1 inch (25 mm) or larger in any dimension, and other extraneous materials harmful to plant growth.

1. Topsoil Source: Reuse surface soil on the site. Verify suitability of surface soil to produce topsoil meeting requirements and amend when necessary. Supplement with imported topsoil when quantities are insufficient. Clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.

2. Topsoil Source: Import topsoil from off-site sources or as required to meet the requirements herein. Obtain topsoil from naturally well-drained sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from bogs or marshes.
3. Soil Analysis: For each unamended soil type, furnish a soil analysis and written report by a qualified soil-testing laboratory stating percentages of organic matter, gradation of sand, silt and clay content, cation exchange capacity, sodium absorption ratio, deleterious material, pH, and mineral and plant-nutrient content of soil
4. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
5. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three representative samples shall be taken from varied locations for each soil to be used or ameded for planting purposes.
6. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. (92.9 sq. m) or volume per cu. yd. (0.76 cu. m) for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.

2.3 SOIL AMENDMENTS

A. Lime: ASTM C 602, Class T, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 (2.36 mm) sieve and a minimum 75 percent passing a No. 60 (250 micrometer) sieve.

1. Provide lime in the form of dolomitic limestone.

B. Aluminum Sulfate: Commercial grade, unadulterated.

C. Sand: Clean, washed, natural or manufactured sand, free of toxic materials.

D. Perlite: Horticultural perlite, soil amendment grade.

E. Peat Humus: Finely divided or granular texture, with a pH range of 6 to 7.5, composed of partially decomposed moss peat (other than sphagnum), peat humus, or reed-sedge peat.

F. Peat Humus: For acid-tolerant trees and shrubs, provide moss peat, with a pH range of 3.2 to 4.5, coarse fibrous texture, medium-divided sphagnum moss peat or reed-sedge peat.

G. Sawdust or Ground-Bark Humus: Decomposed, nitrogen-treated, of uniform texture, free of chips, stones, sticks, soil, or toxic materials.

1. When site treated, mix with at least 0.15 lb (2.4 kg) of ammonium nitrate or 0.25 lb (4 kg) of ammonium sulfate per cu. ft. (cu. m) of loose sawdust or ground bark.

H. Manure: Well-rotted, unleached stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

I. Herbicides: EPA registered and approved, of type recommended by manufacturer.

J. Water: Potable.

2.4 FERTILIZER

A. Bonemeal: Commercial, raw, finely ground; minimum of 4 percent nitrogen and 20 percent phosphoric acid.

B. Superphosphate: Commercial, phosphate mixture, soluble; minimum of 20 percent available phosphoric acid.

C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea-form, phosphorous, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

D. Slow-Release Fertilizer: Granular fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

PART 3 - EXECUTION

3.1 EXAMINATION

A. The Contractor shall examine areas to receive landscaping for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected. No installation of landscaping materials or topsoil shall be done while the soil is either frozen or water saturated.

3.2 LAWN PLANTING PREPARATION

A. Limit subgrade preparation to areas that will be planted in the immediate future.

B. Loosen subgrade to a minimum depth of 4 inches (100 mm). Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous materials.

C. Spread planting soil mixture to depth required to meet thickness, grades, and elevations shown, after light rolling and natural settlement. Lawn areas shall receive minimum of 6" of topsoil and more if indicated on drawings. Sport field turf areas shall receive minimum of 12" topsoil – Refer to sports field drawings and specifications for additional information. Do not spread if planting soil or subgrade is frozen.

1. Place approximately 1/2 the thickness of planting soil mixture required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil mixture.
2. Allow for sod thickness in areas to be sodded.

D. Preparation of Unchanged Grades: Where lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare soil as follows:

1. Remove and dispose of existing grass, vegetation, and turf. Do not turn over into soil being prepared for lawns.
2. Till surface soil to a depth of at least 6 inches (150 mm). Apply required soil amendments and initial fertilizers and mix thoroughly into top 4 inches (100 mm) of soil. Trim high areas and fill in depressions. Till soil to a homogenous mixture of fine texture.
3. Clean surface soil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.
4. Remove waste material, including grass, vegetation, and turf, and legally dispose of it off the Owner's property.

E. Grade lawn and grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future. Remove trash, debris, stones larger than 1 inch in any dimension, and other objects that may interfere with planting or maintenance operations.

F. Moisten prepared lawn areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

G. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.

3.3 SEEDING NEW LAWNS

A. Sow seed with a spreader or a seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in 2 directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.

B. Sow seed at the following rate:

1. Seeding Rate: 5 to 8 lb per 1000 sq. ft. (2.5 to 4 kg per 100 sq. m).

C. Rake seed lightly into top 1/8 inch (3 mm) of topsoil, roll lightly, and water with fine spray.

D. Protect seeded slopes exceeding 1:4 against erosion with erosion-control blankets installed and stapled according to manufacturer's recommendations.

E. Protect seeded slopes exceeding 1:6 against erosion with jute or coir-fiber erosion-control mesh installed and stapled according to manufacturer's recommendations.

F. Protect seeded areas with slopes less than 1:6 against erosion by spreading straw mulch after completion of seeding operations. Spread uniformly at a minimum rate of 2 tons per acre (45 kg per 100 sq. m) to form a continuous blanket 1-1/2 inches (38 mm) loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.

1. Anchor straw mulch by crimping into topsoil by suitable mechanical equipment.

G. Protect seeded areas against hot, dry weather or drying winds by applying peat mulch within 24 hours after completion of seeding operations. Soak and scatter uniformly to a depth of 3/16 inch (4.8 mm) thick and roll to a smooth surface.

3.4 SODDING NEW LAWNS

A. Lay sod within 24 hours of stripping. Do not lay sod if dormant or if ground is frozen.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod across angle of slopes exceeding 1:3.
2. Anchor sod on slopes exceeding 1:6 with wood pegs spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.

C. Saturate sod with fine water spray within 2 hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below the sod.

3.5 RECONDITIONING LAWNS

A. Recondition existing lawn areas damaged by Contractor's operations, including storage of materials or equipment and movement of vehicles. Also recondition lawn areas where settlement or washouts occur or where minor regrading is required.

1. Recondition other existing lawn areas.

B. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury into soil. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.

C. Where substantial lawn remains, mow, dethatch, core aerate, and rake. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

D. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of it off the Owner's property.

E. Till stripped, bare, and compacted areas thoroughly to a depth of 6 inches (150 mm).

F. Apply required soil amendments and initial fertilizers and mix thoroughly into top 4 inches (100 mm) of soil. Provide new planting soil as required to fill low spots and meet new finish grades.

G. Apply seed and protect with straw mulch as required for new lawns.

H. Apply sod as required for new lawns.

I. Water newly planted areas and keep moist until new grass is established.

3.6 CLEAN-UP AND PROTECTION

A. During landscaping, keep pavements clean and work area in an orderly condition.

B. Protect landscaping from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

3.7 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of it off the Owner's property.

3.8 SEEDING SCHEDULE

A. **Lawn Area Sod Mix:** Seed shall be a blend of Turf Type Tall Fescue with annual rye: Provide a minimum of two types of Turf Type Fescue from the following list with Falcon II, Houndog 5, Finelawn Petite, Crossfire II or as recommended by local county extension agent.

3.18 SEED MIXTURES SCHEDULE

Proportion	Name	Min. Pct. Germ.	Min. Pct. Pure Sd.	Max. Pct. Weed Sd.
90 pct.	Turf Type Fescue	85	85	0.50
10 pct.	Annual Rye Grass	85	90	0.50

3.19 SATISFACTORY TURF

A. At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 95% over any 10 sq. ft. and bare spots not exceeding 2" by 2". Contractor will not be paid until acceptable turf is established.

B. Contractor shall notify Landscape Architect and Owner when maintenance period is complete and solid stand of grass is established. The purpose of this notification is to ensure there is no lapse between contractor maintenance and date when Owner accepts and takes over maintenance of lawn areas. Contractor shall provide notification and maintenance acceptance letter for approval and shall not stop maintenance operations until acceptance letter is signed by Owner.

END OF SECTION 02900

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 metal fabrications:

1. Rough hardware.
2. Loose bearing and leveling plates.
3. Loose steel lintels.
4. Shelf and relieving angles.
5. Miscellaneous framing and supports for the following:
   a. Applications where framing and supports are not specified in other sections.
6. Miscellaneous steel trim.
7. Pipe assemblies for acoustical specialties and suspended grids

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage, adjacent materials and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.

C. Samples representative of materials and finished products as may be requested by Architect.

D. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Firm experienced in producing metal fabrications similar to those indicated for this Project with a record of successful in-service performance, and with sufficient production capacity to produce required units without delaying the Work.

B. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel," AWS D1.2 "Structural Welding Code--Aluminum," and AWS D1.3 "Structural Welding Code--Sheet Steel."

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

Comment [COMMENT1]: MASTERSPEC text, Copyright 1993, AIA, The American Institute of Architects

Comment [COMMENT2]: Paragraph number formatting method, Copyright 1988, ARCOM, Architectural Computer Services, Inc.

Comment [COMMENT3]: THIS SECTION WAS SEARCHED FOR REQUIREMENTS INVOLVING INCH-POUND UNITS. IF SUCH UNITS WERE FOUND, THE APPROPRIATE METRIC UNITS WERE ADDED, INCLUDING ANY METRIC EDITIONS OF REFERENCED STANDARDS ISSUED SINCE THE SECTION WAS PREVIOUSLY ISSUED. NO EVALUATION WAS MADE OF ADDED REFERENCED STANDARDS TO DETERMINE OTHER EFFECTS ON THIS SECTION. EXCEPT FOR ADDING METRICATION, NO OTHER REVISIONS WERE MADE.

Comment [COMMENT4]: THIS SECTION USES THE TERM ARCHITECT. CHANGE THIS TERM AS NECESSARY TO MATCH THE ACTUAL TERM USED TO IDENTIFY THE DESIGN PROFESSIONAL AS DEFINED IN THE GENERAL AND SUPPLEMENTARY CONDITIONS.

Comment [COMMENT5]: ADJUST LIST BELOW TO SUIT PROJECT.

Comment [COMMENT6]: REVISE BELOW TO LIST SPECIFIC PRODUCTS FOR WHICH PRODUCT DATA MUST BE SUBMITTED.

Comment [COMMENT7]: RETAIN BELOW IF PROCEDURES FOR CERTIFICATION OF WELDERS ARE INCLUDED UNDER QUALITY ASSURANCE ARTICLE.

Comment [COMMENT8]: RETAIN BELOW IF INSTALLER CERTIFICATION REQUIRED UNDER QUALITY ASSURANCE ARTICLE.

1.5 PROJECT CONDITIONS

A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating products without field measurements. Coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

Comment [COMMENT9]: DELETE BELOW IF NOT ALLOWED.

PART 2 - PRODUCTS

2.1 FERROUS METALS

A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

B. Steel Plates, Shapes, and Bars: ASTM A 36 (ASTM A 36M).

C. Rolled Steel Floor Plates: ASTM A 786 (ASTM A 786M).

D. Steel Tubing: Product type (manufacturing method) and as follows:

1. Cold-Formed Steel Tubing: ASTM A 500.
2. Hot-Formed Steel Tubing: ASTM A 501.

a. For exterior installations and where indicated, provide tubing with hot-dip galvanized coating per ASTM A 53.

Comment [COMMENT10]: RETAIN MATERIAL TYPES, QUALITIES, AND GRADES BELOW THAT ARE INDICATED IN THE SPECIFICATION OR ON THE DRAWINGS FOR EACH FABRICATION TYPE. ADD OR DELETE TO SUIT PROJECT REQUIREMENTS.

Comment [COMMENT11]: REVISE BELOW AS REQUIRED.

E. Steel Pipe: ASTM A 53, standard weight (schedule 40), unless otherwise indicated, or another weight required by structural loads.

1. Black finish, unless otherwise indicated.
2. Galvanized finish for exterior installations and where indicated.

Comment [COMMENT12]: DELETE ABOVE OR BELOW IF NOT APPLICABLE. REVISE IF GALVANIZED FINISH REPRESENTS DEFAULT FINISH AND BLACK FINISH OCCURS ONLY WHERE INDICATED.

F. Gray-Iron Castings: ASTM A 48, Class 30.

G. Malleable-Iron Castings: ASTM A 47, Grade 32510 (ASTM A 47M, Grade 22010).

Comment [COMMENT13]: REVISE ABOVE AND BELOW IF ANOTHER CLASS OR GRADE IS REQUIRED FOR STRUCTURAL REASONS.

H. Handrail Wall Brackets: Provide Model No. 4E96 as manufactured by J.G. Braun or approved equal.

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

Comment [COMMENT14]: DELETE BELOW IF NOT APPLICABLE. IF RETAINED, VERIFY SAFETY FACTOR WITH PROJECT'S STRUCTURAL ENGINEER.

2.2 PAINT

A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements of FS TT-P-664, selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint 20.

Comment [COMMENT15]: CORRELATE PRIMER SELECTION WITH PAINT AND SPECIAL COATING SYSTEMS SPECIFIED IN DIVISION 9 SECTIONS "PAINTING" AND "SPECIAL COATINGS" FOR APPLICATION OVER PRIMED FERROUS METAL PRODUCTS SPECIFIED IN THIS SECTION. INSERT PRODUCT NAMES IF REQUIRED.

Comment [COMMENT16]: DELETE BELOW IF NO GALVANIZED FABRICATIONS.

2.3 FASTENERS

A. General: Provide plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating, for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568, Property Class 4.6), with hex nuts, ASTM A 563 (ASTM A 563M), and, where indicated, flat washers.

Comment [COMMENT17]: DELETE BELOW IF NO DETAILED FASTENING REQUIREMENTS. RETAIN FOR COMPLEX WORK.

C. Machine Screws: ANSI B18.6.3 (ANSI B18.6.7M).

D. Lag Bolts: ANSI B18.2.1 (ANSI B18.2.3.8M).

E. Wood Screws: Flat head, carbon steel, ANSI B18.6.1.

F. Plain Washers: Round, carbon steel, ANSI B18.22.1 (ANSI B18.22M).

G. Lock Washers: Helical, spring type, carbon steel, ANSI B18.21.1.

H. 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 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 agency.

1. Material: Carbon steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Group 1 alloy 304 or 316 stainless-steel bolts and nuts complying with ASTM F 593 (ASTM F 738M) and ASTM F 594 (ASTM F 836M).

Comment [COMMENT18]: ABOVE AND BELOW ARE EXAMPLES ONLY. ABOVE PROTECTS AGAINST CORROSION FROM AN INDOOR ATMOSPHERE. REVISE TO SUIT OTHER CONDITIONS AFTER VERIFYING AVAILABILITY OF THICKER COATINGS.

I. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as required.

2.4 GROUT

A. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.

B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

Comment [COMMENT19]: RETAIN BELOW FOR HEAVY-DUTY GROUTING APPLICATIONS. DO NOT USE IN WET AREAS OR ON EXTERIOR.

Comment [COMMENT20]: RETAIN BELOW FOR GROUTING APPLICATIONS WHERE NONSTAINING GROUT IS REQUIRED.

C. Products: Subject to compliance with requirements, provide one of the following:

Comment [COMMENT21]: SEE EDITING INSTRUCTION NO. 1 IN THE EVALUATIONS FOR CAUTIONS ABOUT NAMING PRODUCTS AND MFRS.

1. Nonshrink, Metallic Grouts:

   a. Supreme Plus; Cormix Construction Chemicals.
   b. Hi Mod Grout; Euclid Chemical Co.
   c. Embeco 885 and 636; Master Builders Technologies, Inc.
   d. Ferrolith G Redi-Mix and G-NC; Sonneborn Building Products--ChemRex, Inc.
   e. Met-ox; The Spray-Cure Company.

2. Nonshrink, Nonmetallic Grouts:

   a. B-6 Construction Grout; W. R. Bonsal Co.
   b. Diamond-Crete Grout; Concrete Service Materials Co.
   c. Supreme; Cormix Construction Chemicals.
   d. Sure-grip High Performance Grout; Dayton Superior Corp.
   e. Euco N-S Grout; Euclid Chemical Co.
   f. Five Star Grout; Five Star Products.
   g. Vibropruf #11; Lambert Corp.
   h. Crystex; L & M Construction Chemicals, Inc.
   i. Masterflow 928 and 713; Master Builders Technologies, Inc.
   j. Sealtight 588 Grout; W. R. Meadows, Inc.
   k. Sonogrout 14; Sonneborn Building Products--ChemRex, Inc.
   l. Kemset; The Spray-Cure Company.

2.5 CONCRETE FILL

Comment [COMMENT22]: DELETE THIS ARTICLE IF NOT REQUIRED FOR CONCRETE-FILLED BOLLARDS OR WHEEL GUARDS.

A. Concrete Materials and Properties: Comply with requirements of Division 3 Section "Concrete Work" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa), unless higher strengths are indicated.

2.6 FABRICATION, GENERAL

A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

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

Comment [COMMENT23]: BELOW IS INTENDED FOR EXTERIOR METALWORK. REVISE TO SUIT PROJECT CONDITIONS AND METALWORK EXPOSURE.

C. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.

Comment [COMMENT24]: REVISE TEMPERATURE RANGE TO SUIT CONDITIONS AT PROJECT LOCATION.

1. Temperature Change (Range): 100 deg F (55.5 deg C).

D. Shear and punch metals cleanly and accurately. Remove burrs.

E. Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

F. Remove sharp or rough areas on exposed traffic surfaces.

G. 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 that no roughness shows after finishing, and contour of welded surface matches those adjacent.

H. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

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

J. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. 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.

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

L. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

2.7 ROUGH HARDWARE

A. Furnish bent, or otherwise custom-fabricated, bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 Sections.

B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts that bear on wood structural connections, and furnish steel washers elsewhere.

2.8 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of the required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

2.9 LOOSE STEEL LINTELS

A. Fabricate loose structural steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Provide all lintels required at all openings whether noted in the Lintel Schedule or not.

B. Weld adjoining members together to form a single unit where indicated or required.

C. Size loose lintels for equal bearing of not less than 8 inches (200 mm) bearing at each side of openings, unless otherwise indicated.

Comment [COMMENT25]: DELETE BELOW IF BEARING LENGTHS ARE INDICATED ON DRAWINGS OR SCHEDULES.

D. Galvanize loose steel lintels located in exterior walls.

2.10 SHELF AND RELIEVING ANGLES

A. Fabricate shelf and relieving angles from steel angles of sizes indicated and for attachment to concrete framing. Provide slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and not more than 24 inches (600 mm) o.c., unless otherwise indicated.

B. For cavity walls, provide vertical channel brackets to support shelf/relieving angles from back-up masonry and concrete. Align expansion joints in angles with indicated control and expansion joints in cavity wall exterior wythe.

C. Galvanize shelf angles to be installed on exterior concrete framing.

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

Comment [COMMENT26]: DELETE BELOW IF NONE. SHELF ANGLES CONNECTED TO STRUCTURAL STEEL FRAMING ARE SPECIFIED WITH THAT WORK IN ANOTHER DIVISION 5 SECTION.

2.11 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports for applications indicated that are not a part of structural steel framework as required to complete the Work.

B. Fabricate units to sizes, shapes, and profiles indicated and required to receive other adjacent construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.

a. Except as otherwise indicated, space anchors 24 inches (600 mm) o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches (32 mm) wide by 1/4

inch (6 mm) thick by 8 inches (200 mm) long.

C. Galvanize miscellaneous framing and supports in the following locations:

1. Exterior locations.
2. Interior locations where indicated.

D. Pipe Assemblies: Schedule 40 -1½" I.D. steel pipe battens required to support acoustical cloud panels, and lighting assemblies, refer to project drawings and coordinate with Acoustic Specialties. Paint assembly per Division 9. Provide ½" allthread suspension with pipe hangers with mechanical attachment to structure above, suspension system to be plumb, equal lengths, and finished to match pipe grid. Paint pipes, hangers and allthread. Size pipe hangers as recommended by manufacturer for pipe diameter designed. Provide miscellaneous angle framing at underside of structure as required for suspended pipe grid supports. Finished assembly painted. Space suspension equally.

Comment [COMMENT27]: BELOW ARE SAMPLE REQUIREMENTS, REVISE TO SUIT SPECIFIC PROJECT REQUIREMENTS. ADD SIMILAR PROVISIONS FOR OTHER SUPPORTS, SUCH AS FOR OPERABLE PARTITIONS, OVERHEAD DOORS, ETC. SIZE SUPPORTS AND BRACING BASED ON RECOMMENDATIONS OF MFR OF ITEM BEING SUPPORTED. INSERT REQUIREMENTS FOR OTHER SPECIFIC APPLICATIONS.

Comment [COMMENT28]: DELETE ABOVE IF NO EXTERIOR FRAMING AND SUPPORTS. RETAIN BELOW (WITH OR WITHOUT ABOVE) WITH A QUALIFYING PHRASE IF ONLY SELECTED INTERIOR FRAMING AND SUPPORTS ARE GALVANIZED AND LOCATIONS ARE INDICATED ON THE DRAWINGS, OR DELETE THE QUALIFYING PHRASE IF ALL INTERIOR FRAMING AND SUPPORTS ARE GALVANIZED.

2.8 MISCELLANEOUS STEEL TRIM

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

B. Provide cutouts, fittings, and anchorages as required to coordinate assembly and installation with other work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6 inches (150 mm) from each end, 6 inches (150 mm) from corners, and 24 inches (600 mm) o.c., unless otherwise indicated.

