Uganda
2001-10034D vol. 5

# ENTEBBE INTERNATIONAL AIRPORT
## UPGRADE AND EXPANSION PROJECT

RECEIVED
U.S. TRADE AND
DEVELOPMENT AGENCY
FEB 26 2008

The Uganda Civil Aviation Authority

4. Board
cop

# INTERNATIONAL PASSENGER TERMINAL
## TENDER DOCUMENTS

Vol. I

# VOLUME I
## BILL OF QUANTITIES & BUILDING SPECIFICATIONS

THE LPA GROUP INCORPORATED
INTERNATIONAL

May 2006
The LPA Group Incorporated

# ENTEBBE INTERNATIONAL AIRPORT

## UPGRADE AND EXPANSION PROJECT

The Uganda Civil Aviation Authority

## INTERNATIONAL PASSENGER TERMINAL

### TENDER DOCUMENTS

## VOLUME I

### BILL OF QUANTITIES & BUILDING SPECIFICATIONS

THE LPA GROUP INCORPORATED INTERNATIONAL

May 2006

The LPA Group Incorporated

# BILL OF QUANTITIES

| Item | Description | Unit | Qty | Rate US$ | Amount US$ |
|---|---|---|---|---|---|
| | **SUMMARY** | | | | |
| 1 | MECHANICAL INSTALLATIONS | | | | 100,772,528 |
| 2 | ELECTRICAL INSTALLATIONS | | | | 251,090,345 |
| | **TOTAL FOR INTERNATIONAL AIRPORT** | | | | 351,862,873 |
| | **BILL NO. 1 : MECHANICAL INSTALLATIONS** | | | | |
| | **ELEMENT NO. 1.1 GROUND FLOOR** | | | | |
| | ***Supply, install, connect and set to work the following, all as described in the Specifications and Drawings.*** | | | | |
| | ***Sanitary Fittings*** | | | | |
| 1.1.01 | White Vitreous China Floor standing WC suite comprising a washdown pan with a box flushing rim, horizontal outlet as ARMITAGE SHANKS, ASCANIA CC S3017, for use with a concealed pattern Modus flush valve S9020AA (685078RCP), with a 32mm BSP female inlet connector for building into wall, with push button, cover plate, and fixing regulator, Ascania plastic seat and cover S4003, Plastic outlet connector S4325 (90190T8), and all accessories. | no | 33 | 759,200 | 25,053,600 |
| 1.1.02 | White Vitreous China Cottage Countertop Wash hand basin with 2 tapholes and a chainstay hole, as ARMITAGE SHANKS, COTTAGE COUNTERTOP, S2530 (121413S) complete with 12mm cottage pillar taps S7130 (9290400), 32mm bead chain waste and metal plug, 80mm slotted tail and bolt stay, 32mm chrome plated metal bottle trap S8900 (70197Q4) with a 75mm seal, with concealed hangers S9110 (7192000) or equal approved. | no | 28 | 644,225 | 18,038,300 |
| 1.1.03 | White Vitreous China Cottage Handrise Wash hand basin with 2 tapholes as ARMITAGE SHANKS, COTTAGE 46, S2710 (121003S) complete with 12mm cottage pillar taps S7130 (9290400), 32mm bead chain waste and metal plug, 80mm slotted tail and bolt stay, 32mm chrome plated metal bottle trap S8900 (70197Q4) with a 75mm seal, with concealed hangers S9110 (7192000) or equal approved. | no | 6 | 461,725 | 2,770,350 |
| 2.2.5 | White Vitreous China Urinal Range comprising of: - 1No. 700x460x325mm wall concealled urinal bowl,with concealed top inlet spreader complete with vitreous china grating and wall hanger , concealed steel hangers, designed for use with automatic electronic syphon cistern with petcock and support , as ARMITAGE SHANKS, Range URINAL or equal approved. | no. | 8 | 621,500 | 4,972,000 |
| 1.1.04 | Screw to wall Semi-recessed toilet roll holder 15cm x 15cm as ARMITAGE SHANKS, MAYFAIR RECESSED S5004 (2053100) or equal approved | no | 33 | 76,650 | 2,529,450 |
| 1.1.05 | Polished mirror plate, beveled edge 600 x 450 x 6mm. | no | 3 | 47,450 | 142,350 |

| Item | Description | Unit | Qty | Rate US$ | Amount US$ |
|---|---|---|---|---|---|
| | ***Water Supply to Appliances*** | | | | |
| 1.1.06 | Allow for relocation, extension and modifications to the new areas of fresh water supply pipework of the nearest water mains to convey fresh water to the wash hand basins(WHB), WC Toilets and all other affected areas which shall need fresh cold water pipes to be burried in the ground, burried in wall, clipped to wall, or in service duct complete with all fittings and accessories.The said works to include bib taps | ls | 1 | 27,375,000 | 27,375,000 |
| | ***Internal Drainage*** | | | | |
| 1.1.20 | 40mm PPR heavy gauge pipes complete with bends and all accessories for WHBs, sinks, in floor, walls, up to manholes/Gully Trap. | m | 294 | 36,205 | 10,644,270 |
| 1.1.21 | 150mm PVC heavy gauge pipes complete with bends, couplers and all other necessary accessories for WCs, in floor, walls, up to manholes/Gully Trap. | m | 132 | 40,971 | 5,408,205 |
| 1.1.22 | Floor Traps as Key Terrain complete with all accessories | no | 18 | 62,050 | 1,116,900 |
| | ***External Drainage*** | | | | |
| 1.1.23 | Allow a provisional sum for cleaning existing Manholes, unblocking drainage system, replacing broken covers,relocating sewer lines, building new manholes where required. | ls | 1 | 40,726,700 | 40,726,700 |
| | ***Fire Fighting Equipment*** | | | | |
| 1.1.24 | 6kg Carbondioxide type, wall mounted fire extinguisher as ANGUS CS6HH, or equal approved | no | 24 | 450,775 | 10,818,600 |
| 1.1.25 | 9kg ABC dry powder type, cartridge operated, wall mounted fire extinguisher as ANGUS A9G or equal approved | no | 12 | 509,175 | 6,110,100 |
| | **Total Carried to Collection** | | | | **64,180,505** |
| | **COLLECTION** | | | | **64,180,505** |
| | **TOTAL FOR GROUND FLOOR CARRIED TO MAIN COLLECTION** | | | | **64,180,505** |
| | **ELEMENT NO. 1.2 FIRST FLOOR** | | | | |
| | ***Supply, install, connect and set to work the following, all as described in the Specifications and Drawings.*** | | | | |
| | ***Sanitary Fittings*** | | | | |

| Item | Description | Unit | Qty | Rate US$ | Amount US$ |
|---|---|---|---|---|---|
| 1.2.01 | White Vitreous China Floor standing WC suite comprising a washdown pan with a box flushing rim, horizontal outlet as ARMITAGE SHANKS, ASCANIA CC S3017, for use with a concealed pattern Modus flush valve S9020AA (685078RCP), with a 32mm BSP female inlet connector for building into wall, with push button, cover plate, and fixing regulator, Ascania plastic seat and cover S4003, Plastic outlet connector S4325 (90190T8), and all accessories. | no | 6 | 576,700 | 3,460,200 |
| 1.2.02 | White Vitreous China Cottage Handrise Wash hand basin with 2 tapholes as ARMITAGE SHANKS, COTTAGE 46, S2710 (121003S) complete with 12mm cottage pillar taps S7130 (9290400), 32mm bead chain waste and metal plug, 80mm slotted tail and bolt stay, 32mm chrome plated metal bottle trap S8900 (70197Q4) with a 75mm seal, with concealed hangers S9110 (7192000) or equal approved. | no | 5 | 826,725 | 4,133,625 |
| 1.2.04 | 600 x 460 x 260mm White Heavy duty Fireclay Cleener's sink as ARMITAGE SHANKS, BELFAST, S5805 (350086S) complete with 2no. 12mm Nimbus inclined bib taps S7205 (6610400), 33mm slotted waste, chain and plug, 2no. stainless steel legs and bearers, 610 x 460mm Heavy duty Fireclay plain drainer S5835 (3507100), 1no. stainless steel leg with screw to wall aluminium alloy bearer for the drainer, 32mm chrome plated metal bottle trap S8900 (70197Q4) with a 75mm seal, or equal approved. | no | 4 | 759,200 | 3,036,800 |
| 1.2.05 | Screw to wall Semi-recessed toilet roll holder 15cm x 15cm as ARMITAGE SHANKS, MAYFAIR RECESSED S5004 (2053100) or equal approved | no | 12 | 76,650 | 919,800 |
| 1.2.06 | Polished mirror plate, beveled edge 600 x 450 x 6mm. | no | 2 | 47,450 | 94,900 |
| | **Total Carried to Collection** | | | | **11,645,325** |
| | ***Water Supply to Appliances*** | | | | |
| 1.2.07 | 38 mm class B cold water pipe, burried in the ground, burried in wall, clipped to wall, or in duct complete with all fittings and accessories. | m | 60 | 7,848 | 470,850 |
| 1.2.08 | 32 mm class B cold water pipe, burried in the ground, burried in wall, clipped to wall, or in duct complete with all fittings and accessories. | m | 42 | 7,118 | 298,935 |
| 1.2.09 | 12 mm class B cold water pipe, burried in wall, clipped to wall, or in duct, complete with all fittings and accessories. | m | 73 | 3,650 | 266,450 |
| 1.2.10 | 12mm gate valves as Peglar heavy duty or equal approved. | no | 9 | 31,025 | 279,225 |
| 1.2.11 | 32mm gate valves as Peglar heavy duty or equal approved. | no | 6 | 47,450 | 284,700 |
| 1.2.12 | 38mm gate valves as Peglar heavy duty or equal approved. | no | 4 | 56,575 | 226,300 |
| 1.2.13 | Flexible tubes (stainless steel braid on PVC) for connection of appliances, complete. | no | 18 | 13,505 | 243,090 |