C. Galvanize miscellaneous steel trim in the following locations:

1. Exterior locations.
2. Interior locations where indicated.

Comment [COMMENT29]: DELETE ABOVE IF NO EXTERIOR TRIM. RETAIN BELOW (WITH OR WITHOUT ABOVE) WITH A QUALIFYING PHRASE IF ONLY SELECTED INTERIOR TRIM IS GALVANIZED AND LOCATIONS ARE INDICATED ON THE DRAWINGS, OR DELETE THE QUALIFYING PHRASE IF ALL INTERIOR TRIM IS GALVANIZED.

2.15 FINISHES, GENERAL

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designing finishes.
D. Finish metal fabrications after assembly.

2.16 STEEL AND IRON FINISHES

A. Galvanizing: For those items indicated for galvanizing, apply zinc coating by the hot-dip process complying with the following requirements:

1. ASTM A 153 for galvanizing iron and steel hardware.
2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch (0.76 mm) thick or thicker.

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): SSPC-SP 6 "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 3 "Power Tool Cleaning."

E. Apply shop primer to uncoated surfaces of metal fabrications, including those with galvanized finishes, unless otherwise indicated. Comply with requirements of SSPC-PA 1 "Paint Application Specification No. 1" for shop painting.

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

D. **All interior and exterior, non-prefinished, steel will be shop primed.** Any steel delivered to site not complying with this requirement will be returned at no additional cost to Owner.

Comment [COMMENT30]: RETAIN OR REVISE BELOW TO SUIT PROJECT SERVICE CONDITIONS OF INSTALLED WORK. INSERT OTHER EXPOSURES AND PREPARATION REQUIREMENTS WHERE APPLICABLE. REFER TO SSPC SPECIFICATION REFERENCED. BOTH OF BELOW APPLY TO LOCATIONS THAT WOULD NORMALLY REMAIN DRY IN SERVICE.

Comment [COMMENT31]: DELETE BELOW IF NOT REQUIRED. STRIPE PAINTING ADDS COST BUT HELPS ENSURE THAT HARD-TO-REACH AREAS, SUCH AS CREVICES, INSIDE CORNERS, AND WELDS, ARE THOROUGHLY COATED AND THAT SHARP EDGES (WHICH ARE VULNERABLE TO CHIPPING, AND WHERE THE FILM MAY BE THINNER, DUE TO SURFACE TENSION) RECEIVE ADEQUATE COVERAGE.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installing anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

B. Set sleeves in concrete with tops flush with finish surface elevations. Protect sleeves from water and concrete entry.

3.2 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

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

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

D. 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 the surfaces of exterior units that have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.

E. 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 that no roughness shows after finishing, and contour of welded surface matches those adjacent.

3.3 SETTING LOOSE PLATES

Comment [COMMENT32]: DELETE BELOW IF NO ALUMINUM.

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

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

1. Use nonshrink, metallic grout 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.

Comment [COMMENT33]: DELETE BELOW IF NOT REQUIRED.

3.4 ADJUSTING AND CLEANING

Comment [COMMENT34]: NOTE THE FOLLOWING 2 PARAS FOR PAINTING ERECTED MISCELLANEOUS STEEL ITEMS. SELECT THE ONE THAT BEST RELATES TO LOCAL PRACTICES, OR REVISE TO SUIT PROJECT.

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

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

Comment [COMMENT35]: RETAIN BELOW IF ON-SITE PAINTING IS TO BE INCLUDED IN MISCELLANEOUS METALWORK.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of the shop paint on miscellaneous metal is specified in Division 9 Section "Painting."

Comment [COMMENT36]: RETAIN BELOW IF ON-SITE PAINTING IS TO BE INCLUDED IN DIVISION 9 SECTION "PAINTING." REVISE REFERENCE IF ANOTHER DIVISION 9 SECTION SUCH AS "SPECIAL COATINGS" APPLIES INSTEAD.

C. For galvanized surfaces, clean welds, bolted connections, and abraded areas, and apply galvanizing repair paint to comply with ASTM A 780.

END OF SECTION 05500

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

RELATED DOCUMENTS

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

SUMMARY

This Section includes the following:

Wood grounds, nailers, and blocking
Sheathing

Related Sections: The following Sections contain requirements that relate to this Section:

Prefabricated equipment bases and support curbs are specified in a Division 15 section.

DEFINITIONS

Rough carpentry includes carpentry work not specified as part of other Sections and generally not exposed, unless otherwise specified.

SUBMITTALS

General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

Material certificates for dimensional lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use as well as design values approved by the Board of Review of American Lumber Standards Committee.

Wood treatment data as follows including chemical treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material:

For each type of preservative treated wood product include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.

For water-borne treated products include statement that moisture content of treated materials was reduced to levels indicated prior to shipment to project site.

For fire-retardant-treated wood products include certification by treating plant that treated material complies with specified standard and other requirements.

Warranty of chemical treatment manufacturer for each type of treatment.

QUALITY ASSURANCE

DELIVERY, STORAGE, AND HANDLING

Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.

For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 - PRODUCTS

LUMBER, GENERAL

Lumber Standards: Furnish lumber manufactured to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

Inspection Agencies: Inspection agencies and the abbreviations used to reference them with lumber grades and species include the following:

RIS - Redwood Inspection Service.
NLGA - National Lumber Grades Authority (Canadian).
SPIB - Southern Pine Inspection Bureau.
WCLIB - West Coast Lumber Inspection Bureau.
WWPA - Western Wood Products Association.

Grade Stamps: Provide lumber with each piece factory-marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

For exposed lumber furnish pieces with grade stamps applied to ends or back of each piece; or omit grade stamps entirely and provide certificates of grade compliance issued by inspection agency.

Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.

Provide dressed lumber, S4S, unless otherwise indicated.

Provide seasoned lumber with 19 percent maximum moisture content at time of dressing and shipment for sizes 2 inches or less in nominal thickness, unless otherwise indicated.

DIMENSION LUMBER

For light framing provide "Stud," "No. 3," or "Standard" grade lumber for stud framing (2 to 4 inches thick, 2 to 4 inches wide, 10 feet and shorter) and "Stud" or "No. 3" grade for other light framing (2 to 4 inches thick, 2 to 6 inches wide), any species.

For light framing (2 to 4 inches thick, 2 to 4 inches wide) provide the following grade and species: "Standard" grade. Southern Pine graded under SPIB rules.

MISCELLANEOUS LUMBER

General: Provide lumber for support or attachment of other construction including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.

Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.

Moisture content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.

Grade: "Standard" grade light-framing-size lumber of any species or board-size lumber as required. "No. 3 Common" or "Standard" grade boards per WCLIB or WWPA rules or "No. 2 Boards" per SPIB rules.

CONSTRUCTION PANELS FOR BACKING

Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with grade designation, APA C-D PLUGGED EXPOSURE 1, in thickness indicated, or, if not otherwise indicated, not less than 15/32 inch.

FASTENERS

General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of AISI Type 304 stainless steel.

Nails, Wire, Brads, and Staples: FS FF-N-105.
Power Driven Fasteners: National Evaluation Report NER-272.

Wood Screws: ANSI B18.6.1.

Lag Bolts: ANSI B18.2.1.

Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and where indicated, flat washers.

METAL FRAMING ANCHORS

General: Provide metal framing anchors of type, size, metal, and finish indicated that comply with requirements specified including the following:

Use galvanized steel framing anchors for rough carpentry exposed to weather, in ground contact, or in area of high relative humidity, and where indicated.

PRESERVATIVE WOOD TREATMENT BY PRESSURE PROCESS

General: Where lumber or plywood is indicated as preservative- treated wood or is specified herein to be treated, comply with applicable requirements of AWPA Standards C2 (Lumber) and C9 (Plywood). Mark each treated item with the AWPB or SPIB Quality Mark Requirements.

Pressure-treat above-ground items (Not Required to be Fire Retardant Treated) with water-borne preservatives to a minimum retention of 0.25 pcf. For interior uses, after treatment, kiln-dry lumber and plywood to a maximum moisture content, respectively, of 19 percent and 15 percent. Treat indicated items and the following:

Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete. Wood framing members less than 18 inches above grade.

FIRE-RETARDANT TREATMENT BY PRESSURE PROCESS

General: Where fire-retardant-treated ("FRT") wood is indicated or required, pressure impregnate lumber and plywood with fire-retardant chemicals to comply with AWPA C20 for lumber, and C27 for plywood, for treatment type indicated; identify "fire-retardant-treated wood" with appropriate classification marking of Underwriters Laboratories, Inc., U.S. Testing, Timber Products Inspection, Inc. or other testing and inspecting agency acceptable to authorities having jurisdiction.
Each piece of fire retardant treated lumber and plywood shall bear an Underwriter's Laboratory Label or imprint testing to this rating. Fire retardant treated lumber shall be kiln dried after treatment to a maximum moisture content of 19% and plywood shall kiln dried to a maximum moisture content of 15%. Fire retardant chemicals used to treat lumber and plywood shall be Halogen-and Sulfate free. The treated wood shall remain dry (below fiber saturation) in relatively humidity exposures up to 95%.

Current Evaluation/Research Reports: Provide fire-retardant- treated wood for which a current model code evaluation/research report exists that is acceptable to authorities having jurisdiction and that evidences compliance of fire-retardant- treated wood for application indicated.

Interior Type A: For interior locations use fire-retardant chemical formulation that produces treated lumber and plywood with
the following properties under conditions present after installation:

No reduction shall take place in bending strength, stiffness, and fastener holding capacities below values published by manufacturer of chemical formulation that are based on tests by a qualified independent testing laboratory of treated wood products identical to those indicated for this Project under elevated temperature and humidity conditions simulating installed conditions.

No other form of degradation shall occur due to acid hydrolysis or other causes related to manufacture and treatment.

No corrosion of metal fasteners shall result from their contact with treated wood.

Products: Subject to compliance with requirements, provide one of the following:

Interior Type A Fire-Retardant-Treated Wood:

"Dricon," Hickson Corporation.
"Pyro-Guard," Hoover Treated Wood Products.
"Flameproof LHC-HTT," Osmose Wood Preserving Co, Inc.

PART 3 - EXECUTION

INSTALLATION, GENERAL

GN-1 All wood blocking, nailers, sill plates, etc. in contact with slabs-on-grade or below-grade masonry or concrete shall be pressure-preservative treated (P.T.). Refer to the drawings for other locations where P.T. wood is required.

GN-2 All P.T. wood components shall be separated from contact with adjacent metals with permanently affixed No. 15 felt, self-adhering elastomeric membrane, or other such permanent non-corrosive separation material.
GN-3 All anchors, fasteners, etc. in contact with P.T. wood components shall be stainless steel or G-90 (min.) hot-dipped galvanized.

Discard units of material with defects that impair quality of rough carpentry construction and that are too small to use in fabricating rough carpentry with minimum joints or optimum joint arrangement.

Set rough carpentry to required levels and lines, with members plumb and true to line and cut and fitted.

Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.

Securely attach rough carpentry work to substrate by anchoring and fastening as indicated.

Countersink nail heads on exposed carpentry work and fill holes.

Use common wire nails, unless otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.

WOOD GROUNDS, NAILERS, BLOCKING, FURRING, AND SLEEPERS

Install wood grounds, nailers, blocking, and sleepers where shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.

Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

Install wood furring plumb and level with closure strips at edges and openings. Shim with as required for tolerance of finished work.

Furring to Receive Plywood Paneling: Install 1-inch by 3-inch furring at 2 feet o.c., horizontally and vertically. Select furring for freedom from knots capable of producing bent-over nails and resulting damage to paneling.

Install framing members of size and spacing indicated.

END OF SECTION 06100

SECTION 08410 - ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following types of aluminum entrance, storefront, and curtainwall work:

1. Vestibule doors.
2. Storefront-type framing system.

B. Related Sections: The following sections contain requirements that relate to this Section:

1. Glazing requirements for aluminum entrances and storefront, including entrances specified to be factory glazed, are included in Division 8 Section "Glazing."
2. Finish Hardware is included in Division 8 Section "Finish Hardware."

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. General: Provide aluminum entrance and storefront assemblies that comply with performance characteristics specified, as demonstrated by testing the manufacturer's corresponding stock assemblies according to test methods indicated.

B. Thermal Movement: Design the aluminum entrance and storefront framing systems to provide for expansion and contraction of the component materials. Entrance doors shall function normally over the specified temperature range.

1. The system shall be capable of withstanding a metal surface temperature range of 180 deg F (100 deg C) without buckling, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, stress on glass, or other detrimental effects.

C. Design Requirements: Provide aluminum entrance and storefront systems that comply with structural performance, air infiltration, and water penetration requirements indicated.

1. Wind Loads: Provide aluminum entrance and storefront assemblies capable of withstanding wind pressures of 20 psf (958 Pa) inward and 20 psf (958 Pa) outward acting normal to the plane of the wall.

D. Structural Performance: Conduct tests for structural performance in accordance with ASTM E 330. At the conclusion of the tests there shall be no glass breakage or permanent damage to fasteners, anchors, hardware or actuating mechanism. Framing members shall have no permanent deformation in excess of 0.2 percent of their clear span.

Comment [COMMENT1]: MASTERSPEC text, Copyright 1990, AIA, The American Institute of Architects

Comment [COMMENT2]: Paragraph number formatting method, Copyright 1988, ARCOM, Architectural Computer Services, Inc.

Comment [COMMENT3]: THIS SECTION WAS SEARCHED FOR REQUIREMENTS INVOLVING INCH-POUND UNITS. IF SUCH UNITS WERE FOUND, THE APPROPRIATE METRIC UNITS WERE ADDED, INCLUDING ANY METRIC EDITIONS OF REFERENCED STANDARDS ISSUED SINCE THE SECTION WAS PREVIOUSLY ISSUED. NO EVALUATION WAS MADE OF ADDED REFERENCED STANDARDS TO DETERMINE OTHER EFFECTS ON THIS SECTION. EXCEPT FOR ADDING METRICATION, NO OTHER REVISIONS WERE MADE.

Comment [COMMENT4]: THIS SECTION USES THE TERM "ARCHITECT." CHANGE THIS TERM AS NECESSARY TO MATCH THE ACTUAL TERM USED TO IDENTIFY THE DESIGN PROFESSIONAL AS DEFINED IN THE GENERAL AND SUPPLEMENTARY CONDITIONS.

Comment [COMMENT5]: DELETE PRODUCT TYPES NOT REQUIRED FROM THE LIST BELOW.

Comment [COMMENT6]: REVISE THE LIST BELOW TO INCLUDE ONLY PRODUCTS, CONSTRUCTION, AND EQUIPMENT INCLUDED IN THE PROJECT THAT A READER MIGHT EXPECT TO FIND IN THIS SECTION. VERIFY THAT SECTIONS LISTED BELOW ARE INCLUDED IN THE PROJECT AND THAT THEIR ... [1]

Comment [COMMENT7]: USUALLY RETAIN THE NEXT PARAGRAPH. DELETE ONLY IF LOCK CYLINDERS ARE INCLUDED IN THIS SECTION. LOCK CYLINDERS ARE USUALLY SUPPLIED BY A SOURCE OTHER THAN THE DOOR MANUFACTURER. ... [2]

Comment [COMMENT8]: RETAIN THE NEXT PARAGRAPH. PROVISION FOR THERMAL MOVEMENT IS PARTICULARLY IMPORTANT FOR ALUMINUM. SEE THE EVALUATIONS FOR FURTHER DISCUSSION ON THERMAL MOVEMENT AND METAL ... [3]

Comment [COMMENT9]: THE TEMPERATURE RANGE GIVEN IN THE NEXT PARAGRAPH IS A MINIMUM, BUT IS ADEQUATE FOR MUCH OF THE UNITED STATES. REVISE THE RANGE AS NECESSARY TO REFLECT CONDITION ... [4]

Comment [COMMENT10]: WIND LOADS IN THE NEXT PARAGRAPH ARE MINIMUM EXAMPLES. REVISE TO REFLECT THE LOADS REQUIRED FOR THE SYSTEM. CONSULT ANSI A58.1 FOR THE WIND VELOCITY NORMALLY APPLICABLE T ... [5]

1. Deflection Normal to the Plane of the Wall: Test pressure required to measure deflection of framing members normal to the plane of the wall shall be equivalent to the wind load specified above. Deflection shall not exceed 1/175 of the clear span, when subjected to uniform load deflection test.

2. Deflection Parallel to the Plane of the Wall: Test pressures required to measure deflection parallel to the plane of the wall shall be equal to 1.5 times the wind pressures specified above. Deflection of any member carrying its full dead load shall not exceed an amount that will reduce glass bite below 75 percent of the design dimension and shall not reduce the edge clearance between the member and the fixed panel, glass or other fixed member above to less than 1/8 inch (3 mm). The clearance between the member and an operable door or window shall be at least 1/16 inch (1.6 mm).

E. Air Infiltration: Provide aluminum entrance and storefront framing system with an air infiltration rate of not more than 0.06 cfm per sq. ft. (0.3 L/s x sq. m) of fixed area (excluding operable door edges) when tested in accordance with ASTM E 283 at an inward test pressure differential of 1.57 psf (75 Pa).

F. Water Penetration: Provide framing systems with no uncontrolled water penetration (excluding operable door edges) as defined in the test method when tested in accordance with ASTM E 331 at an inward test pressure differential of 6.24 lbf per sq. ft. (299 Pa).

G. Condensation Resistance: Where framing systems are "thermal-break" construction, provide units tested for thermal performance in accordance with AAMA 1503 showing condensation resistance factor (CRF) of not less than 57.

H. Thermal Transmittance: Provide framing systems that have an overall U-value of not more than 0.56 BTU/hr x sq. ft. x deg F (3.7 W/sq. m x K) at 15 mph (24 kph) exterior wind velocity when tested in accordance with AAMA 1503.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.

1. Product data for each aluminum entrance and storefront system required, including:

   a. Manufacturer's standard details and fabrication methods.
   b. Data on finishing, hardware and accessories.
   c. Recommendations for maintenance and cleaning of exterior surfaces.

2. Shop drawings for each aluminum entrance and storefront system required, including:

   a. Layout and installation details, including relationship to adjacent work.
   b. Elevations at 1/4 inch = 1 foot (1:50) scale.
   c. Detail sections of typical composite members.
   d. Anchors and reinforcement.
   e. Hardware mounting heights.
   f. Provisions for expansion and contraction.

Comment [COMMENT11]: REVISE DEFLECTION IN THE NEXT PARAGRAPH TO 1/360 OF THE CLEAR SPAN WHEN A PLASTER SURFACE SUBJECT TO BENDING IS AFFECTED.

Comment [COMMENT12]: DEFLECTIONS SPECIFIED IN THE PARAGRAPH BELOW ARE THE MAXIMUM RECOMMENDED. SMALLER DEFLECTIONS MAY BE SPECIFIED IF HEAVIER MEMBERS ARE USED. SEE THE EVALUATIONS FOR FURTHER DISCUSSION.

Comment [COMMENT13]: THE NEXT TWO PARAGRAPHS ARE INTENDED FOR FRAMING SYSTEMS ONLY. REQUIREMENTS FOR AIR INFILTRATION AND WATER PENETRATION ARE NOT USUALLY SPECIFIED FOR ENTRANCE DOORS. IF REQUIREMENTS FOR ENTRANCE DOORS ARE NEEDED, CONSULT MANUFACTURERS TO DETERMINE ACHIEVABLE LEVELS.

Comment [COMMENT14]: RETAIN THE NEXT PARAGRAPH FOR SYSTEMS WITH THERMAL-BREAK FRAMES AND INSULATING GLASS. REQUIREMENTS BELOW ARE EXAMPLES ONLY; CONDENSATION RESISTANCE FACTOR IS SUITABLE FOR MUCH OF THE UNITED STATES. REVISE FOR NORTHERN STATES WHERE THE WINTER OUTDOOR DESIGN TEMPERATURE IS BELOW 0 DEG F (-18 deg C). SEE AAMA PUBLICATION 1502.

Comment [COMMENT15]: CONSIDER DELETING THE NEXT PARAGRAPH. IT LIMITS ACCEPTABLE PRODUCTS TO UNITS USING INSULATING GLASS. THIS MAY BE NECESSARY IN NORTHERN STATES, BUT NOT ELSEWHERE. IF RETAINED, VERIFY AVAILABILITY OF PRODUCTS WITH MANUFACTURERS.

Comment [COMMENT16]: USUALLY RETAIN THE NEXT PARAGRAPH. SHOP DRAWINGS ARE ALMOST ALWAYS REQUIRED FOR ENTRANCE AND STOREFRONT INSTALLATIONS.

g. Glazing details.

3. Samples for Initial Color Selection: Mfr standard color samples and charts. Where normal color variations are anticipated, include 2 or more units in each set of samples indicating extreme limits of color variations.

4. Samples for Verification Purposes: The Architect reserves the right to require additional samples, that show fabrication techniques and workmanship, and design of hardware and accessories.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed installations of aluminum storefront and entrances similar in design and extent to those required for the project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer's Qualifications: Provide aluminum entrances and storefront systems produced by a firm experienced in manufacturing systems that are similar to those indicated for this project and that have a record of successful in-service performance for a period of 5 years.

C. Single Source Responsibility: Obtain aluminum entrance and storefront systems from one source and from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver aluminum entrance and storefront components in the manufacturer's original protective packaging.

B. Store aluminum components in a clean dry location away from uncured masonry or concrete. Cover components with waterproof paper, tarpaulin or polyethylene sheeting in a manner to permit circulation of air.