| Item | Description | Unit | Qty | Rate US$ | Amount US$ |
|---|---|---|---|---|---|
| | ***Internal Drainage*** | | | | |
| 1.2.14 | 38mm PVC heavy gauge pipes complete with bends and all accessories for WHBs, sinks, in floor, walls, up to manholes/Gully Trap. | m | 62 | 6,205 | 384,710 |
| 1.2.15 | 110mm PVC heavy gauge pipes complete with bends and all accessories for WCs, in floor, walls, up to manholes/Gully Trap. | m | 85 | 11,498 | 977,288 |
| 1.2.16 | Floor Traps as Key Terrain complete with all accessories | no | 18 | 43,800 | 788,400 |
| | ***Fire Fighting Equipment*** | | | | |
| 1.2.17 | 6kg Carbondioxide type, wall mounted fire extinguisher as ANGUS CS6HH, or equal approved | no | 24 | 450,775 | 10,818,600 |
| 1.2.18 | 9kg ABC dry powder type, cartridge operated, wall mounted fire extinguisher as ANGUS A9G or equal approved | no | 11 | 509,175 | 5,600,925 |
| | **Total Carried to Collection** | | | | **20,639,473** |
| | **COLLECTION** | | | | |
| | | | | | **11,645,325** |
| | | | | | **20,639,473** |
| | **TOTAL FOR FIRST FLOOR CARRIED TO MAIN COLLECTION** | | | | **32,284,798** |

| Item | Description | Unit | Qty | Rate US$ | Amount US$ |
|---|---|---|---|---|---|
| | **ELEMENT NO. 1.3 MISCELLANEOUS** | | | | |
| | ***Supply, install, connect and set to work the following, all as described in the Specifications and*** | | | | |
| 1.3.01 | Testing and Commissioning of the mechanical installations. | item | 1 | 2,879,975 | 2,879,975 |
| 1.3.02 | As Built Drawings (1 set on Polyester Film and two sets of Paper Prints) | item | 1 | 1,427,250 | 1,427,250 |
| | **Total Carried to Collection** | | | | **4,307,225** |
| | **MAIN COLLECTION** | | | | |
| | GROUND FLOOR | | | | **64,180,505** |
| | FIRST FLOOR | | | | **32,284,798** |
| | MISCELLANEOUS | | | | **4,307,225** |
| | **TOTAL FOR MECHANICAL INSTALLATIONS CARRIED TO SUMMARY** | | | | **100,772,528** |
| | **BILL NO. 2 : ELECTRICAL INSTALLATIONS** | | | | |
| | **ELEMENT NO. 2.1 GROUND FLOOR** | | | | |
| | ***Supply, install, connect and set to work the following, all as described in the Specifications and Drawings.*** | | | | |
| | ***Power Supply*** | | | | |
| 2.1.01 | UPGRADE 200A TPN DB's to 400A TPN MCCB Sub-Main Distribution Boards (SMDBs)with for surface/flush mounting complete with integral isolator, MCCBs complete with all accessories as MERLIN GERIN,HAVELL, MEMSHIELD 2, CRABTREE or equal approved. | no | 8 | 3,553,275 | 28,426,200 |
| 2.1.01 | UPGRADE 100A with 150A TPN MCCB Distribution Board for surface/flush mounting complete with integral isolator, MCCBs to mounted on DIN Rails complete with all accessories as MERLIN GERIN, HAVELL, MEMSHIELD 2, CRABTREE or equal approved. | no | 6 | 3,553,275 | 21,319,650 |

| Item | Description | Unit | Qty | Rate US$ | Amount US$ |
|---|---|---|---|---|---|
| 2.1.02 | Supply Cable 50mm$^2$ x 4core XLPE/SWA/PVC Copper cables buried in ground, clipped to wall complete with terminations clipping and all accessories from Feeder pillar to Sub Main Distribution Boards(SMDB) above. | m | 30 | 49,275 | 1,478,250 |
| 2.1.04 | Supply Cable 35mm$^2$ x 4core PVC/SWA/PVC Copper cables, clipped to wall or in duct, complete with terminations clipping and all accessories from the SMDBs above. | m | 30 | 27,375 | 821,250 |
| | ***Lighting*** | | | | |
| 3.1.13 | Lighting points wired by 3 x 1.5mm$^2$ SC PVC copper cables in 25mm PVC concealed conduits complete with all accessories. | no | 144 | 32,850 | 4,730,400 |
| 3.1.14 | 1500mm, T8 2x36W recessed modular fluorescent luminaire, with low brightness louvres, categorised to CIBSE LG3 category 2 and 3 with switch start, as Thorn Quatro C-line, Cat. No. FQCS 418. (source: Comprehensive Product Catalogue 2004 (Light A) | no | 102 | 173,375 | 17,684,250 |
| 3.1.15 | Emergency version of 1500mm, T8 2x36W recessed modular fluorescent luminaire, with low brightness louvres, categorised to CIBSE LG3 category 2 and 3 with switch start, as Thorn Quatro C-line, Cat. No. E3R FQCS 418. (source: Comprehensive Product Catalogue 2004) (Light AE) | no | 42 | 211,700 | 8,891,400 |
| 3.1.16 | Circular Superclub CD with polycarbonate body, white trim polycarbonate opal diffuser and integral control gear for use with 28W 2D lamps as Thorn SuperClub CD, Cat. No. CLCDO2D28W or equal approved (Source : Comprehensive product catalogue 2004 Page 248 - 249) (Light B) | no | 6 | 135,050 | 810,300 |
| 3.1.17 | Round white surface luminaire with acrylic fresnel diffuser and integral control gear, for use with 28W 2D lamp as Thorn SuperNovello Cat. No. 2DXF28 or equal approved (Source : Comprehensive product catalogue 2004 (Light C) | no | 8 | 153,300 | 1,226,400 |
| | **Total Carried to Collection** | | | | **33,342,750** |
| 3.1.18 | Ceiling arm mounted emergency lighting fitting with a maintained 3 hour duration, for use with a T5 8W fluorescent lamp, with a silver aluminium finish, as Thorn Voyager Recessed Edgelite EREL, Cat No. ERELE3 or equal approved complete with an Exit Sign ERX 2 (source: comprehensive product catalogue 2004, Page 107) (Light EXIT). | no | 1 | 114,975 | 114,975 |
| 3.1.19 | Ceiling arm mounted emergency lighting fitting with a maintained 3 hour duration, for use with a T2 8W fluorescent lamp, with a silver aluminium finish, as Thorn Voyager Recessed Edgelite EREL, Cat No. ERELE3 or equal approved complete with an Exit Sign ERX 4 (source: comprehensive product catalogue 2004, Page 107) (Light EXIT). | no | 1 | 114,975 | 114,975 |