1. Stack framing components in a manner that will prevent bending and avoid significant or permanent damage.

1.7 PROJECT CONDITIONS

A. Field Measurements: Check openings by accurate field measurement before fabrication. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of the work.

1. Where necessary, proceed with fabrication without field measurements, and coordinate fabrication tolerances to ensure proper fit.

1.8 WARRANTY

A. Warranty: Submit a written warranty, executed by the manufacturer and signed by Contractor and Installer, agreeing to repair or replace units that fail in materials or workmanship within the specified warranty period. Failures include, but are not necessarily limited to:

1. Structural failures including excessive deflection, excessive leakage or air infiltration.

Comment [COMMENT17]: REQUIREMENTS IN THE FOLLOWING PARAGRAPH ARE ADEQUATE FOR PROJECTS THAT REQUIRE ONLY BASIC HARDWARE. REVISE AS NECESSARY TO SATISFY PROJECT REQUIREMENTS. FOR PROJECTS WITH SEVERAL TYPES OF ENTRANCE DOORS, MUCH MORE DETAILED SUBMITTAL REQUIREMENTS MAY BE NECESSARY. IF NEEDED, INCORPORATE SUBMITTAL REQUIREMENTS FROM SECTION "FINISH HARDWARE."

Comment [COMMENT18]: DELETE THE NEXT PARAGRAPH FOR APPLICATIONS USING STANDARD STOREFRONT AND ENTRANCE FRAMING COMPONENTS, WHERE THE SPECIFICATION IS PROPRIETARY.

Comment [COMMENT19]: DELETE THE NEXT PARAGRAPH ON SMALL UNCOMPLICATED PROJECTS. RETAIN ON LARGE OR COMPLICATED PROJECTS WHERE QUALIFIED INSTALLERS ARE NEEDED TO ASSURE A SUCCESSFUL INSTALLATION.

Comment [COMMENT20]: RETAIN THE NEXT PARAGRAPH FOR PROJECTS WHERE USE OF STOCK ALUMINUM COMPONENTS IS ACCEPTABLE.

Comment [COMMENT21]: DELETE THE NEXT PARAGRAPH WHEN THE PREVIOUS PARAGRAPH IS RETAINED. RETAIN ONLY FOR HIGH QUALITY CUSTOM DESIGNED INSTALLATIONS.

Comment [COMMENT22]: THE PARAGRAPH BELOW IS INTENDED TO ALLOW COMPETITION BETWEEN MANUFACTURERS OFFERING PRODUCTS THAT ARE SIMILAR WITHOUT HAVING TO DEVELOP CUSTOM COMPONENTS, AND TO ALLOW ARCHITECTS TO BASE THEIR DESIGN ON PRODUCTS FROM ONE OF THESE MANUFACTURERS.

Comment [COMMENT23]: DELETE THIS ENTIRE ARTICLE IF PROVISIONS OF DIVISION 1 SECTION "MATERIALS AND EQUIPMENT" ARE ADEQUATE TO SUIT PROJECT REQUIREMENTS.

Comment [COMMENT24]: RETAIN THE NEXT PARAGRAPH UNLESS IT IS NOT APPLICABLE TO THE NORMAL SEQUENCE OF WORK.

Comment [COMMENT25]: GENERALLY DELETE THIS ARTICLE. WARRANTIES ARE USUALLY INTENDED ONLY FOR CUSTOM FABRICATED WORK OR INSTALLATIONS WHERE INITIAL COST IS NOT A FACTOR. IF WARRANTIES ARE REQUIRED, VERIFY WITH THE OWNER'S COUNSEL THAT THE WARRANTIES STATED IN THIS ARTICLE ARE NOT LESS THAN WHAT IS AVAILABLE TO THE OWNER UNDER PREVAILING LOCAL LAWS. COORDINATE WITH DIVISION 1 SEC ... [6]

2. Faulty operation.
3. Deterioration of metals, metal finishes and other materials beyond normal weathering.

B. Warranty Period:

a. Framing: Five years from date of Substantial Completion.
b. Metal Finish: 15 years from date of Substantial Completion.

C. The warranty shall not deprive the Owner of other rights or remedies the Owner may have under other provisions of the Contract Documents, and is in addition to and runs concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide entrance and storefront systems manufactured by one of the following (**denotes manufacturer and system upon which specification is based).

1. Amarlite Architectural Products
2. CMI-Cronstroms Mfg. Inc.
3. EFCO Corporation
4. Kawneer Company, Inc. (Encore with 500 Wide Stile Entrance Doors)**
5. YKK Architectural Products
6. Tubelite Division of Indal, Inc.
7. United States Aluminum Corp.
8. Vistawall Architectural Products

Comment [COMMENT26]: DELETE THIS ARTICLE IF OWNER-IMPOSED OR OTHER PROJECT REQUIREMENTS PROHIBIT MENTION OF MANUFACTURER'S NAMES OR PRODUCTS.

Comment [COMMENT27]: RETAIN ONLY THOSE MANUFACTURERS LISTED BELOW WHOSE PRODUCTS CORRESPOND WITH PROJECT REQUIREMENTS AND WHOSE AVAILABILITY AND SUITABILITY FOR THE INDICATED APPLICATION HAVE BEEN VERIFIED. INSERT ACCEPTABLE LOCAL MANUFACTURERS, IF DESIRED.

2.2 MATERIALS

A. Aluminum Members: Alloy and temper recommended by the manufacturer for strength, corrosion resistance, and application of required finish; comply with ASTM B 221 (ASTM B 221M) for aluminum extrusions, ASTM B 209 (ASTM B 209M) for aluminum sheet or plate, and ASTM B 211 (ASTM B 211M) for aluminum bars, rods and wire.

B. Carbon steel reinforcement of aluminum framing members shall comply with ASTM A 36 (ASTM A 36M) for structural shapes, plates and bars, ASTM A 611 for cold rolled sheet and strip, or ASTM A 570 (ASTM A 570M) for hot rolled sheet and strip.

C. Glass and Glazing Materials: Comply with requirements of "Glass and Glazing" section of these specifications.

D. Fasteners: Provide fasteners of aluminum, nonmagnetic stainless steel, zinc plated steel, or other material warranted by the manufacturer to be noncorrosive and compatible with aluminum components, hardware, anchors and other components.

1. Reinforcement: Where fasteners screw-anchor into aluminum members less than 0.125 inches (3.2 mm) thick, reinforce the interior with aluminum or nonmagnetic stainless steel

Comment [COMMENT28]: DELETE THE NEXT PARAGRAPH AND INSERT APPROPRIATE PROVISIONS FROM THE GLASS AND GLAZING SECTION IF DESIRED; SEE EVALUATION SHEETS FOR THE GLASS AND GLAZING SECTION FOR DISCUSSION AND VARIOUS OPTIONS.

Comment [COMMENT29]: RETAIN ONE OF THE NEXT THREE PARAGRAPHS FOR CORE MATERIAL FOR INFILL PANELS AND FLUSH-TYPE ALUMINUM PANEL DOORS.

to receive screw threads, or provide standard noncorrosive pressed-in splined grommet nuts.

2. Exposed Fasteners: Do not use exposed fasteners except for application of hardware. For application of hardware, use Phillips flat-head machine screws that match the finish of member or hardware being fastened.

Comment [COMMENT30]: REVISE THE NEXT PARAGRAPH IF USE OF EXPOSED FASTENERS IS PERMITTED.

E. Concealed Flashing: 0.0179-inch (0.5-mm) minimum dead-soft stainless steel, or 0.026-inch (0.7-mm) thick minimum extruded aluminum of alloy and type selected by manufacturer for compatibility with other components.

F. Brackets and Reinforcements: Provide high-strength aluminum brackets and reinforcements; where use of aluminum is not feasible provide nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 123.

G. Concrete and Masonry Inserts: Provide cast iron, malleable iron, or hot-dip galvanized steel inserts complying with ASTM A 123.

H. Compression Weatherstripping: Manufacturer's standard replaceable compressible weatherstripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287.

I. Sliding Weatherstripping: Manufacturer's standard replaceable weatherstripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing, complying with AAMA 701.2.

2.3 COMPONENTS

Comment [COMMENT31]: THE FRAMING SYSTEM IN THE NEXT PARAGRAPH MAY BE USED FOR BOTH STOREFRONT AND ENTRANCE FRAMES. REVISE IF A DIFFERENT SYSTEM IS REQUIRED FOR EACH APPLICATION. REVISE IF GLAZING FROM THE INTERIOR IS REQUIRED. EXTERIOR GLAZING IS MORE COMMON BECAUSE REGLAZING FROM THE INTERIOR IS DIFFICULT AFTER THE BUILDING IS COMPLETED.

A. Storefront Framing System: Provide storefront and entrance framing systems fabricated from extruded aluminum members of size and profile indicated. Include sub sills and reinforcing members as required for installation.. Provide for flush glazing storefront from the exterior on all sides without projecting stops. Shop-fabricate and preassemble frame components where possible. Provide storefront frame sections without exposed seams.

1. Mullion Configurations: Provide pockets at the glazing face to receive resilient elastomeric glazing. Mullions and horizontals shall be one piece. Make provisions to drain moisture accumulation to the exterior.

2. Framing size: Unless specifically noted otherwise on project drawings, provide 1.75" x 4.5" nominal configuration.

3. Assembly Type: 1" insulated glazing, Front Glazed, Screw Spline or shear block as application requires.

4. Accessories: Internal frame reinforcement as required for installations indicated. Provide separate sill set in full bed of sealant where indicated on project drawings, material and finish to match storefront.

B. Stile-and-Rail Type Entrance Doors: Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or j-bolts.

1. Glazing: Fabricate doors to facilitate replacement of glass or panels, without disassembly of stiles and rails. Provide snap-on extruded aluminum glazing stops, with exterior stops anchored for nonremoval.

2. Design: Provide 1-3/4-inch (44-mm) thick doors of design indicated.

   a. Wide stile (4 inches or more nominal width).

3. Design: Provide 1-3/4-inch (44-mm) thick doors of design indicated.
4. Lights: Provide glazed openings as indicated, with aluminum moldings and stops. Provide nonremovable stops on the exterior.

2.4 FABRICATION

A. General: Fabricate aluminum entrance and storefront components to designs, sizes and thicknesses indicated and to comply with indicated standards. Sizes and profile requirements are indicated on the drawings. Variable dimensions are indicated, with maximum and minimum dimensions required, to achieve design requirements and coordination with other work.

1. Thermal-Break Construction: Fabricate storefront framing system with an integrally concealed, low-conductance thermal barrier, located between exterior materials and exposed interior members to eliminate direct metal-to-metal contact. Use manufacturer's standard construction that has been in use for similar projects for period of not less than 3 years.

B. Prefabrication: Complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible before shipment to the Project site. Disassemble components only as necessary for shipment and installation.

1. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. Complete these operations for hardware prior to application of finishes.
2. Do not drill and tap for surface-mounted hardware items until time of installation at project site.
3. Preglaze door and frame units to greatest extent possible.

C. Welding: Comply with AWS recommendations. Grind exposed welds smooth to remove weld spatter and welding oxides. Restore mechanical finish.

1. Welding behind finished surfaces shall be performed in such a manner as to minimize distortion and discoloration on the finished surface.

D. Reinforcing: Install reinforcing as required for hardware and as necessary for performance requirements, sag resistance and rigidity.

E. Dissimilar Metals: Separate dissimilar metals with bituminous paint, or a suitable sealant, or a nonabsorptive plastic or elastomeric tape, or a gasket between the surfaces. Do not use coatings containing lead.

Comment [COMMENT32]: DELETE THE NEXT PARAGRAPH BELOW FOR THIN STILE DOORS THAT MUST BE DISASSEMBLED FOR REGLAZING.

Comment [COMMENT33]: IF DOORS ARE FULLY DETAILED RETAIN THE NEXT PARAGRAPH.

Comment [COMMENT34]: DELETE CHOICES BELOW IF DOORS ARE FULLY DETAILED; IF NOT, SELECT DESIGN FROM THE CHOICES BELOW. CONSIDER INCORPORATING THE CHOICE IN THE PARAGRAPH ABOVE.

Comment [COMMENT35]: DELETE THE NEXT PARAGRAPH IF NO LIGHTS ARE INCLUDED IN THE DESIGN.

Comment [COMMENT36]: THE THERMAL-BREAK CONSTRUCTION FEATURE SPECIFIED BELOW IS NOT AVAILABLE FROM ALL MANUFACTURERS. IT IS NORMALLY USED IN CONJUNCTION WITH DOUBLE GLAZING.

Comment [COMMENT37]: DELETE THE NEXT PARAGRAPH IF ONLY LARGE GLASS SIZES ARE REQUIRED.

F. Continuity: Maintain accurate relation of planes and angles with hairline fit of contacting members.

1. Uniformity of Metal Finish: Abutting extruded aluminum members shall not have an integral color or texture variation greater than half the range indicated in the sample pair submittal.

Comment [COMMENT38]: DELETE THE NEXT PARAGRAPH IF SUBMITTAL OF SAMPLES INDICATING EXTREME RANGE OF COLOR VARIATION HAS NOT BEEN REQUIRED.

G. Fasteners: Conceal fasteners wherever possible.

H. Weatherstripping: For exterior and vestibule doors, provide compression weatherstripping against fixed stops. At other edges, provide sliding weatherstripping retained in adjustable strip mortised into door edge.

1. Provide EPDM or vinyl-blade gasket weatherstripping in bottom door rail, adjustable for contact with threshold.
2. At interior doors and other locations without weatherstripping, provide neoprene silencers on stops to prevent metal-to-metal contact.

Comment [COMMENT39]: DELETE THE NEXT PARAGRAPH FOR EASIER DOOR OPERATION OR IF WEATHERSTRIPPING IS FULLY DETAILED ON THE DRAWINGS.

2.5 FINISHES

Comment [COMMENT40]: DELETE THE NEXT PARAGRAPH IF THE PROJECT DOES NOT INCLUDE CENTER-PIVOTED DOORS.

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by "AA" comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Color: As selected by Architect from manufactured full range of standard colors, Factory applied **Kynar** Finish. One color will be selected from a minimum of seven (7) standard colors.

Comment [COMMENT41]: RETAIN THE NEXT PARAGRAPH AND DELETE THE REST OF THIS ARTICLE IF THE STOREFRONT ON THE PROJECT IS INCORPORATED INTO A CURTAIN WALL SYSTEM. OTHERWISE DELETE THE NEXT PARAGRAPH.

Comment [COMMENT42]: REVISE THE NEXT PARAGRAPH IF A SPECIFIC PRODUCT IS REQUIRED. THE NEXT PARAGRAPH REFERENCES THE AAMA STANDARD FOR A HIGH PERFORMANCE ORGANIC COATING ON EXTRUSIONS AND PANELS.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and supports, with the Installer present, for compliance with requirements indicated, installation tolerances, and other conditions that affect installation of aluminum entrances and storefronts. Correct unsatisfactory conditions before proceeding with the installation.

1. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation.

B. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels. Install components in proper alignment and relation to established lines and grades indicated. Provide proper support and anchor securely in place.

C. Construction Tolerances: Install aluminum entrance and storefront to comply with the following

tolerances:

1. Variation from Plane: Do not exceed 1/8 inch in 12 feet (3 mm in 8.7 m) of length or 1/4 inch (6 mm) in any total length.
2. Offset from Alignment: The maximum offset from true alignment between two identical members abutting end to end in line shall not exceed 1/16 inch (1.5 mm).
3. Diagonal Measurements: The maximum difference in diagonal measurements shall not exceed 1/8 inch (3 mm).
4. Offset at Corners: The maximum out-of-plane offset of framing at corners shall not exceed 1/32 inch (0.8 mm).

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

1. Zinc or cadmium plate steel anchors and other unexposed fasteners after fabrication.
2. Paint dissimilar metals where drainage from them passes over aluminum.
3. Paint aluminum surfaces in contact with mortar, concrete or other masonry with alkali resistant coating.
4. Paint wood and similar absorptive material in contact with aluminum and exposed to the elements or otherwise subject to wetting, with two coats of aluminum house paint. Seal joints between the materials with sealant.

E. Drill and tap frames and doors and apply surface-mounted hardware items. Comply with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.

Comment [COMMENT43]: DELETE THE NEXT PARAGRAPH IF ALL HARDWARE IS FACTORY INSTALLED.

F. Set sill members and other members in bed of sealant as indicated, or with joint fillers or gaskets as indicated to provide weathertight construction. Comply with requirements of Division 7 for sealants, fillers, and gaskets.

G. Refer to "Glass and Glazing" Section of Division 8 for installation of glass and other panels indicated to be glazed into doors and framing, and not preglazed by manufacturer.

3.3 ADJUSTING

A. Adjust operating hardware to function properly, for smooth operation without binding, and for weathertight closure.

3.4 PROTECTION

A. Institute protective measures required throughout the remainder of the construction period to ensure that aluminum entrances and storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.

Comment [COMMENT44]: INSERT A HARDWARE SCHEDULE HERE IF THE PROJECT INCLUDES MORE THAN ONE ENTRANCE DOOR TYPE WITH DIFFERENT HARDWARE REQUIREMENTS. SEE THE EVALUATIONS FOR DISCUSSION ON HARDWARE AND HARDWARE SETS.

END OF SECTION 08410

Page 1: [1] Comment [COMMENT6] **COMMENT**

REVISE THE LIST BELOW TO INCLUDE ONLY PRODUCTS, CONSTRUCTION, AND EQUIPMENT INCLUDED IN THE PROJECT THAT A READER MIGHT EXPECT TO FIND IN THIS SECTION. VERIFY THAT SECTIONS LISTED BELOW ARE INCLUDED IN THE PROJECT AND THAT THEIR TITLES ARE CORRECT.

Page 1: [2] Comment [COMMENT7] **COMMENT**

USUALLY RETAIN THE NEXT PARAGRAPH. DELETE ONLY IF LOCK CYLINDERS ARE INCLUDED IN THIS SECTION. LOCK CYLINDERS ARE USUALLY SUPPLIED BY A SOURCE OTHER THAN THE DOOR MANUFACTURER.

Page 1: [3] Comment [COMMENT8] **COMMENT**

RETAIN THE NEXT PARAGRAPH. PROVISION FOR THERMAL MOVEMENT IS PARTICULARLY IMPORTANT FOR ALUMINUM. SEE THE EVALUATIONS FOR FURTHER DISCUSSION ON THERMAL MOVEMENT AND METAL SURFACE TEMPERATURE RANGE.

Page 1: [4] Comment [COMMENT9] **COMMENT**

THE TEMPERATURE RANGE GIVEN IN THE NEXT PARAGRAPH IS A MINIMUM, BUT IS ADEQUATE FOR MUCH OF THE UNITED STATES. REVISE THE RANGE AS NECESSARY TO REFLECT CONDITIONS AT THE PROJECT LOCATION.

Page 1: [5] Comment [COMMENT10] **COMMENT**

WIND LOADS IN THE NEXT PARAGRAPH ARE MINIMUM EXAMPLES. REVISE TO REFLECT THE LOADS REQUIRED FOR THE SYSTEM. CONSULT ANSI A58.1 FOR THE WIND VELOCITY NORMALLY APPLICABLE TO THE PROJECT LOCATION. FOR UNUSUAL SITE CONDITIONS, BOUNDARY LAYER WIND TUNNEL TESTING MIGHT BE REQUIRED TO DETERMINE CORRECT WIND VELOCITY. SEE THE EVALUATIONS FOR FURTHER DISCUSSION.

Page 3: [6] Comment [COMMENT25] **COMMENT**

GENERALLY DELETE THIS ARTICLE. WARRANTIES ARE USUALLY INTENDED ONLY FOR CUSTOM FABRICATED WORK OR INSTALLATIONS WHERE INITIAL COST IS NOT A FACTOR. IF WARRANTIES ARE REQUIRED, VERIFY WITH THE OWNER'S COUNSEL THAT THE WARRANTIES STATED IN THIS ARTICLE ARE NOT LESS THAN WHAT IS AVAILABLE TO THE OWNER UNDER PREVAILING LOCAL LAWS. COORDINATE WITH DIVISION 1 SECTION "WARRANTIES AND BONDS."

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 01 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.
2. Cylinders for doors specified in other Sections.
3. Access control readers and head-in system and low-voltage power are to be provided by Stanley Best subcontracted to the Contract Hardware Supplier. Basis of design: Stanley Best Basis. Acceptable equals: Lenel On-Guard, Honeywell.
4. Complete installation (less fire alarm service) of all items listed by model numbers in the hardware sets (all by the Contract Hardware Supplier). Fire alarm service is covered by the electrical plans. See 087100-3.1 for details.
5. Conduit rough-in for possible future low-energy automatic swing-door operators, actuators and safety sensors.
6. Electrical information provided as coordination and installation reference.
7. Magnetic door holders: many are part of the access control system, while a few are part of the fire alarm system.

B. Related Sections include the following:

1. Division 08 Section "Hollow Metal Doors and Frames" for astragals provided as part of fire-rated labeled assemblies and for door silencers provided as part of hollow-metal frames.
2. Division 08 Section "Flush Wood Doors" for astragals provided as part of fire-rated labeled assemblies.
3. Division 08 Section "Overhead Coiling Doors" for door hardware provided as part of overhead door assemblies.
4. Division 08 Section "Aluminum-Framed Entrances and Storefronts" for weather seals and thresholds provided as part of aluminum-framed entrance and storefront assemblies.
5. Division 26 Sections for connections to electrical power system and for low-voltage wiring work.

1.3 ALTERNATE PRICING

A. Provide alternate pricing to include the Owner's preferred hardware manufacturers and series as indicated below:

1. Key Cylinder Cores: Best small-format IC, factory keyed to Owner's existing great grand master key system.
2. Access Control Head-in System: Stanley Best Basis.

1.4 SUBMITTALS

A. Product Data: Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Samples for Initial Selection: For each finish, color, and texture required for each type of door hardware as requested by Architect.

C. Samples for Verification: Submit minimum 2-by-4-inch (51-by-102-mm) plate Samples of each type of finish required, except primed finish, as requested by Architect.

D. Samples for Verification: For exposed door hardware of each type, in specified finish, full size, as requested by Architect. Tag with full description for coordination with the door hardware sets. Submit Samples before, or concurrent with, submission of the final door hardware sets.

1. Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

E. Qualification Data:

1. Finish Hardware Installers
   a. Finish hardware, including electrified hardware, for wood, hollow metal, and aluminum doors to be installed by personnel trained and certified by the manufacturer of the product furnished.
   b. Provide manufacturer's certificates for installer as part of Contractor's bid information. Failure to supply certificates may result in rejection of bid.
2. Hardware Supplier
   a. Established contract hardware firm which maintains and operates an office, display, and stock in project area and which is a factory authorized distributor of the lock being furnished.
   b. Hardware scheduled and furnished by or under direct supervision an Architectural Hardware Consultant.
   c. All schedules submitted to the Architect for approval and job use must carry the signature and certified seal of this Architectural Hardware Consultant.
3. Architectural Hardware Consultant
   a. Currently certified by the Door and Hardware Institute.
   b. Full-time employee of the Hardware Supplier.
   c. Available at reasonable times to Architect, Owner, and Contractor during course of work.

F. Maintenance Data: For each type of door hardware. Include final hardware schedule, keying schedule, riser diagrams, and point-to-point wiring diagrams in 3-ring binder, labeled on spine with project name and "Door Hardware".

G. Warranty: Special warranty specified in this Section.

H. Other Action Submittals:

1. Door Hardware Sets: Prepared by or under the supervision of a DHI certified 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. Number of Copies: (5).
   c. 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) Degree of opening for closer and overhead stop and holder installation.
      5) Keying information.
      6) Fastenings and other pertinent information.
      7) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
      8) Explanation of abbreviations, symbols, and codes contained in schedule.
      9) Mounting locations for door hardware.
      10) Door and frame sizes and materials.
      11) Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.

         a) Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit.

      12) List of related door devices specified in other Sections for each door and frame.

   d. Submittal Sequence: Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the door hardware sets.

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.

1.5 QUALITY ASSURANCE

A. Furnish proper hardware types and quantities for door function and to meet applicable codes. Bring discrepancies to the attention of the Architect a minimum of (10) days prior to bid date so that an addendum may be issued. No additional compensation will be allowed after bidding for hardware changes required for proper function or to meet codes.

B. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those 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 or UBC Standard 7-2.

1. Test Pressure: After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches (1016 mm) or less above the sill.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." In addition to Owner, Contractor, and Architect, conference participants shall also include Certified Installer, Hardware Supplier's Architectural Hardware Consultant, and Security Supplier. Review methods and procedures related to electrified door hardware including, but not limited to, the following:

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review required testing, inspecting, and certifying procedures.

1.6 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.

1.7 COORDINATION

A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Distribute templates in a timely manner so as not to delay suppliers. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.8 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: Five years from date of Substantial Completion, except as follows:

a. Manual Closers: 10 years from date of Substantial Completion.

1.9 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.

1.10 EXTRA MATERIALS

A. Furnish full-size units of door hardware described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Door Hardware:
a. (2) closer bodies
b. (1) classroom security lock
c. (1) office lock
d. (1) offset pull RM-3050-12 x Type 12XMD x 630

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in this and door hardware sets indicated in Part 3 "Door Hardware Sets" Article.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.

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. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Sets" Article.
2. 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 manufacturers specified.

2.2 BUTT HINGES, GENERAL

A. Quantity: Provide the following, unless otherwise indicated:

1. Two Hinges: For doors with heights up to 60 inches (1524 mm).
2. Three Hinges: For doors with heights 61 to 90 inches (1549 to 2286 mm).
3. Four Hinges: For doors with heights 91 to 120 inches (2311 to 3048 mm).
4. For doors with heights more than 120 inches (3048 mm), provide 4 hinges, plus 1 hinge for every 30 inches (750 mm) of door height greater than 120 inches (3048 mm).

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 Height, Width, and Weight: Unless otherwise indicated, provide the following:

1. Doors with Exit Devices or 3'6" or more in width: 5" high, heavy-weight hinges.
2. Doors less than 3'6" in width: 4-1/2" high, standard-weight hinges.
3. Width: 4" unless proper clearance requires a different width.
4. Antifriction-bearing hinges.

D. Hinge Base Metal: Unless otherwise indicated, provide the following:

1. Exterior and in-swinging restroom door hinges: Stainless steel, with stainless-steel pin.
2. Balance of hinges: 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 reverse bevel exterior doors.
2. Corners: Square.
3. Knuckles: Three.

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. Finish screw heads to match surface of hinges.

G. Template Hinge Dimensions: BHMA A156.7.

H. Available Manufacturers:

1. Bommer Industries, Inc. (BI).
2. Hager Companies (HAG).
3. IVES Hardware; an Ingersoll-Rand Company (IVS).
4. Lawrence Brothers, Inc. (LB).
5. McKinney Products Company; an ASSA ABLOY Group company (MCK).
6. PBB, Inc. (PBB)
7. Stanley Commercial Hardware; Div. of The Stanley Works (STH).

2.3 SPRING HINGES

A. Self-Closing Hinges: BHMA A156.17

B. Available Manufacturers:

1. Bommer Industries, Inc. (BI).
2. Hager Companies (HAG).
3. IVES Hardware; an Ingersoll-Rand Company (IVS).
4. Lawrence Brothers, Inc. (LB).
5. McKinney Products Company; an ASSA ABLOY Group company (MCK).
6. Stanley Commercial Hardware; Div. of The Stanley Works (STH).

2.4 CONTINUOUS HINGES

A. Provide hinge of general series as indicated in hardware sets and of proper shape and model to suit door and frame configuration.

B. Continuous, Pinless-Type Hinges: Extruded-aluminum, pinless, hinge leaves; with concealed, self-lubricating thrust bearings.

1. Available Manufacturers:

a. Bommer Industries, Inc. (BI).
b. Hager Companies (HAG).
c. IVES Hardware; an Ingersoll-Rand Company (IVS).
d. Markar Architectural Products, Inc.; a Subsidiary of Adams Rite Manufacturing Co. (MP).
e. McKinney Products Company; an ASSA ABLOY Group company (MCK).
f. Pemko Manufacturing Co. (PEM).
g. Select Products Limited (SPL).
h. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
i. Zero International (ZRO).

2.5 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), 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 (22 N).

B. Latches and Locks for Means of Egress Doors: Comply with NFPA 101. Latches shall not require more than 15 lbf (67 N) to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

C. Lock Trim:

1. Levers: Cast or forged.
   a. Best 14 model with full smooth return.
2. Roses: Forged.
   a. Best C model.
3. Dummy Trim: Match lever lock trim and roses.
4. Lockset Designs: Provide design indicated in hardware sets, or, if sets are provided by another manufacturer, provide designs that match those designated.

D. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Bored Locks: Minimum 1/2-inch (13-mm) latchbolt throw.
2. Deadbolts: Minimum 1-inch (25-mm) bolt throw.

E. Backset: 2-3/4 inches (70 mm), unless otherwise indicated.

F. 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:

1. Strikes for Bored Locks and Latches: BHMA A156.2.
2. Strikes for Auxiliary Deadlocks: BHMA A156.5.

2.6 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: Function numbers and descriptions indicated in door hardware sets comply with the following:

1. Bored Locks: BHMA A156.2.

B. Bored Locks: BHMA A156.2.

1. Available Manufacturers:

   a. Best Access Systems; Div. of The Stanley Works (BAS).
   b. Schlage Commercial Lock Division; an Ingersoll-Rand Company (SCH).
   c. Sargent; an Assa Abbloy company.

2.7 AUXILIARY LOCKS AND LATCHES

A. Auxiliary Locks: BHMA A156.5, Grade 1.

1. Available Manufacturers:

a. Best Access Systems; Div. of The Stanley Works (BAS).
b. Schlage Commercial Lock Division; an Ingersoll-Rand Company (SCH).
c. Sargent; an Assa Abbloy company.

2.8 DOOR BOLTS

A. Bolt Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Surface Bolts: Minimum 7/8-inch (22-mm) throw.
2. Mortise Flush Bolts: Minimum 3/4-inch (19-mm) throw.

B. Surface Bolts: BHMA A156.16, Grade 1.

1. Flush Bolt Heads: Minimum of 1/2-inch- (13-mm-) diameter rods of brass, bronze, or stainless steel with minimum 12-inch- (305-mm-) long rod for doors up to 84 inches (2134 mm) in height. Provide longer rods as necessary for doors exceeding 84 inches (2134 mm).
2. Available Manufacturers:

a. Burns Manufacturing Incorporated (BM).
b. Door Controls International (DCI).
c. Glynn-Johnson; an Ingersoll-Rand Company (GJ).
d. Hager Companies (HAG).
e. Hiawatha, Inc. (HIA).
f. IVES Hardware; an Ingersoll-Rand Company (IVS).
g. McKinney Products Company; an ASSA ABLOY Group company (MCK).
h. Rockwood Manufacturing Company (RM).
i. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
j. Trimco (TBM).

C. Manual Flush Bolts: BHMA A156.16, Grade 1; designed for mortising into door edge.

1. Available Manufacturers:

a. Burns Manufacturing Incorporated (BM).
b. Door Controls International (DCI).
c. Glynn-Johnson; an Ingersoll-Rand Company (GJ).
d. Hager Companies (HAG).
e. Hiawatha, Inc. (HIA).
f. IVES Hardware; an Ingersoll-Rand Company (IVS).
g. Rockwood Manufacturing Company (RM).
h. Trimco (TBM).

D. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1; designed for mortising into door edge.

1. Available Manufacturers:

a. Burns Manufacturing Incorporated (BM).
b. Door Controls International (DCI).
c. Glynn-Johnson; an Ingersoll-Rand Company (GJ).
d. Hager Companies (HAG).
e. Hiawatha, Inc. (HIA).
f. IVES Hardware; an Ingersoll-Rand Company (IVS).
g. McKinney Products Company; an ASSA ABLOY Group company (MCK).
h. Rockwood Manufacturing Company (RM).
i. Trimco (TBM).

2.9 EXIT DEVICES

A. Exit Devices: BHMA A156.3, 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 (22 N).

C. Exit Devices for Means of Egress Doors: Comply with NFPA 101. Exit devices shall not require more than 15 lbf (67 N) 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

1. BHMA A156.3.
2. Key removable or as indicated in hardware sets.
3. Provide spacer blocks to support and conceal mullion head cap mounting screws. Finish to match mullion head cap finish.
4. Provided mullion stabilizers for mullions used on exterior openings.

G. Outside Trim: As specified in hardware sets; material and finish to match locksets, unless otherwise indicated.

1. Match design for locksets and latchsets, unless otherwise indicated.

H. Fasteners. Manufacturer's standard, except furnish sex bolts for attachments to doors; all fasteners including for rod guides of surface vertical rod exit devices.

I. Available Manufacturers:

1. Stanley (Precision) Commercial Hardware; Div. of The Stanley Works (STH).
2. Von Duprin; an Ingersoll-Rand Company (VD).
3. Detex.

2.10 LOCK CYLINDERS

A. 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: Seven.
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.
4. Bored-Lock Type: Cylinders with tailpieces to suit locks.

B. Permanent Cores: Small format cores, type and keyway as directed Owner (compatible with existing great grand master key system); finish face to match lockset; complying with the following:

1. Interchangeable Cores: Core insert, removable by use of a special key; usable with other manufacturers' cylinders.
2. Extra Cores: Provide Owner with (20) extra permanent cores for job. Key extra cores as directed by Owner.
3. Ship permanent cores directly from factory to Owner. Obtain Owner's contact information from Architect.

C. Construction Keying: Comply with the following:

1. Construction Master Keys: Provide 6 construction master keys.
2. Construction Cores: Provide keyed brass construction cores that are replaceable by permanent cores for all locking devices and cylinders.
   a. Owner will replace construction cores with permanent cores.

D. Available Manufacturers:

1. Best Access Systems; Div. of The Stanley Works (BAS).
2. Medeco.
3. Schlage.

2.11 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Key cylinders as directed by Owner. Incorporate decisions made in keying conference, and as follows:

1. New or to existing Great Grand Master Key System as directed by Owner: Cylinders are operated by a change key, a master key, and a grand master key.

B. Keys: Nickel silver.

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
   a. Notation: "DO NOT DUPLICATE."
2. Quantity: Provide the following:
   a. Cylinder Change Keys: Three per cylinder.
   b. Master Keys: Six per master.
   c. Grand Master Keys: Six per grand master.
   d. Great-Grand Master Keys: Five.
   e. Blanks: 50.
3. Ship keys directly from factory to Owner. Obtain Owner's contact information from Architect.

2.12 KEY CONTROL SYSTEM

A. Key Control Cabinet: BHMA A156.5, Grade 1; metal cabinet with baked-enamel finish; containing key-holding hooks, core-holding shelves, labels, 2 sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key and core capacity as indicated by model specified in hardware set.

1. Wall-Mounted Cabinet: Cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.
2. Locate and mount per direction of Owner.

B. Cross-Index System: Multiple-index system for recording key information. Include three receipt forms for each key-holding hook.

1. Available Manufacturers:

   a. Lund Equipment Co., Inc. (LUN).
   b. MMF Industries (MMF).
   c. Telkee; a division of Sunroc Corporation (TEL).

2.13 FIRE DEPARTMENT KEY BOX

A. Furnish (1) fully recessed hinged fire department key box.

1. Basis of specification: Knox-Box Model 3200 x RMK x Aluminization x Black.
2. Available Manufacturers:
   a. Knox Company.
   b. Approved equal.

B. Locate in exterior wall as directed by Architect.

2.14 OPERATING TRIM

A. Materials: Fabricate from stainless steel, unless otherwise indicated.

B. Dimensions: All dimensions, shapes, split finishes, fasteners, and other properties identical to models specified in hardware sets.

C. Available Manufacturers:

1. Burns Manufacturing Incorporated (BM).
2. Elmes (ELM)
3. Forms + Surfaces (FS).
4. Hager Companies (HAG).
5. Hiawatha, Inc. (HIA).
6. IVES Hardware; an Ingersoll-Rand Company (IVS).
7. McKinney Products Company; an ASSA ABLOY Group company (MCK).
8. Rockwood Manufacturing Company (RM).
9. Trimco (TBM).

2.15 ACCESSORIES FOR PAIRS OF DOORS

A. Coordinators: BHMA A156.3.

1. Available Manufacturers:

a. Burns Manufacturing Incorporated (BM).
b. Door Controls International (DCI).
c. Glynn-Johnson; an Ingersoll-Rand Company (GJ).
d. Hager Companies (HAG).
e. Hiawatha, Inc. (HIA).
f. IVES Hardware; an Ingersoll-Rand Company (IVS).
g. McKinney Products Company; an ASSA ABLOY Group company (MCK).
h. Rockwood Manufacturing Company (RM).
i. Trimco (TBM).

2.16 SURFACE 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 (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1. Comply with the following maximum opening-force requirements:

a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
b. 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 (133 N) to set door in motion and not more than 15 lbf (67 N) to open door to minimum required width.

C. Fasteners: Manufacturer's standard for arms, shoes and brackets. Sex bolts for fastening closers to doors; all doors, no exceptions.

D. Size of Units: 1-1/2" minimum diameter cylinders. Provide field-sizable closers, adjustable for spring sizes 1-6, plus 50% extra spring power at spring size 6, to meet field conditions and requirements for opening force.

E. Arms: Provide type of arm required for closer to be located on non-public side of door, unless otherwise indicated.

F. Available Manufacturers:

1. LCN Closers; an Ingersoll-Rand Company (LCN).
2. Stanley (Ryobi) Commercial Hardware; Div. of The Stanley Works (STH).
3. Sargent.

2.17 PROTECTIVE TRIM UNITS

A. Size:
1. Width
   a. Singles, and pairs with removable mullions or surface applied astragals: 2 inches (38 mm) less than door width on push side and 1 inch (13 mm) less than door width on pull side
   b. Other pairs: 1 inch (13 mm) less than door width
2. Height: as specified in door hardware sets.

B. Fasteners: Manufacturer's machine or self-tapping countersunk screws.

C. Metal Protective Trim Units: BHMA A156.6; beveled 4 sides; fabricated from 0.050-inch-(1.3-mm-) thick stainless steel.

D. Available Manufacturers:

1. Burns Manufacturing Incorporated (BM).
2. Hager Companies (HAG).
3. Hiawatha, Inc. (HIA).
4. IVES Hardware; an Ingersoll-Rand Company (IVS).
5. McKinney Products Company; an ASSA ABLOY Group company (MCK).
6. Rockwood Manufacturing Company (RM).
7. Trimco (TBM).

2.18 MECHANICAL WALL AND FLOOR STOPS AND HOLDERS

A. Stops and Bumpers: BHMA A156.16, Grade 1.

1. Provide wall stops for doors unless floor, overhead, 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.
2. Properties. Cast construction with fastener suitable for wall or floor condition.
3. Available Manufacturers:
   a. Burns Manufacturing Incorporated (BM).
   b. Hager Companies (HAG).
   c. Hiawatha, Inc. (HIA).
   d. IVES Hardware; an Ingersoll-Rand Company (IVS).
   e. McKinney Products Company; an ASSA ABLOY Group company (MCK).
   f. Rockwood Manufacturing Company (RM).
   g. Trimco (TBM).

B. Wall-mounted Combination Door Stops and Holders: BHMA A156.16, Grade 1.

1. Properties: Heavy cast with adjustable holding force, self-compensating for changes up to ¼" in vertical door position.
2. Furnish shims or spacers as needed for mounting clearance. Obtain Architect's approval of spacer design before mounting. Finish to match substrate.
3. Manufacturer and Model: Trimco 1283 or approved equal.

2.19 OVERHEAD STOPS AND HOLDERS

A. BHMA A156.8, Grade 1.

B. Available Manufacturers:

1. Architectural Builders Hardware Mfg., Inc. (ABH).
2. Glynn-Johnson; an Ingersoll-Rand Company (GJ).
3. Rixson Specialty Door Controls; an ASSA ABLOY Group company (RIX).
4. Rockwood Manufacturing Company (RM).
5. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).

2.20 SILENCERS

A. Silencers for Metal Door Frames: BHMA A156.16, Grade 1; neoprene or rubber, minimum diameter 1/2 inch (13 mm); fabricated for drilled-in application to frame.

B. Available Manufacturers:

1. Architectural Builders Hardware Mfg., Inc. (ABH).
2. Burns Manufacturing Incorporated (BM).
3. Glynn-Johnson; an Ingersoll-Rand Company (GJ).
4. Hager Companies (HAG).
5. Hiawatha, Inc. (HIA).
6. IVES Hardware; an Ingersoll-Rand Company (IVS).
7. McKinney Products Company; an ASSA ABLOY Group company (MCK).
8. Rockwood Manufacturing Company (RM).
9. Trimco (TBM).

2.21 DOOR GASKETING

A. General: Provide continuous weather-strip gasketing on exterior hollow metal doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide noncorrosive fasteners as indicated by models in hardware sets.

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. Mullion Gasketing: Fasten to mullions, forming seal when doors are closed.
4. Sweeps: Apply to bottom of in-swinging hollow metal doors, forming seal with threshold when door is closed.
5. Seals integral to threshold at out-swinging exterior doors.

B. Air Leakage: Not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283.

C. 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.

D. 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 or UBC Standard 7-2.

1. Test Pressure: After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches (1016 mm) or less above the sill.

E. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.

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:
1. As specified in hardware sets or approved equal.
2. Screwed-on weatherstrip and sweeps. Polyurethane.
3. Panic type thresholds. Polyurethane.

H. Available Manufacturers:

1. Hager Companies (HAG).
2. National Guard Products (NGP).
3. Pemko Manufacturing Co. (PEM).
4. Reese Enterprises (RE).
5. Zero International (ZRO).

2.22 THRESHOLDS

A. Standard: BHMA A156.21

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), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.

C. Thresholds for Means of Egress Doors: Comply with NFPA 101. Maximum 1/2 inch (13 mm) high.

D. Fasteners: ¼-20 machine screws and expansion anchors.

E. Gasketing material: At panic-type thresholds: polyurethane.

F. Available Manufacturers:

1. Hager Companies (HAG).
2. National Guard Products (NGP).
3. Pemko Manufacturing Co. (PEM).
4. Reese Enterprises (RE).
5. Zero International (ZRO).

2.23 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 Architect.

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: Manufacturer's standard, except as noted in product sections of this specification.

2.24 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 ACCESS CONTROL SYSTEM

A. Installation and Procurement Scope:

1. High Voltage Electrical Power (Electrical Contractor under contract to the Contract Hardware Supplier) is to provide:
   a. (3) 110VAC, 5A grounded double outlets inside Mechanical Closet 141 (exact location as directed by Architect) for use of access control system.
   b. (1) network connection inside Mechanical Closet 141 (exact location as directed by Architect) for use of Owner's access control system.
   c. Conduit rough-in with pull strings and cover plates to (10) future to automatic door operators locations and (20) pushbutton actuator locations.