| Item | Description | Unit | Qty | Rate US$ | Amount US$ |
|---|---|---|---|---|---|
| 3.1.20 | 70W, Low energy security luminaire, with a choice of longlife lamps for good quality light and low maintanance costs, pre-wired integral control gear for all night security and amenity lighting as Philips KOMBIPACK SGS 113 or equal approved (Source: Philips Lighting, Catalogue 2001-2002, Page 448) (Light Type S) | no | 6 | 153,300 | 919,800 |
| 3.1.21 | 6A 1 gang 1 way moulded switch as MK or equal approved. | no | 12 | 3,833 | 45,990 |
| 3.1.22 | 6A 5 gang 1 way moulded switch as MK or approved equal. | no | 1 | 9,673 | 9,673 |
| 3.1.23 | 6A 1 gang 2 way moulded switch as MK or approved equal. | no | 3 | 4,745 | 14,235 |
| | ***Sockets Outlets*** | | | | |
| 3.1.24 | Socket outlets wired by 3 x 2.5mm$^2$ SC PVC-I cables as a ring in 25mm PVC concealed conduits / trunking complete with all accessories. | no | 148 | 38,325 | 5,672,100 |
| 3.1.25 | 13A 2gang switched socket outlet as MK or equal complete with all accessories (on walls). | no | 27 | 7,118 | 192,173 |
| 3.1.26 | 13A 2gang switched socket outlet as MK or equal complete with all accessories (on trunking). | no | 121 | 9,125 | 1,104,125 |
| | ***Computer Outlets ( to be wired back to the Server Room on First Floor )*** | | | | |
| 3.1.27 | Computer points wired by Cat 6E cables from the nearest switch terminating on RJ45 outlets on plastic Trunking or in Floor Ducts. | no | 121 | 76,650 | 9,274,650 |
| | **Total Carried to Collection** | | | | **17,462,695** |
| | ***Telephone Outlets ( to be wired back to the Server Room on First Floor )*** | | | | |
| 3.1.28 | Telephone points wired by Cat 6E cables from the nearest switch terminating on RJ45 outlets on plastic Trunking or in Floor Ducts. | no | 121 | 76,650 | 9,274,650 |
| | ***Trunking*** | | | | |
| 3.1.29 | Three section plastic trunking overall section 167 x 50mm as Marshall - Tufflex Sterling Trunking Profile 2 or equal approved complete with couplers, end caps, internal / external bends, upward / downward flat angles, flat tees and all accessories. | m | 595 | 96,725 | 57,551,375 |
| | ***Floor Ducts*** | | | | |
| 3.1.30 | 4 x 50mm PVC ducts embedded in floors to connect telephone, power and computer cables complete with junction draw boxes. | m | 75 | 43,800 | 3,285,000 |
| | ***Fire Alarm Installation*** | | | | |
| 3.1.31 | Allow for provisional sum MF9316-L Conventional Fire Alarm Control Panel with 4 zones, system operating voltage of 240V ac, 50Hz, 24V d.c, complete with a 24hour backup (2No. 32AH batteries housed in an approved casing), detection circuits, alarm circuits, including all accessories all encased in high impact | no | 1 | 2,401,700 | 2,401,700 |

| Item | Description | Unit | Qty | Rate US$ | Amount US$ |
|---|---|---|---|---|---|
| 3.1.32 | Fire Alarm points wired by heat resistant cables in 25mm PVC concealed conduits from a central point complete with all accessories. | no | 87 | 63,800 | 5,550,600 |
| 3.1.33 | Optical smoke detector operating voltage 15V DC to 30V DC as MENVIER MPD720 or equal, complete with mounting base MBD700. | no | 12 | 114,975 | 1,379,700 |
| 3.1.34 | | | | | |
| 3.1.35 | Fire Alarm Sounders 152 x 63mm , operating Voltage 24V DC, with a sound output of 94dBA at 1 metre, as MENVIER MBM246 or equal. | no | 2 | 96,725 | 193,450 |
| 3.1.36 | Fire alarm break glass call point operating at 24V DC as MENVIER MBG 914 or equal. | no | 3 | 82,125 | 246,375 |
| | ***Hand Dryers*** | | | | |
| 3.1.37 | Wiring by 3X4.0mm$^2$ SC PVC-I copper cables in 25mm PVC concealed conduits from the Distribution Board to the Hand Dryer outlet | no | 6 | 64,750 | 388,500 |
| 3.1.38 | 20A DP flush mounted switched outlet for Hand Dryer | no | 6 | 52,850 | 317,100 |
| 3.1.39 | Automatic electric hand and face dryer 240 volts, 50Hz, mounted on the wall complete with all accessories as Bunnie Wandsworth or Vent-Axia or equal approved. | no | 6 | 835,800 | 5,014,800 |
| | **Total Carried to Collection** | | | | **85,603,250** |
| | ***Lightning Protection*** | | | | |
| 3.1.40 | Aloow for repair/ replacement of Copper tape of Hard Drawn High conductivity copper plate 3mm x 25mm cross section for Down Conductors,bonded to the iron sheet roof complete with fixing clips and all accessories as by FURSE or equal. | m | 120 | 45,338 | 5,440,500 |
| 3.1.41 | Allow for provision of the accociated Air terminals complete with Tape Adapter,Centre bolt Test Clamp complete a and all accessories as by FURSE or equal. | no | 6 | 314,975 | 1,889,850 |
| 3.1.43 | Earth electrodes made from Hard drawn copper or copper weld 20mm diameter by 1200mm in two length screwed together complete with cap, earth clamp, buried in manhole with a clearly marked cover and all accessories. | no | 6 | 326,725 | 1,960,350 |
| | **Security Lights** | | | | |
| 3.1.48 | Security lighting wired by 4core x 6mm$^2$ PVC/SWA/PVC copper cables burried in the ground complete with trenching, tiling, safety warning tape, back filling, carting away surplus material and all accessories. | m | 380 | 28,250 | 10,735,000 |
| | **Total Carried to Collection** | | | | **20,025,700** |
| 3.1.49 | Oval section steel bollard, 1000mm high to IP55 with white louvre optical system for 70W HPS-E with gear tray and flange mounted, as Thorn BARNOVAL, Cat. No. BORLP210 + BORGNB1070.4 or equal approved. (source: Comprehensive Product Catalogue 2004 Page 455 ) (Light SL). | no | 15 | 250,025 | 3,750,375 |

| Item | Description | Unit | Qty | Rate US$ | Amount US$ |
|---|---|---|---|---|---|
| 3.1.50 | Slim post-top Lantern for 100W discharge lamps, LM6 aluminium base with black polyester powder coat finish, plain bowl (QG6P) and large black canopy (QG6W), protected to IP65 with HPS anti-cycling ignitor as Thorn rumba, Cat. No. S53S100 or equal approved. (source: Comprehensive Product Catalogue 2004, Page 430-4431). (Light GL). | no | 4 | 135,050 | 540,200 |
| | **Contactor / Photocell Switch** | | | | |
| 3.1.51 | 32A TPN isolator for contactor circuit complete with all accessories. | no | 2 | 52,925 | 105,850 |
| 3.1.52 | Control circuit consisting of 32A TPN contactor for switching security lights complete with wiring and a photocell switch all mounted on wall located in position to be determined on site by the Supervising Engineer. | item | 2 | 316,600 | 633,200 |
| | **Total Carried to Collection** | | | | **5,029,625** |
| | **COLLECTION** | | | | |
| | | | | | **33,342,750** |
| | | | | | **17,462,695** |
| | | | | | **85,603,250** |
| | | | | | **20,025,700** |
| | | | | | **5,029,625** |
| | **TOTAL FOR GROUND FLOOR CARRIED TO MAIN COLLECTION** | | | | **161,464,020** |
| | **ELEMENT NO. 3.2 FIRST FLOOR** | | | | |
| | ***Supply, install, connect and set to work the following, all as described in the Specifications and Drawings.*** | | | | |
| | ***Power Supply*** | | | | |
| 3.2.01 | UPGRADE 200A TPN DB's to 400A TPN MCCB Distribution Boards with for surface/flush mounting complete with integral isolator, MCCBs and all accessories as MERLIN GERIN,HAVELL, MEMSHIELD 2, CRABTREE or equal approved. | no | 5 | 3,524,150 | 17,620,750 |
| 3.2.01 | UPGRADE 100A TPN DB's to 150A TPN MCCB Distribution Boards with for surface/flush mounting complete with integral isolator, MCCBs and all accessories as MERLIN GERIN,HAVELL, MEMSHIELD 2, CRABTREE or equal approved. | no | 4 | 3,524,150 | 14,096,600 |