2. Low Voltage (access control supplier, electrical contractor,: all under contract to Contract Hardware Supplier) to provide:
   a. Door Junction Panel at each opening: 12 x 12 x 5 junction box with hinged key locked cover (all keyed alike).
   b. Provide 125 mHZ HID compatible proximity readers as referenced in hardware sets.
   c. Mount each electrified hardware item, including providing mounting boxes as required.
   d. Cabling and conduit as required for function and to meet Code from all Category B through E materials to Door Junction Panel at each opening, and from each Door Junction Panel back to Electrical Room 1314.
   e. Make connections at electrified hardware items, door junction panels, and to head-in system components, clearly labeling cables for identification.
   f. Provide power supplies as needed to power all electrified hardware materials.
   g. Provide controllers, panels, relays, software, licensing, etc. as required for fully functional system in Mechanical Closet 141.
   h. Provide (500) 125mHz HID compatible cards suitable for printing and using as photo ID badges, badge printer and software.
   i. Provide system setup and owner training as required by Owner.
   j. Provide detailed riser and point-to-point wiring diagrams for future trouble-shooting and expansion.

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

3.3 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.

3.4 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 09 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. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule. Document cross-indexing per manufacturer's instructions.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

3.5 FIELD QUALITY CONTROL

A. Provide Door Hardware Inspection Services and Field Quality Report as indicated below.

B. Door Hardware Inspection Services

1. Scope
   a. Inspection of all swinging doors and door hardware immediately following completion of installation.

b. Inspector to furnish a Field Quality Report, itemized per each individual opening, to the Architect within 7 days of the inspection, including:
   1) deficiencies in workmanship and standard industry practices,
   2) use of allowable products,
   3) use of manufacturer recommended fasteners,
   4) compliance with the ADA,
   5) proper door/frame/hardware clearances,
   6) problems related to function, security, aesthetics or maintenance.

c. Follow-up inspections as required for additional fee.

2. Inspector Qualifications
   1) Certified Architectural Hardware Consultant.
   2) Entirely independent of the supply side of the project, having no familial or financial relationship with any manufacturer, manufacturer's representative, distributor, installer or supplier used on this project.
   3) Approved by Architect. Go to http://www.dhi.org/ for searchable list of local Architectural Hardware Consultants.

3.6 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 (75 mm) from the latch, measured to the leading edge of the door.

B. Occupancy Adjustment: Approximately six months after date of Substantial Completion, Installer shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.7 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.

3.8 DOOR HARDWARE SETS (on following pages with Door-Set Index afterward) TBD

Note: Door-Set Index begins on following page.

3.7 DOOR-SET INDEX TBD

END OF SECTION 08710

SECTION 08800 - GLAZING

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 glazing for the following products, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Insulated, Clear,Wire Glass, Tempered, Insulated, Spandrel, and Frosted Glazing panels.

a. Storefront assemblies
b. Vision lites
c. Entrances and other doors
d. Window units
e. Tempered glass shelves at display cases

B. Related Sections: The following sections contain requirements that relate to this Section.

1. Aluminum storefronts.

1.3 DEFINITIONS

A. Manufacturer is used in this Section to refer to a firm that produces primary glass or fabricated glass as defined in the referenced glazing standard.

B. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use due to causes other than glass breakage and improper practices for maintaining, and cleaning insulating glass. Evidence of failure is the obstruction of vision by dust, moisture, or film on the interior surfaces of glass. Improper practices for maintaining and cleaning glass do not comply with the manufacturer's directions.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems that are produced, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading (where applicable), without failure including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; and other defects in construction.

B. Glass Design: Glass thicknesses indicated on Drawings are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for the various size openings in the thicknesses and strengths (annealed or heat-treated) to meet or exceed the following criteria:

Comment [COMMENT1]: MASTERSPEC text, Copyright 1991, AIA, The American Institute of Architects

Comment [COMMENT2]: Paragraph number formatting method, Copyright 1988, ARCOM, Architectural Computer Services, Inc.

Comment [COMMENT3]: THIS SECTION WAS SEARCHED FOR REQUIREMENTS INVOLVING INCH-POUND UNITS. IF SUCH UNITS WERE FOUND, THE APPROPRIATE METRIC UNITS WERE ADDED, INCLUDING ANY METRIC EDITIONS OF REFERENCED STANDARDS ISSUED SINCE THE SECTION WAS PREVIOUSLY ISSUED. NO EVALUATION WAS MADE OF ADDED REFERENCED STANDARDS TO DETERMINE OTHER EFFECTS ON THIS SECTION. EXCEPT FOR ADDING METRICATION, NO OTHER REVISIONS WERE MADE.

Comment [COMMENT4]: THIS SECTION USES THE TERM ARCHITECT. CHANGE THIS TERM AS NECESSARY TO MATCH ACTUAL TERM USED TO IDENTIFY DESIGN PROFESSIONAL AS DEFINED IN GENERAL AND SUPPLEMENTARY CONDITIONS.

Comment [COMMENT5]: ADJUST LIST BELOW TO SUIT PROJECT.

Comment [COMMENT6]: LIST ONLY PRODUCTS, CONSTRUCTION, AND EQUIPMENT INCLUDED IN THIS PROJECT THAT THE READER WOULD EXPECT TO FIND IN THIS SECTION. VERIFY THAT SECTIONS LISTED ARE INCLUDED IN THIS SPECIFICATION AND THAT THEIR TITLES ARE CORRECT. CONSIDER EXPANDING LIST TO INCLUDE THE SECTIONS WHERE PREGLAZED (FACTORY- OR SHOP-GLAZED) CONSTRUCTION IS SPECIFIED.

Comment [COMMENT7]: DELETE DEFINITIONS BELOW NOT APPLICABLE TO PRODUCTS RETAINED FOR PROJECT.

Comment [COMMENT8]: BELOW ASSUMES GLASS THICKNESS INDICATED ON DRAWINGS. IF NOT, REVISE ACCORDINGLY.

1. Minimum glass thickness, nominally, of lites in exterior walls is 6 mm.
2. Tinted and heat-absorbing glass thicknesses for each tint indicated are the same throughout Project.
3. Minimum glass thicknesses of lites, whether composed of annealed or heat-treated glass, are selected so the worst-case probability of failure does not exceed the following:

   a. 8 lites per 1000 for lites set vertically or not over 15 degrees off vertical and under wind action. Determine minimum thickness of monolithic annealed glass according to ASTM E 1300. For other than monolithic annealed glass, determine thickness per glass manufacturer's standard method of analysis including applying adjustment factors to ASTM E 1300 based on type of glass.

C. Normal thermal movement results from the following maximum change (range) in ambient and surface temperatures acting on glass-framing members and glazing components. Base engineering calculation on materials' actual surface temperatures due to both solar heat gain and nighttime sky heat loss.

1. Temperature Change (Range): 120 F deg (67 C deg), ambient; 180 F deg (100 C deg), material surfaces.

1.5 SUBMITTALS

A. General: Submit the following according to Conditions of Contract and Division 1 Specification Sections.

B. Product data for each glass product and glazing material indicated.

C. Samples for verification purposes of 12-inch (300 mm) square samples of each type of glass indicated except for clear monolithic glass products, and 12-inch (300 mm) long samples of each color required (except black) for each type of sealant or gasket exposed to view. Install sealant or gasket sample between two strips of material representative in color of the adjoining framing system.

D. Product certificates signed by glazing materials manufacturers certifying that their products comply with specified requirements.

1. Separate certifications are not required for glazing materials bearing manufacturer's permanent labels designating type and thickness of glass, provided labels represent a quality control program of a recognized certification agency or independent testing agency acceptable to authorities having jurisdiction.

E. Compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed for adhesion.

F. Compatibility test report from manufacturer of insulating glass edge sealant indicating that glass edge sealants were tested for compatibility with other glazing materials including sealants, glazing tape, gaskets, setting blocks, and edge blocks.

Comment [COMMENT9]: REVISE ABOVE IF A GREATER MINIMUM THICKNESS REQUIRED. REVISE BELOW IF VARYING THICKNESS REQUIRED FOR SPECIFIC LOCATIONS.

Comment [COMMENT10]: PROBABILITY OF FAILURE VALUE OF 8 PER 1000 IS REPRESENTED IN ASTM E 1300 AND MFRS' CHARTS. FOR CERTAIN APPLICATIONS A LOWER VALUE MAY BE NEEDED. REVISE REFERENCES TO ASTM E 1300, IF OTHER, MORE STRINGENT CRITERIA APPLIES TO PROJECT.

Comment [COMMENT11]: VALUE BELOW IS AN EXAMPLE ONLY AND IS NOT FOUND IN ANY STANDARD OR ENDORSED BY GLASS MFRS. IT DOES REPRESENT THE RECOMMENDATION IN AAMA PUBLICATION "GLASS DESIGN FOR SLOPED GLAZING." REVISE TO SUIT PROJECT CONDITIONS.

Comment [COMMENT12]: DIFFERENTIAL VALUES BELOW ARE SUITABLE FOR MOST OF THE UNITED STATES AND FOR ALUMINUM IN PARTICULAR. REVISE TO SUIT LOCAL CONDITIONS.

Comment [COMMENT13]: GENERALLY RETAIN BELOW UNLESS TYPES OF GLASS SELECTED DO NOT REQUIRE LABELING BY AUTHORITIES HAVING JURISDICTION, OR IF CERTIFICATION IS REQUIRED AS WELL AS LABELS. SEE EVALUATION SHEETS.

Comment [COMMENT14]: DELETE BELOW IF NO INSULATING GLASS SPECIFIED.

G. Product test reports for each type of glazing sealant and gasket indicated, evidencing compliance with requirements specified.

H. Maintenance data for glass and other glazing materials to include in Operating and Maintenance Manual specified in Division 1.

1.6 QUALITY ASSURANCE

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. FGMA Publications: "FGMA Glazing Manual."
2. SIGMA Publications: TM-3000 "Vertical Glazing Guidelines".

Comment [COMMENT15]: DELETE BELOW IF NO SLOPED GLAZING.

B. Safety Glass: Products complying with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials.

1. Subject to compliance with requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction.

Comment [COMMENT16]: DELETE BELOW IF NOT APPLICABLE. NOT ALL MFRS PARTICIPATE IN SGCC AND THIRD-PARTY TESTING PROGRAMS.

C. Fire-Resistive Glazing Products for Door Assemblies: Products identical to those tested per ASTM E 152, labeled and listed by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

D. Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or at least one component lite of units with appropriate certification label of inspecting and testing agency indicated below:

1. Insulating Glass Certification Council (IGCC).

Comment [COMMENT17]: RETAIN ABOVE FOR DOORS AND BELOW FOR WINDOWS IF WIRE GLASS OR ANOTHER FIRE-RESISTANT GLAZING PRODUCT SPECIFIED IN PART 2.

E. Glazier Qualifications: Engage an experienced glazier who has completed glazing similar in material, design, and extent to that indicated for Project with a record of successful in-service performance.

Comment [COMMENT18]: RETAIN ABOVE OR BELOW OR BOTH. PARTICIPANTS IN AGENCY PROGRAMS BELOW ARE PRIMARILY MFRS OF WINDOWS AND DOORS. VERIFY THAT TYPES OF UNITS REQUIRED ARE CERTIFIED.

F. Single-Source Responsibility for Glass: Obtain glass from one source for each product indicated below:

1. Primary glass of each (ASTM C 1036) type and class indicated.
2. Heat-treated glass of each (ASTM C 1048) condition indicated.
3. Insulating glass of each construction indicated.

Comment [COMMENT19]: DELETE SUBPARAs BELOW NOT APPLICABLE TO PROJECT.

G. Single-Source Responsibility for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.

H. Preconstruction Compatibility and Adhesion Testing: Submit to sealant manufacturers, samples of each glass, gasket, glazing accessory, and glass-framing member that will contact or affect glazing sealants for compatibility and adhesion testing as indicated below:

Comment [COMMENT20]: DELETE BELOW IF NORMAL SAMPLE SUBMITTAL IS SUFFICIENT. REVISE IF SPECIFIC REQUIREMENTS FOR MOCKUPS ARE INDICATED ON DRAWINGS OR IF GLAZING IS PART OF LARGER MOCKUP SPECIFIED IN ANOTHER SECTION. IF RETAINED INDICATE LOCATION, SIZE, AND OTHER DETAILS OF MOCKUPS ON DRAWINGS OR BY INSERTS.

1. Use test methods standard with sealant manufacturer to determine if priming and other specific preparation techniques are required for rapid, optimum glazing sealants adhesion to glass and glazing channel substrates.

a. Perform tests under normal environmental conditions during installation.

2. Submit not less than nine pieces of each type and finish of glass-framing members and each type, class, kind, condition, and form of glass (monolithic, laminated, insulating units) for adhesion testing, as well as one sample of each glazing accessory (gaskets, setting blocks and spacers) for compatibility testing.
3. Schedule sufficient time to test and analyze results to prevent delay in the Work.
4. Investigate materials failing compatibility or adhesion tests and get sealant manufacturer's written recommendations for corrective measures, including using special primers.
5. Testing is not required when glazing sealant manufacturer can submit required preparation data that is acceptable to Architect and is based on previous testing of current sealant products for adhesion to and compatibility with submitted glazing materials.

Comment [COMMENT21]: RETAIN BELOW WHERE UNUSUAL ENVIRONMENTAL CONDITIONS MAY EXIST DURING INSTALLATION THAT COULD AFFECT SEALANT PERFORMANCE.

Comment [COMMENT22]: DELETE BELOW IF TESTING PROJECT MATERIAL IS REQUIRED.

1.7 DELIVERY, STORAGE, AND HANDLING

Comment [COMMENT23]: DELETE BELOW IF WORK IS NOT EXTENSIVE OR COMPLEX ENOUGH TO JUSTIFY CONFERENCE.

A. Protect glazing materials to comply with manufacturer's directions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1. Where insulating glass units will be exposed to substantial altitude changes, comply with insulating glass fabricator's recommendations for venting and sealing to avoid hermetic seal ruptures.

Comment [COMMENT24]: DELETE BELOW IF NO INSULATING GLASS OR IF NO EXPOSURE TO ALTITUDE CHANGES.

1.8 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing materials manufacturer or when glazing channel substrates are wet from rain, frost, condensation, or other causes.

Comment [COMMENT25]: DELETE BELOW IF NO LIQUID SEALANTS REQUIRED OR REQUIREMENTS LISTED ABOVE ARE ADEQUATE. REVISE IF OTHER TEMPERATURE RANGE REQUIRED.

1.9 WARRANTY

Comment [COMMENT26]: GENERALLY DELETE THIS ARTICLE. WARRANTIES ARE USUALLY INTENDED ONLY FOR CUSTOM FABRICATED WORK OR INSTALLATIONS WHERE INITIAL COST IS NOT A FACTOR. IF WARRANTIES ARE REQUIRED, VERIFY WITH THE OWNER'S COUNSEL THAT THE WARRANTIES STATED IN THIS ARTICLE ARE NOT LESS THAN WHAT IS AVAILABLE TO THE OWNER UNDER PREVAILING LOCAL LAWS. COORDINATE WITH DIVISION 1 SECTION "WARRANTIES AND BONDS."

A. General: Warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

B. Manufacturer's Warranty on Insulating Glass: Submit written warranty signed by manufacturer of insulating glass agreeing to furnish replacements for insulating glass units that deteriorate as defined in "Definitions" article, f.o.b. point of manufacture, freight allowed Project site, within specified warranty period indicated below. Warranty covers only deterioration due to normal conditions of use and not to handling, installing, protecting, and maintaining practices contrary to glass manufacturer's published instructions.

1. Warranty Period: Manufacturer's standard but not less than 10 years after date of Substantial Completion.

Comment [COMMENT27]: BELOW ARE EXAMPLES ONLY. VERIFY AVAILABLE WARRANTIES FROM MFRS SPECIFIED AND ON LENGTH OF WARRANTY PERIOD.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products specified in Product Data at end of this Section, or equal.

2.2 PRIMARY FLOAT GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I (transparent glass, flat), Class as indicated below, and Quality q3 (glazing select).

1. Class 1

B. Refer to requirements for sealed insulating glass units for performance characteristics of assembled units composed of tinted glass, coated or uncoated, relative to visible light transmittance, U-values, shading coefficient, and visible reflectance.

2.3 HEAT-TREATED FLOAT GLASS PRODUCTS, GENERAL

A. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.

2.4 HEAT-TREATED FLOAT GLASS

A. Uncoated, Clear, Heat-Treated Float Glass: ASTM C 1048, Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1, Quality q3 (glazing select), kind as indicated below.

1. Kind FT (fully tempered) where indicated and required by Kentucky Building Code.

B. Uncoated, Tinted, Heat-Treated Float Glass: ASTM C 1048, Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 2 (tinted heat-absorbing and light-reducing), Quality q3 (glazing select), with tint color and performance characteristics for 6 mm thick glass matching those indicated for annealed primary tinted float glass; kind as indicated below:

1. Kind FT (fully tempered) where indicated and required by Kentucky Building Code and/or to meet loading requirements.

C. Available Manufacturers: Subject to compliance with requirements, provide heat-treated glass by one of the following, or equal.

1. AFG Industries, Inc.
2. Artistic Glass Products Co.
3. Cardinal IG
4. Saint-Gobain
5. Falconer Glass Industries
6. Glasstemp, Inc.
7. Guardian Industries Corp.
8. HGP Industries

Comment [COMMENT28]: POSSIBLY INSERT GLAZIER'S WARRANTY COVERING LABOR TO REPLACE INSULATING GLASS UNITS OR, AS AN ALTERNATIVE, A MAINTENANCE CONTRACT THAT INCORPORATES UNIT PRICES FOR REPLACEMENT LABOR.

Comment [COMMENT29]: RETAIN THIS ARTICLE WITH OTHER, SUBSEQUENT ARTICLES SPECIFYING FABRICATED GLASS PRODUCTS (HEAT-TREATED, ETC.) WHERE REFERENCE IS MADE TO REQUIREMENTS IN THIS ARTICLE. SEE EDITING INSTRUCTION NO. 3 IN EVALUATIONS.

Comment [COMMENT30]: RETAIN ONE REQUIREMENT FROM THREE SUBPARAs BELOW. RETAIN LAST SUBPARA IF CLASS SPECIFIED EXCLUSIVELY IN DATA SHEETS.

Comment [COMMENT31]: DELETE THIS ARTICLE IF ASTM C 1048 COMPLIANCE IS ALL THAT IS REQUIRED.

Comment [COMMENT32]: RETAIN KINDS OF HEAT-TREATED GLASS PRODUCTS BELOW REQUIRED FOR PROJECT; COORDINATE CHOICES WITH MFR'S LISTING AND WITH REQUIREMENTS IN ARTICLES ON OTHER FABRICATED GLASS PRODUCTS WHICH REFERENCE REQUIREMENTS IN THIS ARTICLE.

Comment [COMMENT33]: DELETE ABOVE OR BELOW OR REVISE AND INSERT WHICH PROCESS TO USE WITH EACH SPECIFIC TYPE OF HEAT-TREATED FLAT GLASS SELECTED. SEE EVALUATIONS. VERIFY THAT GLASS WIDTHS INDICATED CAN BE MANUFACTURED WITH ROLL WAVE PARALLEL WITH BOTTOM EDGE.

Comment [COMMENT34]: RETAIN KINDS OF HEAT-TREATED GLASS PRODUCTS BELOW THAT ARE REQUIRED FOR PROJECT; CORRELATE CHOICES WITH MFR'S LISTING AND WITH REQUIREMENTS IN PRECEDING AND SUBSEQUENT ARTICLES THAT REFER TO REQUIREMENTS IN THIS ARTICLE.

Comment [COMMENT35]: RETAIN ONE OR BOTH BELOW.

Comment [COMMENT36]: RETAIN ONE OR BOTH BELOW.

Comment [COMMENT37]: SEE EDITING INSTRUCTION NO. 1 IN EVALUATIONS FOR CAUTIONS ABOUT NAMING PRODUCTS AND MFRS.

9. PPG Industries, Inc.
10. Spectrum Glass Products, Inc.
11. Tempglass
12. Viracon, Inc.

2.5 WIRED GLASS

A. Wired Glass: ASTM C 1036, Type II (patterned and wired glass, flat), Class 1 (clear), Quality q8 (glazing); 6.4 mm thick; of form and mesh pattern indicated below:

1. Polished Wired Glass: Form 1 (wired, polished both sides), and as follows:

a. Mesh m1 (diamond).

B. Manufacturers: Subject to compliance with requirements, provide wired glass by one of the following companies.

1. Polished Wired Glass:

a. Ashai Glass Co.
b. Central Glass Co., Ltd.
c. Nippon Sheet Glass Ltd.
d. Pilkington Sales (North America) Ltd.
e. AFG Industries, Inc.
f. Guardian Industries Corp.

Comment [COMMENT38]: IF WIRE GLASS RETAINED BELOW FOR USE AS FIRE-RESISTANT APPLICATIONS, RETAIN APPLICABLE FIRE-RESISTANT GLAZING PRODUCT PARA IN PART 1 "QUALITY ASSURANCE" ARTICLE.

Comment [COMMENT39]: RETAIN ONE FORM AND MESH FROM FOLLOWING CHOICES OR DELETE ALL AND INSERT ANOTHER. VERIFY AVAILABILITY. SEE EVALUATIONS FOR DISCUSSION OF SOURCES FOR WIRED GLASS.

Comment [COMMENT40]: DELETE ABOVE OR BELOW.

Comment [COMMENT41]: SEE EDITING INSTRUCTION NO. 1 IN EVALUATIONS FOR CAUTIONS ABOUT NAMING PRODUCTS AND MFRS.

2.6 ELASTOMERIC GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
2. Suitability: Comply with sealant and glass manufacturer's recommendations for selecting glazing sealants and tapes that are suitable for applications indicated and conditions existing at time of installation.

3. Colors: Provide color of exposed joint sealants to comply with the following:

a. Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

C. Elastomeric Glazing Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that comply with ASTM C 920 requirements indicated on each Elastomeric Glazing Sealant Product Data at the end of this Section, including those referencing ASTM classifications for Type, Grade, Class and Uses.

1. Additional Movement Capability: Where additional movement capability is specified in Elastomeric Glazing Sealant Product Data, provide products, when tested for adhesion and

Comment [COMMENT42]: RETAIN ONE REQUIREMENT FROM CHOICES BELOW. IF FIRST REQUIREMENT IS RETAINED, INDICATE COLORS, ETC., ON SEPARATE SCHEDULE.

Comment [COMMENT43]: RETAIN PARA BELOW AND AS MANY EDITED DATA SHEETS AT END OF SECTION AS NEEDED TO SPECIFY ELASTOMERIC SEALANTS FOR EACH DIFFERENT GLAZING APPLICATION. SEE EDITING INSTRUCTION NO. 2.

Comment [COMMENT44]: DELETE BELOW IF CORRESPONDING REQUIREMENT IS NOT RETAINED IN PRODUCT DATA SHEETS AT END OF THIS SECTION. ADDITIONAL MOVEMENT CAPABILITY REQUIREMENT APPLIES ONLY TO THOSE LOW- AND MEDIUM-MODULUS SILICONES AND OTHER SEALANTS OF CLASS 25 THAT HAVE CAPABILITY TO MOVE IN EXCESS OF 25 PERCENT IN BOTH COMPRESSION AND EXTENSION PER ASTM C 719.

cohesion under maximum cyclic movement per ASTM C 719, with the capability to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements of ASTM C 920 for uses indicated.

D. Glazing Sealant for Fire-Resistant Glazing Products: Identical to product used in test assembly to obtain fire-resistive rating.

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent, nonstaining and nonmigrating in contact with nonporous surfaces, with or without spacer rod as recommended by tape and glass manufacturers for application indicated, packaged on rolls with a release paper backing, and complying with AAMA 800 for products indicated below:

1. AAMA 804.1.

B. Expanded Cellular Glazing Tape: Closed-cell, polyvinyl chloride foam tape, factory coated with adhesive on both surfaces, packaged on rolls with release liner protecting adhesive, and complying with AAMA 800 for product 810.5.

C. Products: Subject to compliance with requirements, provide one of the following:

1. Back-Bedding Mastic Glazing Tape Without Spacer Rod:

   a. PTI 303 Glazing Tape (shimless), Protective Treatments, Inc.
   b. S-M 5700 Poly-Glaze Tape Sealant, Schnee-Morehead, Inc.
   c. Tremco 440 Tape, Tremco Inc.
   d. Extru-Seal, Pecora Corp.
   e. PTI 606 Architectural Sealant Tape, Protective Treatments, Inc.

2. Back-Bedding Mastic Glazing Tape With Spacer Rod:

   a. PTI 303 Glazing Tape (with shim), Protective Treatments, Inc.
   b. Pre-shimmed Tremco 440 Tape, Tremco, Inc.
   c. PTI 606 Architectural Sealant Tape, Protective Treatments, Inc.

3. Expanded Cellular Glazing Tape:

   a. Norseal V-980 Closed-Cell Glazing Tape, Norton Company.

2.8 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:

1. Neoprene, ASTM C 864.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the

Comment [COMMENT45]: TAPES WITHOUT CONTINUOUS SPACER RODS ARE GENERALLY RECOMMENDED FOR LIGHTS UNDER 75 TO 100 UNITED INCHES (1875 to 2500 mm), DEPENDING ON MFR, AND TAPES WITH SPACER RODS, FOR LIGHTS OVER 75 TO 100 UNITED INCHES (1875 to 2500 mm). REFER TO MFR'S LITERATURE FOR OTHER LIMITATIONS.

Comment [COMMENT46]: RETAIN ONE OR MORE BACK BEDDING TAPES FROM CHOICES BELOW. CORRELATE WITH PRODUCT LISTING. 804.1 TAPE PERMITS MODERATE MOVEMENT (SOME MFRS LIMIT USE TO LITES UP TO 75 UNITED INCHES (1875 mm) IN SIZE), 806.1 TAPE PERMITS LIMITED MOVEMENT, AND 807.1 TAPE PERMITS LARGE AMOUNTS OF MOVEMENT.

Comment [COMMENT47]: SEE EDITING INSTRUCTION NO. 1 IN EVALUATIONS FOR CAUTIONS ABOUT NAMING PRODUCTS AND MFRS.

Comment [COMMENT48]: PRODUCTS BELOW ADVERTISED AS COMPLYING WITH AAMA 804.1.

Comment [COMMENT49]: PRODUCTS BELOW ADVERTISED AS COMPLYING WITH BOTH AAMA 804.1 AND AAMA 807.1.

Comment [COMMENT50]: PRODUCTS BELOW ADVERTISED AS COMPLYING WITH AAMA 06.1.

Comment [COMMENT51]: PRODUCTS BELOW ADVERTISED AS COMPLYING WITH AAMA 804.1.

Comment [COMMENT52]: PRODUCT BELOW ADVERTISED AS COMPLYING WITH BOTH AAMA 804.1 AND AAMA 807.1.

Comment [COMMENT53]: RETAIN ONE OR MORE MATERIALS BELOW. NEOPRENE IS NOT COMPATIBLE WITH SILICONE GLAZING SEALANTS.

following companies.

1. Preformed Gaskets:

    a. Advanced Elastomer Systems, L.P.
    b. Schnee-Morehead, Inc.
    c. Tremco, Inc.

Comment [COMMENT54]: SEE EDITING INSTRUCTION NO. 1 IN EVALUATIONS FOR CAUTIONS ABOUT NAMING PRODUCTS AND MFRS.

2.9 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials involved for glazing application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85 plus or minus 5.

E. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

F. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side-walking).

Comment [COMMENT55]: DELETE BELOW WHERE NONE NEEDED IN GLAZING CHANNELS.

G. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonextruding, nonoutgassing, strips of closed-cell plastic foam of density, size, and shape to control sealant depth and otherwise contribute to produce optimum sealant performance.

2.10 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

Comment [COMMENT56]: DELETE BELOW IF NO BUTT-GLAZED LITES.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine glass framing, with glazier present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Do not proceed with glazing until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

3.3 GLAZING, GENERAL

A. Comply with combined recommendations of manufacturers of glass, sealants, gaskets, and other glazing materials, except where more stringent requirements are indicated, including those in referenced glazing publications.

B. Glazing channel dimensions as indicated on Drawings provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

C. Protect glass from edge damage during handling and installation as follows:

1. Use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass lites with flares or bevels on bottom horizontal edges so edges are located at top of opening, unless otherwise indicated by manufacturer's label.
2. Remove damaged glass from Project site and legally dispose of off site. Damaged glass is glass with edge damage or other imperfections that, when installed, weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

E. Install elastomeric setting blocks in sill rabbets, sized and located to comply with referenced glazing standard, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass sizes larger than 50 united inches (1250 mm) (length plus height) as follows:

1. Locate spacers inside, outside, and directly opposite each other. Install correct size and spacing to preserve required face clearances, except where gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and comply with system performance requirements.
2. Provide 1/8-inch (3 mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking to comply with requirements of referenced glazing publications, unless otherwise required by glass manufacturer.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

Comment [COMMENT57]: DELETE THE FOLLOWING TWO PARAs IF NO GLAZING WITH WEDGE-SHAPED GASKETS REQUIRED FOR PROJECT.

K. Square cut wedge-shaped gaskets at corners and install gaskets in manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that when compressed by glass their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously but not in one continuous length. Do not stretch tapes to make them fit opening.

C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until just before each lite is installed.

Comment [COMMENT58]: DELETE BELOW IF NOT REQUIRED OR QUALIFY BY ADDING WHERE INDICATED AND SHOW LOCATIONS ON DRAWINGS OR SCHEDULES.

F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

Comment [COMMENT59]: DELETE BELOW IF NOT APPLICABLE OR REVISE. BELOW ASSUMES FIXED STOP IS LOCATED ON EXTERIOR.

3.5 GASKET GLAZING (DRY)

A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.

B. Secure compression gaskets in place with joints located at corners to compress gaskets producing a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

C. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel weep systems until sealants cure. Secure spacers in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of

sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass. Install pressurized gaskets to protrude slightly out of channel to eliminate dirt and moisture pockets.

3.7 PROTECTION AND CLEANING

A. Protect exterior glass from breakage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkali deposits, or stains, and remove as recommended by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents and vandalism, during construction period.

E. Wash glass on both faces in each area of Project not more than 4 days prior to date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

Comment [COMMENT60]: REMOVE BELOW AS DESIRED FOR PROJECT.

PRIMARY CLEAR FLOAT GLASS PRODUCT DATA:

A. Class: Class 1 clear float glass, quality q3 (glazing select).

B. Provide products by one of the following manufacturers.
   1. AFG Industries, Inc.
   2. Ford Glass Division.
   3. LOF Glass, Inc.
   4. PPG Industries, Inc.
   5. Saint-Gobain/Euroglass.
   6. Guardian Industries Corp.
   7. Viracon (Basis of Design)

END OF SECTION 08800

SECTION 09511 - ACOUSTICAL PANEL CEILINGS

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 ceilings composed of acoustical panels, gypsum panels and exposed suspension systems.

B. This section includes specialty ceiling trim (Lighting Channel)

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Samples for initial selection in the form of manufacturer's color charts consisting of actual acoustical panels or sections of panels and sections of suspension system members showing the full range of colors, textures, and patterns available for each ceiling assembly indicated.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed acoustical panel ceilings similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:

1. Fire-response tests are performed by a qualified testing and inspecting agency. Qualified testing and inspecting agencies include Underwriters Laboratories (UL), Warnock Hersey, or another agency that is acceptable to authorities having jurisdiction and that performs testing and follow-up services.
2. Surface-burning characteristics of acoustical panels comply with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84.
3. Acoustical panel ceilings indicated are identical in materials and construction to those tested for fire resistance per ASTM E 119.
4. Fire-resistance-rated, acoustical panel ceilings are indicated by design designations listed in the UL "Fire Resistance Directory," in the Warnock Hersey "Certification Listings," or in the listing of another qualified testing and inspecting agency.
5. Products are identified with appropriate markings of applicable testing and inspecting agency.

C. Single-Source Responsibility for Ceiling Units: Obtain each type of acoustical ceiling panel from a single source with resources to provide products of consistent quality in appearance and

Comment [COMMENT1]: MASTERSPEC text, Copyright 1993, AIA, The American Institute of Architects

Comment [COMMENT2]: Paragraph number formatting method, Copyright 1988, ARCOM, Architectural Computer Services, Inc.

Comment [COMMENT3]: THIS SECTION USES THE TERM ARCHITECT. CHANGE THIS TERM AS NECESSARY TO MATCH THE ACTUAL TERM USED TO IDENTIFY THE DESIGN PROFESSIONAL AS DEFINED IN THE GENERAL AND SUPPLEMENTARY CONDITIONS.

Comment [COMMENT4]: DELETE ABOVE IF COLORS, ETC., ARE PRESELECTED AND SPECIFIED OR SCHEDULED. RETAIN BELOW WITH OR WITHOUT ABOVE.

Comment [COMMENT5]: REVISE BELOW IF ONLY CEILINGS TESTED BY ONE OR MORE SPECIFICALLY NAMED TESTING AND INSPECTING AGENCIES ARE ACCEPTABLE.

Comment [COMMENT6]: REVISE BELOW IF SELECTING CLASS B MATERIALS. CLASS B UNITS ARE THOSE WITH FLAME NOT EXCEEDING 75 ON FACE SIDE.

Comment [COMMENT7]: DELETE THE NEXT 3 SUBPARAS IF NO FIRE-RESISTANCE-RATED, ACOUSTICAL PANEL CEILINGS ARE REQUIRED FOR PROJECT.

Comment [COMMENT8]: INDICATE RATING, TESTING AGENCY, AND TESTING AGENCY'S DESIGN DESIGNATION ON DRAWINGS. REVISE BELOW TO CORRELATE WITH ANY CHANGES MADE IN THE FIRST SUBPARA ABOVE RELATIVE TO NAMES OF TESTING AGENCIES.

physical properties without delaying the Work.

D. Single-Source Responsibility for Suspension System: Obtain each type of suspension system from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes. Do not deliver any material to the project site until buildings normal operating temperature and humidity levels have been reached and will be maintained.

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.

1.6 PROJECT CONDITIONS

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

1.7 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system components (if any), and partition assemblies (if any).

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels clearly describing contents.

1. Acoustical Ceiling Units: Furnish quantity of full-size units equal to 5.0 percent or one full carton whichever is greater of amount installed.
2. Exposed Suspension System Components: Furnish quantity of each exposed component equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide products with physical and performance characteristics specified for each type of acoustical panel as manufactured by:

Comment [COMMENT9]: GENERALLY DELETE BELOW UNLESS ACOUSTICAL PANELS WILL FIT ONLY THE SAME MFR'S SUSPENSION SYSTEM. ARMSTRONG AND USG INTERIORS OFFER BOTH SUSPENSION SYSTEMS AND ACOUSTICAL PANELS.

Comment [COMMENT10]: LIMITATIONS BELOW ARE NECESSARY FOR FIRST-CLASS RESULTS IN MANY LOCATIONS. MODIFY OR DELETE FOR HUMIDITY-RESISTANT PRODUCTS.

Comment [COMMENT11]: EXTRA MATERIALS MAY NOT BE ALLOWED FOR PUBLICLY FUNDED WORK.

Comment [COMMENT12]: RETAIN OR REVISE BELOW TO REPLACE PERCENTAGE WITH ACTUAL NUMBER OF UNITS AND COMPONENTS REQUIRED.

Comment [COMMENT13]: SEE EDITING INSTRUCTIONS NO. 1 THROUGH NO. 3 IN THE EVALUATIONS BEFORE EDITING THIS ARTICLE AND SUBSEQUENT ARTICLES, WHICH INCLUDE TWO DISTINCTLY DIFFERENT METHODS FOR SPECIFYING ACOUSTICAL PANEL CEILINGS. THE FIRST SET OF PARAS AND ACCOMPANYING LISTS ARE FOR SPECIFYING PANEL PRODUCTS WITHOUT USING PRODUCT DATA SHEETS. THE SECOND SET IS FOR SPECIFYING ACOUSTICAL PANEL CEILINGS USING PRODUCT DATA SHEETS. DELETE FIRST SET OF PARAS AND PRODUCT LISTS IF USING PRODUCT DATA SHEETS.

1. Armstrong World Industries, Inc.
2. Celotex Corporation.
3. USG Corporation.

2.2 ACOUSTICAL PANELS, GENERAL

A. 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 Noise Reduction Coefficient (NRC): Type E-400 (plenum mounting in which face of test specimen is 15-3/4 inches 400 mm away from the test surface) per ASTM E 795.
2. Test Method for Ceiling Attenuation Class (CAC): Where acoustical panel ceilings are specified to have a CAC, provide units identical to those tested per ASTM E 1414 by a qualified testing agency.

B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

1. Where appearance characteristics of acoustical panels are indicated by reference to ASTM E 1264 pattern designations and not to manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range of products that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.3 CEILINGS OF WATER-FELTED, MINERAL-BASE ACOUSTICAL PANELS (TYPE-A)

A. Panel Characteristics: Type III, Form 2 acoustical panels per ASTM E 1264, with painted finish, complying with pattern and other requirements indicated below:

1. Pattern: Panels fitting ASTM E 1264 pattern designations (pattern description) indicated below:
   a. Designation CD
2. Color/Light Reflectance Coefficient: White/LR 0.80 - 0.87.
3. Color: White.
4. Noise Reduction Coefficient: NRC 0.55.
5. Ceiling Attenuation: CAC 35-40.
6. Edge Detail: Square.
7. Thickness: 5/8 inch (16 mm).
8. Size: 24 by 48 inches (610 by 1220 mm).
9. Provide manufacturer's ceiling panel designed to withstand a minimum of 104°F and 90% relative humidity without visible sag. Provide manufacturer's standard fifteen (15) year warranty against any visible sag in ceiling panel.
10. Design Basis: USG Radar Climaplus #2410, or equal.

B. Suspension System Type: As described below and specified in Part 2 "Non-Fire-Resistance-Rated, Direct-Hung Suspension Systems" Article:

Comment [COMMENT14]: BELOW REPRESENTS THE STANDARD MOUNTING REFERENCED IN ASTM E 1264 FOR TESTING UNITS UNLESS A DIFFERENT MOUNTING METHOD IS SPECIFIED.

Comment [COMMENT15]: BELOW REFERENCES THE NEW ASTM TEST METHOD FOR MEASURING AIRBORNE SOUND ATTENUATION BETWEEN ROOMS SHARING A COMMON CEILING PLENUM. IT IS AN ADAPTATION OF THE AMA 1-II-1967 TEST METHOD, WHICH REMAINS THE METHOD REFERENCED IN ASTM E 1264. SEE EDITING INSTRUCTION NO. 6 IN THE EVALUATIONS BEFORE RETAINING BELOW. IF RETAINED, REVISE CEILING SOUND TRANSMISSION CLASS AND CSTC RATINGS TO CEILING ATTENUATION CLASS AND CAC RATINGS UNDER ARTICLES SPECIFYING DIFFERENT PANEL CEILINGS.

Comment [COMMENT16]: RETAIN BELOW ONLY IF PATTERNS ARE EXCLUSIVELY SPECIFIED BY USING ASTM E 1264 PATTERN DESIGNATIONS.

Comment [COMMENT17]: RETAIN ONE NOISE REDUCTION COEFFICIENT FROM BELOW.

Comment [COMMENT18]: RETAIN ONE EDGE DETAIL FROM BELOW OR REVISE.

1. USG Donn DX, or equal, wide-face, capped, double-web, steel suspension system. Color to be white.

Comment [COMMENT19]: DELETE ABOVE OR BELOW. CORRELATE SUSPENSION SYSTEM TYPE WITH PANEL EDGE DETAIL AND WITH REQUIREMENTS IN REFERENCED ARTICLE. SEE EDITING INSTRUCTION NO. 7 IN THE EVALUATIONS.

2.4 ACOUSTICAL CEILING SYSTEM (TYPE-B)

A. Panel Characteristics: Vinyl clad gypsum board. Gypsum board with sealed edges, formulated especially for ceiling application in humid environments; 1/2 inch thick.

1. Size: 24 by 24 inches. (2 x 2)
2. Finish: Vinyl film
3. Color: White
4. Light Reflectance Coefficient: Minimum LR 0.77
5. Products with properties specified, which are comparable in appearance to the following, will be considered.
   a. Provide product as manufactured by USG Interiors, Inc., Chicago, Illinois with the following physical and performance characteristics.
   b. Series: USG sheet rock lay-in, gypsum ceiling panel with laminated vinyl surface. Clima Plus laminated vinyl #3260, or equal
   c. Color: White Sheet Rock
   d. CAC minimum 35
   e. Grid: USG Donn DX or equal
   f. Edge DTL: Sq.

Comment [COMMENT20]: DELETE ABOVE OR BELOW. RETAIN ASTM PATTERN DESIGNATION ONLY WITH BELOW. SEE EDITING INSTRUCTION NO. 5 IN THE EVALUATIONS BEFORE MAKING A CHOICE. RETAIN ABOVE ONLY IF THE NAMES OF ONE OR MORE PRODUCTS ARE INSERTED IN REFERENCED "MANUFACTURERS" ARTICLE.

Comment [COMMENT21]: RETAIN ONE PATTERN DESIGNATION BELOW OR INSERT ANOTHER.

Comment [COMMENT22]: RETAIN ONE NOISE REDUCTION COEFFICIENT FROM BELOW.

B. Exposed Grid: Provide non-rust type with other characteristics same as specified for the preceding lay-in acoustical ceiling system.

1. Provide aluminum grid cap at wet areas.

2.5 METAL CEILING SYSTEM

A. System equal to Axiom edge trim, for use with any standard suspension system as manufactured by Armstrong World Industries, or approved equal.

B. Finish: White (field-painted)

2.6 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635 and ASTM C 636 requirements.

1. Accessories: Provide hold-down clips; minimum two per 2 feet of panel length at all vestibules and for a distance of 10 feet in from all exterior doors.

Comment [COMMENT23]: DELETE BELOW IF NOT REQUIRED. GENERALLY APPLICABLE TO HOT-DIP GALVANIZED-STEEL AND ALUMINUM SYSTEMS WITH ANODIZED FINISH. SHOW ON DRAWINGS THE LOCATION WHERE HIGH-HUMIDITY FINISHES ARE REQUIRED.

B. Finishes and Colors: Provide manufacturer's standard white factory-applied finish for type of system indicated.

C. Attachment Devices: Size for 5 times the design load indicated in ASTM C 635, Table 1.

Direct Hung unless otherwise indicated.