| Item | Description | Unit | Qty | Rate US$ | Amount US$ |
|---|---|---|---|---|---|
| 3.2.02 | Supply Cable 50mm$^2$ x 4core PVC/SWA/PVC Copper cables, clipped to wall or in duct, complete with terminations clipping and all accessories to 400A DB's above. | m | 285 | 45,375 | 12,931,875 |
| 3.2.02 | Supply Cable 35mm$^2$ x 4core PVC/SWA/PVC Copper cables, clipped to wall or in duct, complete with terminations clipping and all accessories from 150A DB's above. | m | 260 | 35,275 | 9,171,500 |
| 3.2.03 | Main Earth at adaptable box by 25mm$^2$ PVC copper cables to copper electrode in manhole complete with all accessories. | item | 9 | 391,625 | 3,524,625 |
| | ***Lighting*** | | | | |
| 3.2.04 | Lighting points wired by 3 x 2.5mm$^2$ SC PVC copper cables in 25mm PVC concealed conduits complete with all accessories. | no | 20 | 32,850 | 657,000 |
| 3.2.05 | 1200mm, T8 4x36W recessed modular fluorescent luminaire, with low brightness louvres, categorised to CIBSE LG3 category 2 and 3 with switch start, as Thorn Quatro C-line, Cat. No. FQCS 418. (source: Comprehensive Product Catalogue 2004(Light F12) | no | 10 | 173,375 | 1,733,750 |
| 3.2.06 | Emergency version of 600 x 600mm, T8 4x18W recessed modular fluorescent luminaire, with low brightness louvres, categorised to CIBSE LG3 category 2 and 3 with switch start, as Thorn Quatro C-line, Cat. No. E3R FQCS 418. (source: Comprehensive Product Catalogue 2004(Light F12E) | no | 3 | 211,700 | 635,100 |
| 3.2.07 | Circular Superclub CD with polycarbonate body, white trim polycarbonate opal diffuser and integral control gear for use with 28W 2D lamps as Thorn SuperClub CD, Cat. No. CLCDO2D28W or equal approved (Source : Comprehensive product catalogue 1999 Page 282 - 283) (Light B) | no | 4 | 135,050 | 540,200 |
| | **Total Carried to Collection** | | | | **60,911,400** |
| 3.2.08 | Round white surface luminaire with acrylic fresnel diffuser and integral control gear, for use with 28W 2D lamp as Thorn SuperNovello Cat. No. 2DXF28 or equal approved (Source : Comprehensive product catalogue 1999 Page 284 - 285) (Light C) | no | 2 | 153,300 | 306,600 |
| 3.2.09 | Ceiling arm mounted emergency lighting fitting with a maintained 3 hour duration, for use with a T2 8W fluorescent lamp, with a silver aluminium finish, as Thorn Voyager T2 Architectural Signage, Cat No. ESWX3M/SL or equal approved complete with an Exit Sign ERX 4 (source: comprehensive product catalogue 2004, Page 107) (Light EXIT). | no | 1 | 114,975 | 114,975 |
| 3.2.10 | 6A 1 gang 1 way moulded switch as MK or equal approved. | no | 8 | 3,833 | 30,660 |
| 3.2.11 | 6A 2 gang 1 way moulded switch as MK or approved equal. | no | 1 | 4,745 | 4,745 |
| 3.2.12 | 6A 1 gang 2 way moulded switch as MK or approved equal. | no | 1 | 4,745 | 4,745 |

| Item | Description | Unit | Qty | Rate US$ | Amount US$ |
|---|---|---|---|---|---|
| | ***Sockets Outlets*** | | | | |
| 3.2.13 | Socket outlets wired by 3 x 2.5mm$^2$ SC PVC-I cables as a ring in 25mm PVC concealed conduits / trunking complete with all accessories. | no | 15 | 38,325 | 574,875 |
| 3.2.14 | 13A 2gang switched socket outlet as MK or equal complete with all accessories (on walls). | no | 6 | 7,300 | 43,800 |
| 3.2.15 | 13A 2gang switched socket outlet as MK or equal complete with all accessories (on trunking). | no | 9 | 9,125 | 82,125 |
| | ***Computer Outlets ( to be wired up to the Server Room )*** | | | | |
| 3.2.16 | Computer points wired by Cat 6E cables from the nearest switch terminating on RJ45 outlets on plastic Trunking or in Floor Ducts. | no | 6 | 76,650 | 459,900 |
| | ***Telephone Outlets ( to be wired up to the Server Room )*** | | | | |
| 3.2.17 | Telephone points wired by Cat 6E cables from the nearest switch terminating on RJ45 outlets on plastic Trunking or in Floor Ducts. | no | 8 | 76,650 | 613,200 |
| | ***Trunking*** | | | | |
| 3.2.18 | Three section plastic trunking overall section 167 x 50mm as Marshall - Tufflex Sterling Trunking Profile 2 or equal approved complete with couplers, end caps, internal / external bends, upward / downward flat angles, flat tees and all accessories. | m | 50 | 96,725 | 4,836,250 |
| | ***Floor Ducts*** | | | | |
| 3.2.19 | 4 x 50mm PVC ducts embedded in floors to connect telephone, power and computer cables complete with junction draw boxes. | m | 5 | 43,800 | 219,000 |
| | **Total Carried to Collection** | | | | **7,290,875** |
| | ***Fire Alarm Installation*** | | | | |
| 3.2.20 | Fire Alarm points wired by heat resistant cables in 25mm PVC concealed conduits from a central point complete with all accessories. | no | 47 | 43,800 | 2,058,600 |
| 3.2.21 | Optical smoke detector operating voltage 15V DC to 30V DC as MENVIER MPD720 or equal, complete with mounting base MBD700. | no | 25 | 114,975 | 2,874,375 |
| 3.2.22 | Fire Alarm Sounders 152 x 63mm , operating Voltage 24V DC, with a sound output of 94dBA at 1 metre, as MENVIER MBM246 or equal. | no | 12 | 96,725 | 1,160,700 |
| 3.2.23 | Fire alarm break glass call point operating at 24V DC as MENVIER MBG 914 or equal. | no | 18 | 82,125 | 1,478,250 |
| | ***Hand Dryers*** | | | | |
| 3.2.24 | Wiring by 3X4.0mm$^2$ SC PVC-I copper cables in 25mm PVC concealed conduits from the Distribution Board to the Hand Dryer outlet | no | 4 | 67,450 | 269,800 |
| 3.2.25 | 20A DP flush mounted switched outlet for Hand Dryer | no | 4 | 42,850 | 171,400 |

| Item | Description | Unit | Qty | Rate US$ | Amount US$ |
|---|---|---|---|---|---|
| 3.2.26 | Automatic electric hand and face dryer 240 volts, 50Hz, mounted on the wall complete with all accessories as Bunnie Wandsworth or Vent-Axia or equal approved. | no | 4 | 835,800 | 3,343,200 |
| | **Total Carried to Collection** | | | | **11,356,325** |
| | **COLLECTION** | | | | |
| | | | | | **60,911,400** |
| | | | | | **7,290,875** |
| | | | | | **11,356,325** |
| | **TOTAL FOR FIRST FLOOR CARRIED TO MAIN COLLECTION** | | | | **79,558,600** |
| | **ELEMENT NO. 3.3 MISCELLANEOUS** | | | | |
| | ***Supply, install, connect and set to work the following, all as described in the Specifications and Drawings.*** | | | | |
| 3.3.01 | Testing and Commissioning of the electrical installations. | item | 1 | 2,768,325 | 2,768,325 |
| 3.3.02 | O & M Manuals | sets | 3 | 1,240,900 | 3,722,700 |
| 3.3.03 | As Built Drawings (1 set on Polyester Film and two sets of Paper Prints) | item | 1 | 3,576,700 | 3,576,700 |
| | **Total Carried to Collection** | | | | **10,067,725** |
| | **MAIN COLLECTION** | | | | |
| | GROUND FLOOR | | | | **161,464,020** |
| | FIRST FLOOR | | | | **79,558,600** |
| | MISCELLANEOUS | | | | **10,067,725** |
| | **TOTAL FOR ELECTRICAL INSTALLATIONS CARRIED TO SUMMARY** | | | | **251,090,345** |

# SPECIFICATIONS

# Entebbe International Airport
# Upgrade and Expansion Project
# International Passenger Terminal

## SPECIFICATIONS

*Number of Pages* **434**


**DIVISION 1 – GENERAL REQUIREMENTS**

| | |
|---|---|
| 01100 – Summary | 01100-1 to 01100-2 |
| 01140 – Work Restrictions | 01140-1 to 01140-5 |
| 01143 – Airport Project Procedures | 01143-1 to 01143-6 |
| 01143a – SidaApp | 01143a-1 to 01143a-4 |
| 01143b – Appendix | 01143b-1 to 01143b-2 |
| 01210 – Allowances | 01210-1 to 01210-3 |
| 01250 – Contract Modification Procedures | 01250-1 to 01250-2 |
| 01290 – Payment Procedures | 01290-1 to 01290-4 |
| 01320 – Construction Progress Documentation | 01320-1 to 01320-4 |
| 01330 – Submittal Procedures | 01330-1 to 01330-5 |
| 01400 – Quality Requirements | 01400-1 to 01400-4 |
| 01500 – Temp Facilities and Controls | 01500-1 to 01500-6 |
| 01530 – Marking and Barricades | 01530-1 to 01530-1 |
| 01600 – Product Requirements | 01600-1 to 01600-5 |
| 01700 – Execution Requirements | 01700-1 to 01700-4 |
| 01731 – Cutting and Patching | 01731-1 to 01731-2 |
| 01732 – Selective Demolition | 01732-1 to 01732-8 |
| 01770 – Closeout Procedures | 01770-1 to 01770-9 |