1. Cast-In-Place and Postinstalled Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attachment of hangers of type indicated and with capability to sustain, without failure, a load equal to 5 times that imposed by ceiling construction, as determined by testing per ASTM E 488, conducted by a qualified testing agency.

   a. Type: 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 service condition (mild).

D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated Carbon Steel Wire: ASTM A 641 (ASTM A 641M), Class 1 zinc coating, soft temper.
2. Size: Select wire diameter so that its stress at 3 times the hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than the yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.

E. Hanger Rods: Mild steel, zinc coated, or protected with rust-inhibitive paint.

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 (22 mm) wide, formed with 0.0396-inch- (1-mm-) thick galvanized-steel sheet complying with ASTM A 446, G 90 (ASTM A 446M, Z 275) Coating Designation, with bolted connections and 5/16-inch- (8-mm-) diameter bolts.

H. Sheet-Metal Edge Moldings and Trim: Type and profile indicated, or if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.

1. For lay-in panels with reveal edge details, provide stepped-edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

I. Impact Clips: Where required, provide manufacturer's standard impact-clip system design to absorb impact forces against acoustical panels.

2.7 NON-FIRE-RESISTANCE-RATED, DIRECT-HUNG SUSPENSION SYSTEMS

A. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from prepainted or electrolytic zinc-coated, cold-rolled steel sheet, with prefinished 15/16-inch- (24-mm-) wide metal caps on flanges; other characteristics as follows:

Comment [COMMENT24]: BELOW DOES NOT APPLY TO POWDER-ACTUATED FASTENERS. DELETE IF NO ANCHORAGE TO CONCRETE IS REQUIRED AND POWDER-ACTUATED FASTENERS ARE ACCEPTABLE. VERIFY SAFETY FACTOR WITH PROJECT'S STRUCTURAL ENGINEER.

Comment [COMMENT25]: SELECT TYPE BELOW THAT IS ACCEPTABLE. VERIFY WITH PROJECT'S STRUCTURAL ENGINEER.

Comment [COMMENT26]: RETAIN ONE CORROSION-PROTECTION SUBPARA BELOW OR, IF MORE THAN ONE IS REQUIRED, INDICATE BY INSERTING THE LOCATION OF EACH. ZINC PLATING OF THE CLASS INDICATED PROTECTS AGAINST CORROSION FROM AN INDOOR ATMOSPHERE; REVISE THICKNESS TO SUIT MORE CORROSIVE CONDITIONS OR USE STAINLESS STEEL OR NICKEL-COPPER ALLOY, DEPENDING ON CONDITIONS. IF POSTINSTALLED ANCHORS ARE USED TO ATTACH NICKEL-COPPER ALLOY WIRE HANGERS AND BRACES, CONSIDER RETAINING NICKEL-COPPER ANCHORS, AFTER FIRST VERIFYING AVAILABILITY WITH MFRS.

Comment [COMMENT27]: DELETE ABOVE OR BELOW UNLESS BOTH MATERIALS ARE REQUIRED. IF BOTH ARE REQUIRED, INDICATE LOCATION OF EACH. SEE THE EVALUATIONS FOR DISCUSSION ON CORROSION RESISTANCE OF HANGERS AND FASTENERS. REVISE HANGERS TO STRAP TYPE WHERE REQUIRED BY CODE OR LOCAL UNION REGULATIONS.

Comment [COMMENT28]: DELETE HANGER TYPES BELOW IF NOT REQUIRED. INSERT SIZES HERE OR SHOW ON DRAWINGS.

Comment [COMMENT29]: REVISE BELOW TO SUIT PROJECT CONDITIONS AND PRODUCTS SELECTED. COMPLEMENT BY SHOWING PROFILES ON DRAWINGS.

Comment [COMMENT30]: SELECT TYPES OF SYSTEMS REQUIRED FROM BELOW AND, UNDER EACH, SELECT ONE REQUIREMENT FROM EACH SET OF CRITERIA. BEFORE EDITING THIS ARTICLE, REFER TO EDITING INSTRUCTION NO. 7 AND TABLES OF PRODUCTS IN THE EVALUATIONS.

1. Structural Classification: Intermediate-duty system.
2. End Condition of Cross Runners: Override (stepped) or butt-edge type, as standard with manufacturer.
3. Cap Material and Finish: Steel sheet painted white.
4. Cap Material and Finish: Aluminum sheet with white painted finish. (Provide at dishwashing area.)

B. Products: Subject to compliance with requirements, provide one of the following:

1. Wide-Face, Capped, Double-Web, Steel Suspension Systems:

a. Prelude 15/16" Exposed Tee System (w/7300 m.r.); Armstrong World Industries, Inc.
b. 1200 System/211-219 Main Tee; Chicago Metallic Corporation.
c. DX 24 System; USG Interiors, Inc.

2.8 ACOUSTICAL SEALANT

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following requirements:

1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E 90.
2. Product has flame-spread and smoke-developed ratings of less than 25 per ASTM E 84.

B. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

C. Products: Subject to compliance with requirements, provide one of the following.

1. Acoustical Sealant for Exposed and Concealed Joints:

a. AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
b. SHEETROCK Acoustical Sealant; United States Gypsum Company.

2. Acoustical Sealant for Concealed Joints:

a. BA-98; Pecora Corp.
b. Tremco Acoustical Sealant; Tremco, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections

Comment [COMMENT31]: SEE EDITING INSTRUCTION NO. 4 IN THE EVALUATIONS FOR CAUTIONS ABOUT NAMING PRODUCTS AND MFRS AND NO. 3 IF PRODUCT DATA SHEETS ARE USED TO SPECIFY ACOUSTICAL RANEL CEILINGS.

Comment [COMMENT32]: THE FOLLOWING PRODUCTS ARE GROUPED UNDER TITLES MATCHING THOSE OF PRECEDING PARAS IN THIS ARTICLE DESCRIBING SUSPENSION SYSTEM CHARACTERISTICS. RETAIN ONLY THOSE PRODUCTS THAT CORRELATE WITH OTHER REQUIREMENTS SPECIFIED IN THIS SECTION.

Comment [COMMENT33]: PRODUCTS BELOW ARE INTERMEDIATE-DUTY SYSTEMS WITH STEEL OR ALUMINUM CAPS AND OVERRIDE CROSS TEES.

Comment [COMMENT34]: PRODUCT BELOW IS A STEEL-CAPPED, INTERMEDIATE-DUTY SYSTEM WITH OVERRIDE CROSS TEES THAT IS ONLY AVAILABLE EAST OF THE ROCKY MOUNTAINS.

Comment [COMMENT35]: PRODUCT BELOW IS A STEEL-CAPPED, INTERMEDIATE-DUTY SYSTEM WITH OVERRIDE OR BUTT-EDGE CROSS TEES.

Comment [COMMENT36]: PRODUCT BELOW IS A HEAVY-DUTY SYSTEM WITH STEEL OR ALUMINUM CAPS AND OVERRIDE CROSS TEES.

Comment [COMMENT37]: PRODUCT BELOW IS AN ALUMINUM-CAPPED, HEAVY-DUTY SYSTEM WITH OVERRIDE OR BUTT-EDGE CROSS TEES.

Comment [COMMENT38]: SUBPARA BELOW REFERS TO UNITED STATES GYPSUM COMPANY PRODUCT.

Comment [COMMENT39]: SEE EDITING INSTRUCTION NO. 1 IN THE EVALUATIONS FOR CAUTIONS ABOUT NAMING PRODUCTS AND MFRS.

that affect ceiling installation and anchorage. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordination: Furnish layouts for cast-in-place anchors, clips, and other ceiling anchors whose installation is specified in other Sections.

1. Furnish cast-in-place anchors and similar devices to other trades for installation well in advance of time needed for coordinating other work.

B. Measure each ceiling area and establish the layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and conform to the layout shown on reflected ceiling plans. Borders of 4" or less shall be on one side of space, coordinate with Architect prior to installation.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with publications referenced below per manufacturer's instructions and CISCA "Ceiling Systems Handbook."

1. Standard for Ceiling Suspension System Installations: Comply with ASTM C 636.
2. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
3. CISCA Recommendations for Acoustical Ceilings: Comply with CISCA "Recommendations for Direct-Hung Acoustical Tile and Lay-In Panel Ceilings."
4. CISCA Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies."
5. U.B.C. Standard for Ceiling Suspension Systems: U.B.C. Standard No. 47-18.
6. Ceiling grids will be no closer than 6" below the lowest obstruction above ceiling. Contact Architect prior to installation if conflict is observed.

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 the supporting structure or of the ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of 3 tight turns. Connect hangers either directly to structures or to inserts, eye screws, or other devices that are secure, that are appropriate for substrate, and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

Comment [COMMENT40]: MODIFY BELOW TO SUIT PROJECT CONDITIONS.

Comment [COMMENT41]: DELETE BELOW IF NOT NEEDED.

Comment [COMMENT42]: VERIFY REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION AS TO WHICH OF THE FOLLOWING 4 SUBPARAS TO REFERENCE.

Comment [COMMENT43]: SUBPARA ABOVE APPLIES TO SEISMIC ZONES 0-2. SUBPARA BELOW APPLIES TO SEISMIC ZONES 3 AND 4.

Comment [COMMENT44]: DELETE ABOVE OR BELOW. RETAIN BELOW ONLY IF FIRE-RESISTANCE-RATED CEILINGS ARE SELECTED THAT DO NOT ALLOW SPLAYING OF HANGERS.

5. Do not support ceilings directly from permanent metal forms. Fasten hangers to cast-in-place hanger inserts, powder-actuated fasteners, or drilled-in anchors that extend through forms into concrete.
6. Do not attach hangers to steel deck tabs.
7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
8. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise shown; and provide hangers not more than 8 inches (200 mm) from ends of each member.
9. All devices installed in ceilings or above ceilings shall be provided with independent supports. Provide extra hanger wires to support light fixtures, speakers, diffusers and similar devices independently of ceiling suspension system. Coordinate with electrical and mechanical work. Provide one hanger at each corner of fixtures and diffusers.

Comment [COMMENT45]: DELETE ABOVE OR BELOW UNLESS BOTH TYPES OF HANGERS ARE REQUIRED AND THEIR LOCATIONS ARE INDICATED ON DRAWINGS OR IN THIS SECTION BY INSERTIONS.

Comment [COMMENT46]: REVISE BELOW IF STRUCTURAL MEMBERS ARE SPACED TOO FAR APART FOR HANGERS AND ANOTHER METHOD IS REQUIRED. REFER TO CISCA GUIDELINES FOR ALTERNATIVES THAT MAY NEED TO BE DETAILED ON DRAWINGS.

C. 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 over 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.18 mm in 3.66 m). Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

Comment [COMMENT47]: RETAIN BELOW TO ELIMINATE AIR MOVEMENT, LIGHT LEAKS, AND SOUND LEAKS AT EDGES OF CEILING.

Comment [COMMENT48]: DELETE BELOW OR QUALIFY IF EXPOSED FASTENERS ARE ALLOWED.

D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Install acoustical panels with undamaged edges and fitted accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide neat, precise fit.

1. Arrange directionally patterned acoustical panels in the manner as directed by Architect.
2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
3. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
4. Install hold-down clips in areas indicated and in areas required by governing regulations, or for fire-resistance ratings; space as recommended by panel manufacturer, unless otherwise indicated or required.
5. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

Comment [COMMENT49]: DELETE BELOW IF NO DIRECTIONALLY PATTERNED PANELS ARE SPECIFIED.

Comment [COMMENT50]: DELETE BELOW IF NO FIRE-RESISTANCE-RATED ASSEMBLIES.

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's 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

Comment [COMMENT51]: INSERT PRODUCT DATA SHEETS ON SEPARATE PAGES FOLLOWING THE LAST ARTICLE IN PART 3 ABOVE. MOVE "END OF SECTION 09511" TO THE END OF THE LAST PRODUCT DATA SHEET.

SECTION 09910 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes surface preparation, painting, and finishing of exposed interior and exterior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop-priming and surface treatment specified under other Sections.

B. Paint exposed surfaces whether or not colors or finish are designated in schedules, except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available.

1. Painting includes field-painting exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment. Include painting of electrical panels at Architect's direction.
2. Painting includes all exterior work, exposed surfaces, gyp. board soffits, exposed metal, piping, etc.

3. Painting includes all exterior roof top HVAC curbs and equipment.

C. Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts, and labels.

1. Prefinished items not to be painted include the following factory-finished components:

a. Acoustic materials.
b. Architectural woodwork and casework.
c. Elevator entrance doors and frames.
d. Elevator equipment.
e. Finished mechanical and electrical equipment.
f. Light fixtures.
g. Switchgear.
h. Distribution cabinets (except electrical panel covers at direction of Architect.)

2. Concealed surfaces not to be painted include wall or ceiling surfaces in the following generally inaccessible areas:

a. Furred areas.

Comment [COMMENT1]: MASTERSPEC text, Copyright 1992, AIA, The American Institute of Architects

Comment [COMMENT2]: Paragraph number formatting method, Copyright 1988, ARCOM, Architectural Computer Services, Inc.

Comment [COMMENT3]: MASTERSPEC text, Copyright 1992, AIA, The American Institute of Architects

Comment [COMMENT4]: Paragraph number formatting method, Copyright 1988, ARCOM, Architectural Computer Services, Inc.

Comment [COMMENT5]: DELETE THE NEXT PARA IF PAINTING MECHANICAL AND ELECTRICAL COMPONENTS IS INCLUDED IN DIVISIONS 15 AND 16.

Comment [COMMENT6]: AMPLIFY THE PARAS BELOW AS NECESSARY TO SATISFY PROJECT REQUIREMENTS.

Comment [COMMENT7]: REVIEW ITEMS LISTED BELOW AND REVISE TO SUIT PROJECT.

Comment [COMMENT8]: REVIEW AREAS AND SPACES LISTED BELOW AND REVISE TO SUIT PROJECT.

b. Utility tunnels.
c. Pipe spaces and plumbing chase.
d. Duct shafts.
e. Elevator shafts.

3. Finished metal surfaces not to be painted include:

a. Anodized aluminum.
b. Stainless steel.
c. Chromium plate.
d. Copper.
e. Bronze.
f. Brass.

Comment [COMMENT9]: REVIEW FINISHED METAL SURFACES LISTED BELOW AND REVISE TO SUIT PROJECT.

4. Operating parts not to be painted include moving parts of operating equipment, such as the following:

a. Valve and damper operators.
b. Linkages.
c. Sensing devices.
d. Motor and fan shafts.

Comment [COMMENT10]: REVIEW ITEMS LISTED BELOW AND REVISE TO SUIT PROJECT.

5. Labels: Do not paint over Underwriters Laboratories, Factory Mutual or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 5 Section "Structural Steel" for shop-priming structural steel.
2. Division 5 Section "Metal Fabrications" for shop-priming ferrous metal.
3. Division 6 Section "Interior Architectural Woodwork" for shop-priming interior architectural woodwork.
4. Division 8 Section "Standard Steel Doors and Frames" for shop-priming steel doors and frames.
5. Divisions 15 and 16: Painting mechanical and electrical work is specified in Divisions 15 and 16, respectively.

Comment [COMMENT11]: THE LIST BELOW CONTAINS ITEMS THAT ARE OFTEN SHOP PRIMED AND MATERIALS THAT MIGHT BE FOUND IN THIS SECTION. REVISE TO SATISFY PROJECT REQUIREMENTS. RETAIN ONLY ITEMS CONTAINED IN THE PROJECT. VERIFY THAT SECTIONS LISTED ARE INCLUDED AND TITLES ARE CORRECT.

E. Maintenance Stock:

1. At time of completing application, deliver stock of maintenance material to the Owner. Furnish not less than two properly labeled and sealed one gallon cans of each type of finish coat of each color, taken from lots furnished for the work.
2. Provide at typed listing of all color codes for the Owner's use.

1.3 SUBMITTALS

Comment [COMMENT12]: IF ALTERNATES, ALLOWANCES, OR UNIT PRICES APPLY TO WORK OF THIS SECTION, INSERT BRIEF PARAS HERE TO ALERT THE CONTRACTOR AND REFERENCE THE APPROPRIATE DIVISION 1 SECTION FOR SPECIFIC DETAILS.

A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.

B. Samples for initial color selection in the form of manufacturer's color charts.

1. After color selection, the Architect will furnish color chips.

C. Samples for Verification Purposes: Provide samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate.

Comment [COMMENT13]: RETAIN THE NEXT PARA WITH OR WITHOUT THE PRECEDING PARA.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to those indicated for the Project that have resulted in a construction record of successful in-service performance.

B. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

Comment [COMMENT14]: ALWAYS RETAIN THE NEXT PARA. SYSTEMS COULD FAIL IF COATS ARE INCOMPATIBLE.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.

Comment [COMMENT15]: DELETE THE PARAS BELOW IF FIELD SAMPLES (MOCKUPS) ARE NOT REQUIRED. THIS REQUIREMENT IS NORMALLY USED ONLY IF SPECIAL CARE IS REQUIRED IN APPLICATION.

Comment [COMMENT16]: ADD OTHER LABEL REQUIREMENTS AS NECESSARY TO SATISFY SPECIFIC PROJECT CIRCUMSTANCES.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.6 JOB CONDITIONS

Comment [COMMENT17]: IF DESIRED, ADD SPECIAL PROJECT REQUIREMENTS FOR FIRE PROTECTION, HEATING, VENTILATION, AND OTHER SPECIAL CONDITIONS FOR STORAGE AREAS ON THE SITE.

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 deg F (10 deg C) and 90 deg F (32 deg C).

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 deg F (7 deg C) and 95 deg F (35 deg C).

C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

1. Devoe and Raynolds Co. (Devoe)
2. The Glidden Company (Glidden)
3. Benjamin Moore and Co. (Moore)
4. PPG Industries, Pittsburgh Paints (PPG)
5. The Sherwin-Williams Company (S-W)
6. Sonneborn Building Products (Concrete Sealers)
7. Porter Paints
8. Town & Ranch Paints
9. ScuffMaster

Comment [COMMENT18]: DELETE THIS ARTICLE IF OWNER-IMPOSED OR OTHER PROJECT REQUIREMENTS PROHIBIT MENTIONING MFR'S NAMES OR PRODUCTS.

Comment [COMMENT19]: MFRS LISTED BELOW PRODUCE AN EXTENSIVE LINE OF PAINT PRODUCTS THAT ARE NATIONALLY DISTRIBUTED AND USUALLY AVAILABLE LOCALLY. ADD LOCAL AND REGIONAL PAINT MFRS, IF DESIRED. EDIT THE LIST TO SUIT PROJECT REQUIREMENTS AND LOCAL PRODUCT AVAILABILITY. SEE EDITING INSTRUCTION NO. 1 IN THE EVALUATIONS FOR CAUTIONS ABOUT NAMING PRODUCTS AND MFRS.

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

B. Material Quality: Provide the manufacturer's best-quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish the manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: Provide color selections made by the Architect from the manufacturer's full range of standard colors.

Comment [COMMENT20]: ALWAYS RETAIN THE NEXT PARA. SYSTEMS COULD FAIL IF COATINGS ARE INCOMPATIBLE.

Comment [COMMENT21]: DELETE THE NEXT PARA IF OWNER-IMPOSED OR OTHER PROJECT REQUIREMENTS PROHIBIT MENTION OF MFR'S NAMES OR IF PRODUCTS OF A SINGLE MFR ONLY ARE ACCEPTABLE.

Comment [COMMENT22]: RETAIN ONLY ONE OF THE THREE OPTIONAL PARAS BELOW. IF MORE THAN ONE COLOR IS REQUIRED, INDICATE COLORS IN A SEPARATE SCHEDULE OR SHOW LOCATION AND EXTENT ON THE DRAWINGS.

2.3 MASONRY BLOCK FILLER

A. Filler Coat Materials: Provide the manufacturer's recommended factory-formulated, latex-type concrete masonry block fillers that are compatible with the finish materials indicated.

B. Products: Subject to compliance with requirements, provide one of the following:

1. High-Performance Latex Block Filler:

a.	Devoe:	52901 Bloxfil Interior/Exterior Acrylic Latex Block Filler.
b.	Glidden:	5317 Ultra-Hide Acrylic Latex Block Filler.
c.	Moore:	Moorcraft Interior & Exterior Block Filler #173.
d.	PPG:	6-7 Latex Masonry Block Filler.
e.	S-W:	Heavy-Duty Block Filler B42W46.

Comment [COMMENT23]: BLOCK FILLERS BELOW ARE RECOMMENDED BY THE MFRS TO FILL POROUS SURFACES OF CONCRETE MASONRY BLOCK UNDER A VARIETY OF PRIMERS AND FINISH COATS.

2.4 PRIMERS

A. Primers: Provide the manufacturer's recommended factory-formulated primers that are compatible with the substrate and finish coats indicated.

B. Products: Subject to compliance with requirements, provide one of the following:

1. Concrete and Masonry Primers: Interior, flat, latex-based paint.

a.	Devoe:	51701 Wonder-Prime Interior All Purpose Latex Primer Sealer & Vapor Barrier.
b.	Glidden:	5300 Ultra-Hide Flat Wall Paint.
c.	Moore:	Moore's Latex Quick-Dry Prime Seal #201.
d.	PPG:	80 Line Wallhide Flat Latex Paint.
e.	S-W:	ProMar 200 Latex Flat B30W200.

Comment [COMMENT24]: RETAIN THE PRIMER LISTED BELOW OVER MINERAL-FIBER-REINFORCED CEMENT PANELS AND UNDER FLAT ACRYLIC EMULSIONS. NEITHER PITTSBURGH NOR SHERWIN-WILLIAMS REQUIRES A PRIMER ON THIS SURFACE.