**DIVISION 2 – SITEWORK**

| | |
|---|---|
| 02230 – Site Clearing | 02230-1 to 02230-5 |
| 02361 – Termite Treatment | 02361-1 to 02361-4 |

**DIVISION 3 – CONCRETE**

| | |
|---|---|
| 03000 - Concrete | 03000-1 to 03000-16 |

**DIVISION 4 – MASONRY**

| | |
|---|---|
| 04810 – Unit Masonry Assemblies | 04810-1 to 04810-12 |

**DIVISION 5 – METALS**

| | |
|---|---|
| 05500 – Mtl Fabrications | 05500-1 to 05500-9 |
| 05521 – Pipe and Tube Railings | 05521-1 to 05521-9 |
| 05580 – Formed Metal Fabrications | 05580-1 to 05580-5 |

**DIVISION 6 – WOOD AND PLASTICS**

| | |
|---|---|
| 06100 – Rough Carpentry | 06100-1 to 06100-5 |
| 06402 – Interior Arch Wood | 06402-1 to 06402-6 |

**DIVISION 7 – THERMAL AND MOISTURE PROTECTION**

| | |
|---|---|
| 07100 – Waterproof Membrane | 07100-1 to 07100-8 |
| 07210 – Building Insulation | 07210-1 to 07210-3 |
| 07411 - METAL FASCIA PANELS | 07411-1 to 07411-7 |
| 07531- EPDM Membrane Roofing | 07531-1 to 07531-6 |
| 07605 – Flashing and Sheet Metal, Extruded Metals | 07605-1 to 07605-6 |
| 07920 – Joint Sealant | 07920-1 to 07920-6 |

**DIVISION 8 – DOORS AND WINDOWS**

| | |
|---|---|
| 08110 – HM doors and frames | 08110-1 to 08110-5 |
| 08210 – Wood Doors | 08210-1 to 08210-4 |
| 08311 – Access Doors | 08311-1 to 08311-4 |
| 08334 – Overhead Coiling Grilles | 08334-1 to 08334-4 |
| 08411 – Aluminum Storefront | 08411-1 to 08411-9 |
| 08461 – Sliding Automatic Entrance Doors | 08461-1 to 08461-7 |
| 08521 – Aluminum Windows | 08521-1 to 08521-3 |
| 08711 – Door Hardware | 08711-1 to 08711-19 |
| 08800 - Glazing | 08800-1 to 08800-6 |

**DIVISION 9 – FINISHES**

| | |
|---|---|
| 09215 – Gypsum Veneer Plaster | 09215-1 to 09215-8 |
| 09220 - Stucco | 09220-1 to 09220-7 |
| 09310 – Ceramic Tile | 09310-1 to 09310-5 |
| 09311- Porcelain Floor Tile | 09311-1 to 09311-10 |
| 09402 – Resinous Matrix Terrazo Flooring | 09402-1 to 09402-8 |
| 09511 – Acoustical Panel Ceilings | 09511-1 to 09511-7 |
| 09651 – Resilient Floor Tile | 09651-1 to 09651-5 |
| 09653 – Resilient Wall Base | 09653-1 to 09653-2 |
| 09900 – Painting | 09900-1 to 09900-13 |
| 09963 – Elastomeric Coatings | 09963-1 to 09963-9 |

**DIVISION 10 – SPECIALTIES**

| | |
|---|---|
| 10155 – Toilet Compartments | 10155-1 to 10155-4 |
| 10200 – Louvers and Vents | 10200-1 to 10200-4 |
| 10350 - Flagpoles | 10350-1 to 10350-3 |
| 10425 – Pedestrian Control Devices | 10425-1 to 10425-2 |
| 10505 – Metal Lockers | 10505-1 to 10505-6 |
| 10520 – Fire-Protection Specialties | 10520-1 to 10520-5 |
| 10671 – Metal Shelving | 10671-1 to 10671-9 |

**DIVISION 11 – EQUIPMENT**

THIS SECTION IS NOT USED

**DIVISION 12 – FURNISHINGS**

| | |
|---|---|
| 12484 – Floor Mats | 12484-1 to 12484-4 |
| 12491 – Louver Blinds | 12491-1 to 12491-4 |
| 12615 – Public Seating | 12615-1 to 12615-3 |

**DIVISION 13 – SPECIAL CONSTRUCTION**

THIS SECTION IS NOT USED

**DIVISION 14 – CONVEYING SYSTEMS**

| | |
|---|---|
| 14540 – Baggage Conveyors | 14540-1 to 14540-27 |

**DIVISION 15 - MECHANICAL**

THIS SECTION IS NOT USED

**DIVISION 16 - ELECTRICAL**


| | |
|---|---|
| 16708 – Access Control System | 16708-1 to 16708-7 |
| 16742 – Structured Cabling System | 16742-1 to 16742-5 |
| 16770 – Public Address System | 16770-1 to 16770-5 |
| 16780 – Closed Circuit Television | 16780-1 to 16780-3 |
| 16781 – Digital Video Recording System | 16781-1 to 16781-4 |
| 16790 – Data Communications Network Equipment | 16790-1 to 16790-7 |
| 16860 – Multi-User Flight Information Display System | 16860-1 to 16860-6 |
| 16865 – Common Use Terminal Equipment (CUTE) | 16865-1 to 16865-7 |

# SECTION 01100 - SUMMARY

## PART 1 - GENERAL

### 1.1 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: Project consists of the renovation and additions to the International Terminal arrivals level (ground floor) and selective areas of the Departure Level (first floor)

1. Project Location: Entebbe International Airport Terminal.
2. Owner: Civil Aviation Authority of Uganda.

B. Architect Identification: The Contract Documents, dated August 2005, were prepared for Project by The LPA Design Group, Inc., 2090 Palm Beach Lakes Blvd., Ste 503, West Palm Beach, FL, USA, 33409, (561) 686-5130.

C. The Work consists of the following:
1. Renovation of the Arrivals area including Immigration, Customs and Baggage Claim areas. Approximate area 3,785 sq./m.
2. Building addition to the Arrivals area including Immigration, Customs and Meeter/Greeter areas. Approximate area 4,232 sq./m.
3. Renovation of selective areas of the Departure area. New concession spaces approximate area 105 sq./m.
4. Placement of waterproofing membrane to emplaning Driveway. Approximate area 4,000 sq./m.

D. Portions of the work will be conducted in close proximity to occupied areas of the Airport, so restrictions on activities and work hours will apply.

E. Project will be constructed under a single prime general construction contract.

### 1.2 WORK SEQUENCE

A. The General Contractor shall submit to the Owner and Architect a proposed sequence of Work. This sequencing of Work will take into account airport operations and schedules, assuring that the terminal will continue to operate while providing for the safety and welfare to traveling passengers.

### 1.3 USE OF PREMISES

A. General: Refer to Sections 01140 "Work Restrictions" and to Phasing and Staging plans in the documents.

### 1.4 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 16-division format and CSI/CSC's "MasterFormat" numbering system.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

    a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01100

# SECTION 01140 - WORK RESTRICTIONS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and General Conditions of the Contract Section

### 1.2 SEQUENCING:

The Contractor shall schedule his work activities in accordance with requirements of Section 01100 "Summary and Phasing Plans", and these Specifications unless otherwise approved by the Owner.

### 1.3 USE OF PREMISES

A. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of site beyond areas in which the work is indicated.

1. Limits: Confine constructions operations as indicated in the documents and necessary to the progress of the Work.

2. Owner Occupancy: Allow for Owner occupancy of site and use by the public. The owner will endeavor to cooperate with the contractor's operations when the contractor has notified the owner in advance of need for changes in operations in order to accommodate construction operations. Conduct the work so as to cause the least interference with the owner's operations.

3. Contractor and personnel shall be limited to only access the immediate construction area. Contractor is to submit for Owner's approval a staging plan for this Work.

4. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

   a. Schedule deliveries and debris removal to minimize use of driveways and entrances. Post warning signs at crossing of haul route with Airport loop road. Maintain barricades or gates to limit access to construction areas.
   b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
   c. Delivery vehicles, construction vehicles and other construction related hauling vehicles are restricted to the hauling/travel routes identified on the Site Phasing Plan, unless otherwise authorized, in writing, by the Owner.
   d. Storage areas will be available on site.

## 1.4 OCCUPANCY REQUIREMENTS

A. Full Owner Occupancy: Owner will occupy site and existing building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations.

# PART 2 - PRODUCTS (Not Used)

# PART 3 - EXECUTION

## 3.1 COORDINATION WITH OCCUPANTS

A. Occupied areas include all areas in which the Owner's regular operations will be going on or to which the Owner requires access during the construction period, whether conducted by the Owner or his tenants, clientele, or the public.

B. Construction related activities, in general, may proceed during normal working hours, unless the work will interfere with operating procedures of the Airport. When this interference occurs, the Contractor shall arrange his activities and work schedule to be performed during non-operating hours of the area of the Airport affected. The Airport is generally in operation between the hours of 6:00 am and 12:00 (midnight), seven days per week.

C. Limit access through occupied areas to those days and times, which the Owner approves.

D. The Contractor shall review the phasing plans and shall submit his plan for providing safe and secure passageway for users of the Airport during construction activities.

E. When the following must be modified, provide alternate facilities acceptable to the Owner:

1. Entrances, which must remain open.
2. Utilities, which must remain in operation.
3. Informational signage to direct the movement of passengers or traffic.

## 3.2 UTILITIES

A. Utilities are located within the construction area. Contractor shall coordinate with Owner and Architect to identify utilities. Contractor shall be responsible for contacting utility owners and locating all existing utilities within the work area. Contractor shall be responsible for costs associated with utility location, protection, and for required repairs due to failure to comply with these requirements.

B. Information concerning underground utilities and service lines may be obtained from the utility companies, owner, CAA, or the national weather service. The owner and the architect do not guarantee their accuracy. The contractor is advised to determine the exact locations from the available sources of information, or provide his own means of detection.

C. Contractor shall notify airport personnel, utility companies, CAA personnel, and weather bureau personnel before excavating in any area.

D. Agencies / utility companies with service on the airport are as follows:

1. Civil Aviation Authority
2. National Weather Service
3. Gas, Electric
4. Domestic Water
5. Sewer
6. Telephone Service

E. In all construction areas, all CAA/Airport cables will be marked by CAA prior to construction. Contractor is to protect cables during construction. Contractor shall notify CAA supervisor in advance of construction activity to allow the CAA sufficient time to locate and mark existing field cable and to avoid unscheduled facility outages. Any CAA/Airport equipment/cable that is damaged by the contractor shall be repaired as approved by the CAA supervisor / representative. All cable splice/repairs shall meet CAA specifications and be accomplished to the satisfaction of the CAA representative. Qualified workmen regularly engaged in that type of work shall perform all cable work. If an existing cable cannot be repaired to the satisfaction of the CAA, new cable of like kind shall be installed.

F. Maintain existing surface and pipe storm drainage, unless otherwise noted.

## 3.3 USE OF SITE

A. The contractor shall at all times so conduct his work as to create no hindrance, hazard, or obstacle to vehicular or aircraft traffic using the airport.

B. Access to the work: access to the work will be via the access routes shown on the plans or as directed by Owner. The contractor shall identify access routes with suitable signs, barricades and similar equipments.

C. All construction traffic shall enter and exit the project area through access points directed by the Owner. Contractor will be responsible for security of construction access gates in accordance with the airport's security plan.

D. Haul Route: All existing roads that will be used as part of the haul road will be restored to their original condition. After completion of the project the contractor will be responsible for daily clean up operations of debris that may be on the haul road.

1. The existing airport pavements, access roads, and haul routes may not be capable of supporting certain types of construction equipment. Prior to bidding, the contractor shall fully satisfy himself as to the ability of the existing airport pavements to satisfactorily sustain the type of equipment he plans to use. Contractor shall size the equipment used for construction accordingly. The contractor at no additional cost to the owner shall repair any damage caused by hauling or any other construction activity to existing pavement.

E. Project access, staging area, waste area, stockpile area and all haul roads shall be restored to original condition including topsoil and seeding at job completion at no additional cost to Owner.

F. The contractor's staging area has been shown on the plans for information purposes only. The actual size and location will be determined at the pre-construction conference.

1. All construction material and equipment shall be located and stored in the designated staging area(s) only.
2. The contractor will be responsible for the cleanup and disposal of all trash and debris created by his work or personnel. All trash and debris must be disposed of offsite.
3. The contractor will be responsible for the storage and security of his material and equipment and shall erect storage facilities and fencing as necessary. The contractor's storage and staging area shall be in the general location(s) shown on drawing.

G. Contractor shall control dust at an acceptable level. The contractor shall be required to keep a water supply at the project site during heavy equipment usage areas.

H. Burning of debris will not be allowed on airport property.

I. All vehicles operated on existing pavements to remain shall be rubber tired.

J. Damage to facilities or grounds resulting from hauling or storage of material or other activities in connection with the execution of the contract work, shall be repaired or replaced by the contractor in as good or better condition as originally found.

L. Stock-piled material shall be constrained in a manner to prevent movement resulting from wind.

M. All vehicles of the contractor's forces shall be parked in designated areas only. Contractor to provide temporary gate or barricades and demarcation of the construction area perimeter and is to be responsible for maintenance and restoration of areas.

1. In the event the contractor services his equipment on airport property, all oil and fluids removed from the equipment must be collected and disposed of in accordance with the local, state and federal environmental laws. If a hazardous, or regulated material is spilled, it must be promptly reported to the airport and cleaned up by the contractor at his expense.

## 3.4 PHASING AND SEQUENCING

A. Existing easements to other properties shall be maintained at all times. Areas outside the project limits are designated as restricted areas. The contractor's forces are prohibited from entering restricted areas at any time, unless specifically authorized by the architect or airport operations department.

B. Contractors shall be responsible for visiting the site to become familiar with the existing conditions. The documents shall serve to aid the contractor in his evaluation of the sequences and extents of construction; but shall not be held to be all-inclusive. Any con-

flicts or apparent deficiencies must be submitted to the Architect in writing prior to bidding.

C. Portions of the airport shall be occupied during construction. The general contractor shall comply with the following life safety issues. Failure to list all life safety issues does not relieve the contractors from complying with federal, and local codes, the contractual agreement between the contractor and owner, and other governing bodies which have jurisdiction on this project. The following are interim life safety code issues which are specific to this project and must be addressed:

1. Develop and enforce storage, housekeeping and debris removal procedures that reduce the flammable and combustible fire load to the lowest level necessary for daily operations.

2. Secure all tools and construction materials during breaks and non-construction hours.

D. The Owner shall be responsible for remaining and/or removing any furniture, fixtures, or equipment to be salvaged or sold. Insofar as possible, the Owner shall remove said materials prior to the pre-bid conference. The Contractor shall be responsible for removal of all remaining materials as a part of the construction contract. No storage or sale of salvaged material will be permitted on Airport property.

END OF SECTION 01140

# SECTION 01143- AIRPORT PROJECT PROCEDURES

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawing and General Conditions of the Contract, Section 01140 "Work Restrictions".

### 1.2 INTRODUCTION

A. This project will include Contractor operations within active Air Operations Areas (AOA). The Airport will conduct normal aircraft operations during the course of this project, subject to certain restrictions called out in this section or elsewhere in the specifications. Therefore, to provide for the security and safety of Airport users and the Contractor's forces, as well as to minimize interruptions to aircraft operations, the Contractor shall limit his work within the areas designated and conduct his operations as specified.

B. UNAUTHORIZED CROSSING OF THE AIRFIELD AOA IS PROHIBITED. Any fines or assessments levied against the Sponsor as a result of intrusions in the AOA or other violations by the Contractor's personnel or those of his will be passed on to the Contractor. In addition, the Contractor will be subject to a fine of $2,000,000.00 UGS per incident, assessed by the Sponsor.

### 1.3 AIR OPERATION AREA (AOA) SAFETY REQUIREMENTS:

A. Contractor shall obtain, have knowledge of, and incorporate the following safety provisions into the construction project:

1. Operational Safety On Airports During Construction..
2. Airport Safety Self-Inspection.
3. Painting, Marking, And Lighting Of Vehicles Used On An Airport.

B. Construction activities shall comply with all applicable local and Federal safety guidelines.

C. Contractor shall comply with all airport security regulations that may be established to protect airport operations.

D. Observe and/or follow all safety related instructions by any Uganda Civil Aviation Authority and airport personnel at all times.

E. Obtain necessary clearances and identification badges for construction personnel from the Entebbe International Airport Security Office. The Contractor will be required to adhere to all security requirements and all construction personnel working in, or having access to, secure areas (AOA side of the SIDA line), will be required to obtain and wear badges issued by the Security Office.

1. Badges will be required for certain construction employees. Badges shall be obtained through the Airport's Security Office. The badges shall be returned at project completion. The construction supervisor and all approved equipment escort personnel shall be trained, certified and badged for operations within the security identification area as defined with the current approved airport security plan.
2. Applications should be turned into the Airport Security Office. A photo I.D. badge will be issued for each approved application. There will be no charge for the initial finger printing and badge issuance. There will be a nonrefundable fee of Fifty Thousand Shillings ($50,000 UGS) for replacement of lost badges. Each badge holder will be required to comply with the security rules and regulations of the Entebbe International Airport Security Office. The Airport could suffer severe fines or penalties as a result of security violations. The Contractor will be responsible for these fines or penalties for any security violations that are his responsibility. Contractor security measures will be discussed and reviewed at the Preconstruction Conference.