2. Gypsum Drywall Primer: White, interior, latex-based primer.

a.	Devoe:	50801 Wonder-Tones Latex Primer and Sealer.
b.	Glidden:	5019 PVA Primer.
c.	Moore:	Moore's Latex Quick-Dry Prime Seal #201.
d.	PPG:	6-2 Quick-Dry Latex Primer Sealer.
e.	S-W:	ProMar 200 Latex Wall Primer B28W200.

Comment [COMMENT25]: RETAIN PRIMERS LISTED BELOW OVER NEW PLASTER AND UNDER ALKYD FINISH MATERIALS.

3. Ferrous Metal Primers: Alkyd-type primers.

a.	Devoe:	41820 Bar-Ox Alkyd Shop/Field Primer Grey.
b.	Glidden:	5205 Glid-Guard Tank and Structural Primer.
c.	Moore:	IronClad Retardo Rust-Inhibitive Paint #163.
d.	PPG:	6-612 Speedhide Inhibitive White Primer.
e.	S-W:	Kem Kromik Metal Primer B50N2/B50W1.

Comment [COMMENT26]: RETAIN THE PRIMERS LISTED BELOW ON WOOD UNDER GLOSS ALKYD ENAMELS, FLAT FINISHES, AND ON WOOD TRIM UNDER HIGH-GLOSS ALKYD FINISH. (FOR DEEP-COLOR, FULL-GLOSS WOOD TRIM, SUBSTITUTE MOORE'S MOORWHITE DEEP COLOR BASE #100-04 FOR PRIMER INDICATED.)

4. Galvanized Metal Primers:

a.	Devoe:	13201 Mirrolac Galvanized Metal Primer.
b.	Glidden:	5229 Glid-Guard All-Purpose Metal Primer.
c.	Moore:	IronClad Galvanized Metal Latex Primer #155.
d.	PPG:	6-215/216 Speedhide Galvanized Steel Primer.
e.	S-W:	Galvite B50W3.

Comment [COMMENT27]: RETAIN PRIMERS LISTED BELOW OVER GALVANIZED METAL AND UNDER GLOSS ALKYD ENAMELS UNDER INTERIOR FLAT LATEX PAINTS, AND ODORLESS, SEMIGLOSS OR GLOSS ALKYD ENAMELS.

2.5 UNDERCOAT MATERIALS

Comment [COMMENT28]: RETAIN PRIMERS LISTED BELOW OVER ALUMINUM AND UNDER HIGH-GLOSS ALKYD ENAMELS.

A. Undercoat Materials: Provide the manufacturer's recommended factory-formulated undercoat materials that are compatible with the substrate and finish coats indicated.

B. Products: Subject to compliance with requirements, provide one of the following:

1. Interior Enamel Undercoat: Ready-mixed enamel.

a.	Devoe:	51701 Wonder-Prime Interior All Purpose Latex Primer

Comment [COMMENT29]: RETAIN UNDERCOAT MATERIALS LISTED BELOW OVER CONCRETE OR MASONRY AND UNDER AN ODORLESS, SEMIGLOSS, ALKYD ENAMEL.

Sealer & Vapor Barrier.

b. Glidden: UH400 Ultra Hide Alkyd Interior Enamel Undercoat
c. Moore: Moore's Alkyd Enamel Underbody #217.
d. PPG: 6-6 Speedhide Quick-Dry Enamel Undercoater.
e. S-W: ProMar 200 Latex Wall Primer B28W200.

2.6 EXTERIOR FINISH PAINT MATERIAL

Comment [COMMENT30]: RETAIN UNDERCOAT MATERIALS LISTED BELOW OVER FILLED CONCRETE MASONRY BLOCK AND UNDER AN ODORLESS, SEMIGLOSS, ALKYD ENAMEL.

A. Finish Paint: Provide the manufacturer's recommended factory-formulated finish-coat materials that are compatible with the substrate and undercoats indicated.

B. Products: Subject to compliance with requirements, provide one of the following:

Comment [COMMENT31]: RETAIN THE PRODUCTS BELOW FOR A FLAT FINISH OVER CONCRETE, STUCCO, MASONRY (INCLUDING CONCRETE MASONRY BLOCK), AND MINERAL-FIBER-REINFORCED CEMENT PANELS.

1. Exterior Acrylic Emulsion: Quick-drying, flat, acrylic paint.

   a. Devoe: 15XX Wonder-Shield Exterior Acrylic Latex Flat House Paint.
   b. Glidden: 3525 Spred Glide-On.
   c. Moore: Moore's Flat Exterior Latex Masonry & House Paint #105.
   d. PPG: 72 Line Sun-Proof Acrylic Latex House Paint.
   e. S-W: A-100 Acrylic Latex Flat Exterior Finish A-6 Series.

Comment [COMMENT32]: RETAIN THE PRODUCTS BELOW FOR A FLAT FINISH OVER CONCRETE, STUCCO, AND MASONRY.

2. Alkyd Gloss Enamel: Weather-resistant, air-drying, high-gloss enamel.

   a. Devoe: 70XX Mirrolac Interior/Exterior Alkyd-Urethane Gloss Enamel.
   b. Glidden: 4500 Glid-Guard Industrial Enamel.
   c. Moore: Impervo High-Gloss Enamel #133.
   d. PPG: 54 Line Quick-Dry Enamel.
   e. S-W: Industrial Enamel B-54 Series.

3. Exterior Textured Elastomeric Acrylic Emulsion Coating: Factory-formulated sand textured finish per Sonneborn; Sonocoat Flex Tex, textured elastomeric acrylic emulsion coating, or equal.

2.7 INTERIOR FINISH PAINT MATERIAL

Comment [COMMENT33]: RETAIN THE PRODUCTS BELOW ON WOOD TRIM WHERE A HIGH-GLOSS, DEEP-COLOR ALKYD COATING IS REQUIRED.

A. Finish Paint: Provide the manufacturer's recommended factory-formulated finish-coat materials that are compatible with the substrate and undercoats indicated.

B. Products: Subject to compliance with requirements, provide one of the following:

Comment [COMMENT34]: RETAIN THE PRODUCTS BELOW FOR A FLAT FINISH OVER CONCRETE, MASONRY, MINERAL-FIBER-REINFORCED CEMENT PANELS; OVER NEW PLASTER; OVER FILLED CONCRETE MASONRY UNITS; AND OVER PRIME-COATED GYPSUM DRYWALL, FERROUS METAL, AND ZINC-COATED (GALVANIZED) METAL SURFACES.

1. Latex Semi-Gloss:

   a. Devoe: Wondertones Semi-Gloss, 38-XX.
   b. Glidden: 5800 Spred Latex Low Lustre.
   c. Moore: Moorcraft Latex Satin, 255.
   d. PPG: Latex Semi-Gloss White 6-510.

e. S-W: SuperPaint Latex Semi-Gloss, A88 Series.

2. Latex Eggshell:

a. Scuffmaster: Scrubtough – "Paint" Series

3. Interior, Semigloss, Odorless Alkyd Enamel: Semigloss, low-odor, alkyd enamel.

a. Devoe: 26XX Velour Alkyd Semigloss Enamel.
b. Glidden: UH 8000 Ultra-Hide Alkyd Semigloss Enamel.
c. Moore: Moore's Satin Impervo Enamel #235.
d. PPG: 27 Line Wallhide Semigloss Enamel.
e. S-W: Promar 200 Alkyd Semigloss Enamel (B34).

Comment [COMMENT35]: RETAIN THE PRODUCTS LISTED BELOW OVER A PRIMER AND UNDERCOAT ON CONCRETE, MASONRY (INCLUDING CONCRETE MASONRY BLOCK), PLASTER, GYPSUM DRYWALL, WOOD, HARDBOARD, AND FERROUS AND ZINC-COATED (GALVANIZED) METAL SURFACES WHENEVER A SEMIGLOSS, LOW-ODOR, ALKYD, ENAMEL FINISH IS REQUIRED.

4. Alkyd Gloss Enamel: Air-drying, high-gloss enamel.

a. Devoe: 70XX Mirrolac Interior'Exterior Alkyd-Urethane Gloss Enamel.
b. Glidden: 4500 Glid-Guard Industrial Enamel.
c. Moore: Impervo High-Gloss Enamel #133.
d. PPG: 54 Line Quick-Dry Enamel.
e. S-W: Industrial Enamel B-54 Series.

5. Spraying Dry Fog Alkyd Paint:

a. Glidden: 5067 Ultra Hide Alkyd Dry Fog, or equivalent product by other paint manufacturers listed.

Comment [COMMENT36]: RETAIN THE PRODUCTS LISTED BELOW FOR A FLAT FINISH OVER ACOUSTICAL PLASTER, AND AS A SIZE OVER COTTON OR CANVAS COVERING ON INSULATION.

6. Interior Flat Acrylic Paint: Factory-formulated flat acrylic-emulsion latex paint for interior application.

a. Benjamin Moore; Moorecraft Super Spec Latex Flat No. 275: Applied at a dry film thickness of not less than 1.2 mils (0.031 mm).
b. Coronado; 28 Line Super Kote 5000 Latex Flat Paint: Applied at a dry film thickness of not less than 1.2 mils (0.031 mm).
c. Pittsburgh Paints; 6-70 Line SpeedHide Interior Wall Flat-Latex Paint: Applied at a dry film thickness of not less than 1.0 mil (0.025 mm).
d. Sherwin-Williams; ProMar 200 Interior Latex Flat Wall Paint B30W200 Series: Applied at a dry film thickness of not less than 1.4 mils (0.036 mm).

Comment [COMMENT37]: RETAIN THE NEXT PARA WHERE PASTE WAX IS REQUIRED AS THE FINAL COAT OVER NATURAL-FINISHED OR STAINED WOODWORK.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which painting will be performed for compliance with paint application requirements. Surfaces receiving paint must be thoroughly dry before paint is applied.

1. Do not begin to apply paint until unsatisfactory conditions have been corrected.

2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

Comment [COMMENT38]: COORDINATE PRIMERS SPECIFIED IN OTHER SECTIONS WITH FINISH MATERIAL IN THIS SECTION TO ENSURE COMPATIBLE PRIMERS. SOME FINISH-COAT MATERIALS, SUCH AS LACQUERS AND EPOXIES, LIFT OIL AND OLEORESINOUS AIR-DRY PRIMERS. A LONG-OIL FINISH COAT MAY CRAWL AND HAVE POOR ADHESION WHEN USED OVER ZINC-DUST PHENOLIC OR BAKED PRIMERS.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items, if necessary, to completely paint the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease prior to cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to the manufacturer's instructions for each particular substrate condition and as specified.

Comment [COMMENT39]: ALWAYS RETAIN THE FOLLOWING PARAS SPECIFYING SURFACE PREPARATION. AMPLIFY THE PARAS IF NECESSARY TO INCLUDE SPECIAL PROCEDURES REQUESTED BY THE MFRS OR TO SATISFY SPECIAL PROJECT CONDITIONS.

1. Provide barrier coats over incompatible primers or remove and reprime. Notify Architect in writing about anticipated problems using the specified finish-coat material with substrates primed by others.

Comment [COMMENT40]: COORDINATION OF SHOP-APPLIED PRIMERS WITH FINISH COATS IS CRITICAL. SEE "EXAMINATION" ARTICLE, "COORDINATION OF WORK" PARA. IF COMPATIBILITY PROBLEMS DEVELOP, IT MIGHT BECOME NECESSARY TO PROVIDE BARRIER COATS OVER SHOP-APPLIED PRIMERS OR REMOVE THE PRIMER AND REPRIME THE SUBSTRATE.

2. Cementitious Materials: Prepare concrete, concrete masonry block, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen, as required, to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

Comment [COMMENT41]: DELETE THE PARAS BELOW IF CEMENTITIOUS SURFACES ARE NOT TO BE PAINTED, OR REVISE TO SUIT PROJECT REQUIREMENTS.

a. Use abrasive blast-cleaning methods if recommended by the paint manufacturer.
b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.
c. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.

Comment [COMMENT42]: DELETE THE NEXT PARA IF THIS PROCEDURE IS NOT REQUIRED.

3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

Comment [COMMENT43]: DELETE THE PARAS BELOW IF WOOD SURFACES ARE NOT TO BE PAINTED, OR REVISE TO SUIT THE PROJECT SITUATION.

a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac

or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.

b. Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.

c. When transparent finish is required, backprime with spar varnish.

d. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately upon delivery.

4. Ferrous Metals: Clean ungalvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council (SSPC).

a. Blast steel surfaces clean as recommended by the paint system manufacturer and according to requirements of SSPC specification SSPC-SP 10.

b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.

c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by the paint manufacturer, and touch up with the same primer as the shop coat.

5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Materials Preparation: Carefully mix and prepare paint materials according to manufacturer's directions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
3. Use only thinners approved by the paint manufacturer and only within recommended limits.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

1. Paint colors, surface treatments, and finishes are indicated in the schedules.
2. Provide finish coats that are compatible with primers used.
3. The number of coats and the film thickness required are the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as

Comment [COMMENT44]: DELETE THE PARAS BELOW IF THESE REQUIREMENTS ARE SPECIFIED IN OTHER SECTIONS.

Comment [COMMENT45]: DELETE THE NEXT PARA IF BLAST CLEANING IS NOT REQUIRED. THE METHOD (SSPC-SP 10) REQUIRES A HIGHER LEVEL OF PREPARATION THAN IS OFTEN JUSTIFIED. REDUCE PREPARATION LEVEL TO SSPC-SP 6 IF WARRANTED.

Comment [COMMENT46]: DELETE THE NEXT PARA IF THIS TREATMENT IS NOT REQUIRED.

Comment [COMMENT47]: DELETE THE NEXT PARA IF TOUCH UP PAINTING OF SHOP-APPLIED PRIMERS WILL BE DONE BY THE MATERIAL ERECTOR OR INSTALLER.

Comment [COMMENT48]: DELETE THE NEXT PARA IF TINTING IS NOT REQUIRED. THE DIFFERENCES COULD SHOW THROUGH WHEN THE TOP COAT ERODES.

Comment [COMMENT49]: REVISE THIS ARTICLE TO SATISFY PROJECT REQUIREMENTS. ADD RESTRICTIONS TO APPLICATION METHODS, IF REQUIRED.

Comment [COMMENT50]: IF NECESSARY, ADD RESTRICTIONS OR LIMITS ON USE OF SPRAY EQUIPMENT.

recommended by the manufacturer. Sand between applications where sanding is required to produce a smooth even surface according to the manufacturer's directions.

4. Apply additional coats if undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.
5. The term exposed surfaces includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
6. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
7. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, nonspecular black paint.
8. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
9. Finish exterior doors on tops, bottoms, and side edges same as exterior faces.
10. Sand lightly between each succeeding enamel or varnish coat.
11. Omit primer on metal surfaces that have been shop-primed and touch-up painted.

Comment [COMMENT51]: DELETE THE NEXT PARA IF CASEWORK IS PREFINISHED.

C. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

D. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to the manufacturer's directions.

1. Brushes: Use brushes best suited for the material applied.
2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

E. Minimum Coating Thickness: Apply materials no thinner than the manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

F. Mechanical and Electrical Work: Painting mechanical and electrical work is limited to items exposed in mechanical equipment rooms and in occupied spaces as directed by Architect.

Comment [COMMENT52]: THE PARA BELOW IS A SIMPLIFIED EXAMPLE OF PAINTING REQUIREMENTS FOR MECHANICAL AND ELECTRICAL WORK. DELETE IF THIS PAINTING IS INCLUDED IN DIVISIONS 15 AND 16, OR REVISE TO SUIT PROJECT.

G. Mechanical and electrical items to be painted are included in Division 15 and 16.

1. Exposed Mechanical ductwork; piping and Electrical conduit paint colors are specified in Divisions 15 and 16 respectively.

Comment [COMMENT53]: REVISE THE LIST BELOW TO SUIT PROJECT.

H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled. Incomplete covering will require additional coats as directed by Architect.

I. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime-coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

J. Pigmented (Opaque) Finishes: Completely cover to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

Comment [COMMENT54]: DELETE THE FOLLOWING ITEMS IF NONE ARE INCLUDED IN THE PROJECT. INDICATE LOCATIONS IN THE FINISH SCHEDULES.

K. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with specified requirements.

3.4 CLEANING

A. Cleanup: At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

Comment [COMMENT55]: DELETE THE NEXT PARA IF THIS FINAL CLEANING IS NOT DONE BY THE PAINTER.

3.5 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings.

1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINT SCHEDULE

Comment [COMMENT56]: EXAMPLES OF EXTERIOR PAINT SYSTEMS ARE INDICATED BELOW. MATERIALS ARE LISTED BY GENERIC PRODUCT DESCRIPTION.

A. General: Provide the following paint systems for the various substrates indicated.

1. Dry film thickness applies to all coats including primer unless noted otherwise.

Comment [COMMENT57]: SELECT SUBSTRATES AND PAINT SYSTEMS TO SUIT PROJECT REQUIREMENTS. WHERE MORE THAN ONE PAINT SYSTEM IS TO BE APPLIED TO THE SAME SUBSTRATE, CLEARLY DEFINE THE LOCATION AND EXTENT OF EACH SYSTEM.

B. Concrete Masonry Units: (and GRFC Materials)

1. Lusterless (Flat) Acrylic Finish: Two coats over block filler with total dry film thickness not less than 2.5 mils, excluding the block filler.

Comment [COMMENT58]: RETAIN THE SYSTEM BELOW FOR A FLAT ACRYLIC FINISH.

a. Block Filler: High-performance, latex block filler.

b. First and Second Coats: Exterior acrylic emulsion.

C. Ferrous Metal: Primer is not required on shop-primed items.

1. Full-Gloss Alkyd Enamel: Two finish coats over primer. Total dry film thickness of not less than 2.5 mils, excluding primer.

a. Primer: Ferrous metal primer.
b. First and Second Coats: Gloss alkyd enamel.

D. Zinc-Coated Metal:

1. High-Gloss Alkyd Enamel: Two finish coats over primer. Total dry film thickness of not less than 4.0 mil.

a. Primer: Galvanized metal primer.
b. First and Second Coats: Gloss alkyd enamel.

Comment [COMMENT59]: RETAIN THE SYSTEM BELOW FOR A FULL-GLOSS ALKYD ENAMEL.

Comment [COMMENT60]: RETAIN THE SYSTEM BELOW FOR A FULL-GLOSS, ALKYD ENAMEL FINISH. REVISE OR ADD OTHER FINISHES AS REQUIRED. SEE FERROUS METALS.

3.7 INTERIOR PAINT SCHEDULE

A. General: Provide the following paint systems for the various substrates, as indicated.

B. Concrete Masonry Units - Filled Finish: Refer to project drawings for location of "Enamel" and "Latex" finish requirements.

1. Oil Base, Semigloss: Two coats over block filler with a total dry film thickness not less than 2.5 mil, excluding block filler.
2. Oil Base, High-Gloss: Two coats over block filler with a total dry film thickness not less than 3.0 mil, excluding block filler.

C. Gypsum Drywall Systems:

1. Latex, Flat and Semigloss: Two coats over primer with total dry film thickness not less than 3.3 mil.

a. Bottom coat: Primer.
b. First and Second Coat: Interior semigloss latex.

D. Ferrous Metal:

1. Semigloss Enamel Finish: Two coats over primer with total dry film thickness not less than 2.5 mils, excluding primer.

a. Primer: Ferrous metal primer.
b. Intermediate Coat: Same as top coat.
c. Finish Coat: Interior, semigloss, odorless, alkyd enamel.

E. Zinc-Coated Metal:

Comment [COMMENT61]: EXAMPLES OF INTERIOR PAINT SYSTEMS ARE INDICATED BELOW. MATERIALS ARE LISTED BY GENERIC PRODUCT DESCRIPTION.

Comment [COMMENT62]: EDIT PRODUCT LISTS IN PART 2 TO SUIT PROJECT REQUIREMENTS.

Comment [COMMENT63]: SELECT SUBSTRATES AND PAINT SYSTEMS TO SUIT PROJECT CONDITIONS. WHERE MORE THAN ONE PAINT SYSTEM IS APPLIED TO THE SAME SUBSTRATE, THE LOCATION AND EXTENT OF EACH SYSTEM MUST BE CLEARLY DEFINED.

Comment [COMMENT64]: RETAIN THE SYSTEM BELOW FOR A FLAT FINISH.

Comment [COMMENT65]: RETAIN THE SYSTEM BELOW FOR A FLAT FINISH.

1. Semigloss Finish: Two coats over primer, with total dry film thickness not less than 2.5 mils, excluding primer.

    a. Primer: Galvanized metal primer.
    b. Intermediate Coat: Same as top coat.
    c. Finish Coat: Interior, semigloss, odorless, alkyd enamel.

F. Dry Fog Spray Paint:

1. Spray Dry Paint:

    a. Spraying dry fog alkyd paint for overhead exposed construction where scheduled or indicated on the drawings:

    b. System specified is Ultra-Hide alkyd paint sprayed using equipment and application instructions in accordance with Porter recommendations. Equivalent materials and instructions are acceptable by other manufacturers listed.

END OF SECTION 09910

Comment [COMMENT66]: THIS SECTION USES THE TERM ARCHITECT. CHANGE THIS TERM AS NECESSARY TO MATCH THE ACTUAL TERM USED TO IDENTIFY THE DESIGN PROFESSIONAL AS DEFINED IN THE GENERAL AND SUPPLEMENTARY CONDITIONS.