F. The contractor will provide security within the construction area and will keep all unauthorized personnel out.

1. Confine all construction personnel to within the construction limits during each phase of the work.

G. All actions of the contractor's employees, subcontractors and suppliers are the sole responsibility of the contractor. All employees, subcontractors and suppliers must be educated regarding related work and the safety requirements of the aircraft active area and public safety adjacent to the construction area.

H. Work will be carried on in such a manner as to leave the portion of the building open to airport users free from hazards at all times. All walk surfaces shall be kept clean and free of dirt, stone, and debris. Mud tracked into portions of the building that are in use shall be cleaned immediately. Waste and loose material capable of causing harm to the public shall not be tolerated.

I. In case of emergency, the Contractor shall make every effort to remove the equipment and personnel from affected area(s) and abide by decisions made by the Owner or his/her representative.

J. The contractor shall cooperate with the airport users through the Owner in scheduling his operation to provide adequate clearances for safe access, circulation and exit of passengers; loading and unloading of baggage, and maneuvering, taxiing, and parking of aircraft and ground equipment.

1. Safety and security will be discussed with the contractor or his/her representative at progress meetings at the job site.

1.4 COORDINATION

A. The Contractor shall have a general supervisor on the job at all times during construction activity.

B. The Owner will designate a representative who will issue all safety notices with the Uganda Civil Aviation Authority.

C. The contractor shall make reasonable effort to coordinate with separate contractors working in the same area or adjacent areas. Specific overlap areas are noted elsewhere in the phasing drawings and in the specifications.

1.5 CONSTRUCTION SAFETY REQUIREMENTS:

A. General:

1. Safety Officer: The Contractor is required to designate a Safety Officer who will be the liaison between the Contractor, the Engineer and the Owner in all safety related matters for the duration of the project. The Safety Officer shall be on call 24 hours per day for emergency maintenance of airport hazard lighting, barricades, and other safety features.

2. Protection of Utilities: The Contractor shall be responsible for field marking and protecting all utilities within the construction limits.

3. Storage of Equipment, Vehicles, and Materials: All equipment, vehicles, and materials must be stored in the designated storage or staging area or in areas acceptable to the Engineer.

4. Vehicular Markings: Contractor vehicles and equipment shall be marked with checkered flags and lighted with flashing beacons to comply with requirements.

5. Construction Methods Limitation:

a. No open flames or burning will be allowed on Airport property.
b. Stockpiled material shall be constrained in a manner to prevent displacement by jet blast, prop blast, or wind.

6. Safety and Accident Protection:

a. The Contractor shall comply with all applicable federal, state, and local laws, ordinances, and regulations governing safety, health, and sanitation; shall provide barricades; and shall take any other needed actions, on his own responsibility, that are reasonably necessary to protect the life and health of employees on the job,

the safety of airport users, and the safety of moving and parked aircraft, and other property during the performance of the work.

b. The Safety Officer's duties shall include accident prevention.

B. Taxiway Safety Zones:

1. Limitations: When necessary to accomplish construction in areas adjacent to taxiways, the construction equipment, vehicles, and men are authorized to operate without interruption within the project limits, except within the following areas and as specified otherwise:

Distance from active taxiway or apron taxilane centerline
- within 129.5 feet.

2. Request for Facility Closures: Construction activities on taxiways or within the above-restricted areas shall only be performed at times when the taxiways are closed to aircraft. Closure of a taxiway or any portion thereof must be requested in writing by the Contractor through the Engineer. This request must indicate the areas needed and a schedule of operations and time(s) required for operations within the area. The Owner reserves the right, however, to shift any approved closure periods to alleviate aircraft congestion or when inclement weather conditions dictate.

3. Equipment Operation Restrictions: Contractor may be permitted to operate trenching machines and other equipment in Taxiway Safety Zones provided all of the following conditions are satisfied:

a. The equipment operator and/or crew foreman monitors the ATC ground frequency continuously, using a two-way radio transceiver.

b. All equipment shall be cleared from the Taxiway Safety Zones during aircraft operations (landings, take-offs, and taxiing).

c. All equipment within the Taxiway Safety Zones is manned and being used. No unnecessary or parked equipment will be allowed within the Taxiway Safety Zones.

d. All excavated trenches and holes shall be backfilled, tamped and leveled to match existing grades before workmen leave the site at the end of each workday.

4. Stockpiles: Stockpiled materials shall not be permitted within the taxiway safety zones.

5. Grading Requirements: All construction within a restricted area shall be performed in such a manner that, at the end of the closure period, it will leave the safety area with no abrupt grade changes and with no trenches

with depth or width greater than 3".

C. Obstructions to Navigation:

1. Violation of Safety Zone Surfaces: Penetration of equipment, vehicles, materials, or men into the safety zones and approach surfaces requires the preparation and distribution of Notices of Airmen (NOTAM) in advance to the actual penetration.

2. Scheduling: When part of the work in this project is in violation of approved schedules, the clearance distance requirements from runway and taxiway edges shall be incorporated into the construction sequence schedule. At no time shall the construction limits of the area under construction violate the safety zones without prior notification to and approval by the Engineer.

3. Coordination and Communication: Work within and adjacent to active AOAs shall be coordinated with the Owner prior to commencement of the activity. Work crews in these areas shall be accompanied by the construction superintendent who shall be in constant radio contact with ATC.

## 1.6 COMMUNICATIONS AND CONTROLS

A. Contractors shall maintain radio communication with ground control at all times during construction activity or access in the Aircraft Operations Area (AOA). The contractor will have a working radio on site at all times during construction and shall assign responsible personnel to continuously monitor the ground control and shall immediately obey all instructions to vacate when directed.

B. Contractor shall protect existing runway and taxiway lights, signs, and NAVAIDS.

1. Any unplanned, unapproved, or accidental shutdown or interruption of service to any lighting circuit or navigational aid requires immediate notification to the airport operations department and the architect and shall be repaired immediately by the contractor. The cost of materials and labor required to repair the lighting circuit shall be borne by the contractor.

C. Barricades: Existing aprons, taxiways and runways outside the limits of construction shall be separated from construction areas with barricades as shown on the phasing plans and described in Section 01530.

1. Contractor shall provide Type I barricades along the active pavement areas as directed while work is proceeding in those areas. Barricades shall be sited and relocated during the course of the work to clearly identify areas temporarily closed to aircraft operations.

D. If the contractor is given approval to work at night, he shall provide lights at the work site. Type, direction, number and location of lights shall be subject to the approval of the airport manager. Where lighting affects the aircraft apron, it shall be accomplished in a manner to create no hindrance to aircraft.

E. Appropriately mark or light all equipment to be operated on the airside area in accordance with regulations. Maximum height of equipment shall be **50 feet** depending on the location within contractor's work limits shown on safety and sequencing plans unless approved by the Uganda Civil Aviation Authority. Use of any equipment exceeding this height at any time, will only be during daylight VFR conditions.

1.7 SECURITY GATES AND FENCING:

A. The Contractor has the responsibility for maintaining control of the access gates or any other entrance to the AOA. The Contractor may utilize a gate guard or install an automatic operated gate controller with limited access with numeric key pad. The Contractor's method of maintaining security shall be set forth in his Security Plan.

PART 2 - PRODUCTS

2.1 BARRICADES

A. Barricades shall be constructed as specified in Section 01530.

PART 3 - EXECUTION

3.1 LIMITATION OF CLOSURES:

A. Airfield pavement closures will be made only by the Owner. The Contractor shall request the closure from the Owner.

3.2 BARRICADE INSTALLATION:

A. Install barricades at locations shown on the drawings and where directed by Engineer. Anchor barricades as specified in Section 01530. Maintain barricades until removal is directed by Owner. Barricade batteries shall be checked daily to insure adequate operation of the flashers during the night. Replace batteries as required. Upon removal of barricades repair any damage to pavement or surrounding area caused by barricades.

END OF SECTION 01143

# SECURITY IDENTIFICATION DISPLAY AREA (SIDA) BADGE APPLICATION INSTRUCTIONS

A Fingerprint-based criminal history records checks (CHRC), SIDA and Ramp Driving classes must be completed to obtain a Security Identification Display Area (SIDA) badge at Entebbe International Airport for unescorted access authority. The following instructions are provided.

I. **Identification Verification**

You must present two forms of personal identification.

1. Government Picture I.D. (i.e., drivers license, passport,)
2. Other (i.e., Government Identity card)

II. **Application**

You must print clearly and complete the following forms in full:

1. Read and sign Badge Holder Responsibilities (page 2).
2. SIDA Badge/Fingerprint Application
   a. Do not leave any blanks on this form.
   b. DO NOT write in the Aviation Department Use Only section.
   c. Read and complete page 4 carefully, sign and date.
3. When the results of the CHRC come back you will be notified and scheduled for training.

III. **Training**

Before you may receive your SIDA badge, you must complete the following courses offered by the Airport in compliance with the Federal Aviation Regulations.

1. S.I.D.A. (Security Identification Display Area) Training
2. Ramp Driving.
3. Upon completion you will be scheduled for a picture and badge issue.



WARNING: THIS DOCUMENT CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER THE PROVISIONS OF UGANDA FEDERAL LAWS. NO PART OF THIS DOCUMENT MAY BE RELEASED EXCEPT AS AUTHORIZED. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY ACTION.

# SECURITY IDENTIFICATION DISPLAY AREA (SIDA) BADGE

## BADGE HOLDER RESPONSIBILITIES

1. All SIDA badges remain the property of Entebbe International Airport Security Office.

2. SIDA badges are not transferable between employees.

3. EMPLOYEE MUST IMMEDIATELY NOTIFY YOUR EMPLOYER AND Entebbe International Airport Security OF LOSS OR THEFT OF SIDA BADGE. A letter from your employer and police report is required by Entebbe International Airport Security Office before a replacement SIDA badge can be issued.

4. The first SIDA badge will be issued at no charge. Thereafter, the charge for each successive replacement badge will be $ 50,000.00 UGS.

5. The Entebbe International Airport Security Office reserves the right to revoke authorization of an individual for an Airport SIDA badge where such action is determined to be in the best interest of airport security.

6. SIDA badges MUST BE VISIBLY DISPLAYED on the upper portion of the body on the outer garment in all *restricted areas* of the airport.

7. Airport SIDA badges are used as a positive identification for all authorized persons operating in the secured area (SIDA) of the Airport. Badge holders are required to challenge any person that is not displaying an approved badge. Any person not displaying an approved badge will be reported immediately to Airport Security and escorted from the premises.

8. Employees will not divulge information regarding the Airport Security System or the security system of any Airport Tenant.

9. If you have any questions regarding your responsibilities as an Airport employee, you may ask the person issuing your badge.

10. The Airport SIDA badge must be returned to the Entebbe International Airport Security Office at the end of employment. Failure to return the Airport SIDA badge will result in a fine, and/or subject to prosecution and assessment of court costs as defined under Federal Law.

DISCLAIMER:

I hereby certify I have read and understand the above information.

Employee Signature _____ Date_____

WARNING: THIS DOCUMENT CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER THE PROVISIONS OF UGANDA FEDERAL LAWS. NO PART OF THIS DOCUMENT MAY BE RELEASED EXCEPT AS AUTHORIZED. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY ACTION.

SIDA Badge/Fingerprint Application

Applicant Instructions:
1. Clearly and legibly print all information.
2. Provide all information requested.

| Last Name : | First Name: | MI: | Alias(s)/ Nicknames(s): |
|---|---|---|---|
| Social Security Number: - - | Date of Birth (DD/MM/YY) | Place of Birth | Citizenship |

| Sex: M / F | Race | Height | Weight | Hair Color | Eye Color |
|---|---|---|---|---|---|

| 1st identification | | 2nd Identification |
|---|---|---|
| Drivers License #: State: | Drivers License Expiration Date: | |

| Home Street Address (Do not use Post Office Box): | | | |
|---|---|---|---|
| City: | State: | Zip Code: | Home Phone: |
| Employer Name: | Date of Employment: | Job Title: | Work Phone: |

| Medical Alert Information: | |
|---|---|
| Emergency Contact Person: | Relationship: |
| Emergency Phone Number (Work): | Emergency Phone Number (Home): |

| **AVIATION DEPARTMENT USE ONLY** | |
|---|---|
| **SIDA Training** (DD/MM/YY): _____/_____/_____ | **SIDA Badge # :** _____ |
| **RAMP Training** (DD/MM/YY): _____/_____/_____ | **Case # :** _____ |

WARNING: THIS DOCUMENT CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER THE PROVISIONS OF UGANDA FEDERAL LAWS. NO PART OF THIS DOCUMENT MAY BE RELEASED EXCEPT AS AUTHORIZED. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY ACTION.

***Disqualifying criminal offenses.*** An individual has a disqualifying criminal offense if the individual has been convicted, or found not guilty of by reason of insanity, of any of the disqualifying crimes listed in **49 CFR 1542.209(d)** in any jurisdiction during the 10 years before the date of the individual's application for unescorted access authority, or while the individual has unescorted access authority. The disqualifying criminal offenses are as follows –

| YES | NO | Please complete the following by placing an "X" in the YES or NO column |
|---|---|---|
| | | (1) Forgery of certificates, false marking of aircraft, and other aircraft registration violation; 49 U.S.C. 46306. |
| | | (2) Interference with air navigation; 49 U.S.C. 46308. |
| | | (3) Improper transportation of a hazardous material; 49 U.S.C. 46312. |
| | | (4) Aircraft piracy; 49 U.S.C. 46502. |
| | | (5) Interference with flight crew members or flight attendants; 49 U.S.C. 46504. |
| | | (6) Commission of certain crimes aboard aircraft in flight; 49 U.S.C. 46506. |
| | | (7) Carrying a weapon or explosive aboard aircraft; 49 U.S.C. 46505. |
| | | (8) Conveying false information and threats; 49 U.S.C. 46507. |
| | | (9) Aircraft piracy outside the special aircraft jurisdiction of the United States; 49 U.S.C. 46502(b). |
| | | (10) Lighting violations involving transporting controlled substances; 49 U.S.C. 46315. |
| | | (11) Unlawful entry into an aircraft or airport area that serves air carriers or foreign air carriers contrary to established security requirements; 49 U.S.C. 46314. |
| | | (12) Destruction of an aircraft or aircraft facility; 18 U.S.C. 32. |
| | | (13) Murder. |
| | | (14) Assault with intent to murder. |
| | | (15) Espionage. |
| | | (16) Sedition. |
| | | (17) Kidnapping or hostage taking. |
| | | (18) Treason. |
| | | (19) Rape or aggravated sexual abuse. |
| | | (20) Unlawful possession, use, sale, distribution, or manufacture of an explosive or weapon. |
| | | (21) Extortion. |
| | | (22) Armed or felony unarmed robbery. |
| | | (23) Distribution of, or intent to distribute, a controlled substance. |
| | | (24) Felony arson. |
| | | (25) Felony involving a threat. |
| | | (26) Felony involving -- Willful destruction of property; Importation or manufacture of a controlled substance; Burglary; Theft; Dishonesty, fraud, or misrepresentation; Possession or distribution of stolen property; Aggravated assault; Bribery; Illegal possession of a controlled substance punishable by a maximum term of imprisonment of more than 1 year. |
| | | (27) Violence at international airports; 18 U.S.C. 37. |
| | | (28) Conspiracy or attempt to commit any of the criminal acts listed in this paragraph 49 CFR 1542.209 (d). |
| | | |

**STATEMENT:**

**"I do not have a disqualifying criminal offense. Under Federal regulations under 49 CFR 1542.209 (l) I am obligated to disclose to the Augusta Regional Airport within 24 hours if convicted of any disqualifying criminal offense that occurs while having unescorted access authority. The information I have provided on this application is true, complete, and correct to the best of my knowledge and belief and is provided in good faith. I understand that a knowing and willful false statement on this application can be punished by fine or imprisonment or both. (See section 1001 of Title 18 United States Code.)"**

Printed Name: _____

Signature: _____ Date_____

WARNING: THIS DOCUMENT CONTAINS SENSITIVE SECURITY INFORMATION THAT IS CONTROLLED UNDER THE PROVISIONS OF UGANDA FEDERAL LAWS. NO PART OF THIS DOCUMENT MAY BE RELEASED EXCEPT AS AUTHORIZED. UNAUTHORIZED RELEASE MAY RESULT IN CIVIL PENALTY ACTION.

# RESTRICTED AREA IDENTIFICATION BADGE APPLICATION

_____
Name of Requesting Agency (Air Carrier, Tenant or Contractor)

_____
Address

It is requested the following named individual be issued a Restricted Area Identification Badge [ ] .

Name: _____ ID No._____

Date of Birth: _____ Height: _____ Weight: _____

Color of Eyes:_____ Hair: _____ Date of Employment: _____

Area Duties Performed:_____

Type of Badge Requested: Original [ ] Contractor [ ] Temporary/Visitor [ ]
Renewal [ ] Replacement [ ]

Date Lost: _____ Expiration Date: _____ Terminal Permit [ ] Airfield Permit [ ]

# RESTRICTED AREA IDENTIFICATION BADGE
# RULES AND REGULATIONS

A) It is not permissible, under any circumstances, to permit another person to use the I.D. Badge, Card Key, a or Personal Identification Number.

B) The I.D. Badge is to be worn while in any restricted area of the Airport, preferably on the upper left side of the outer garment in plain view.

C) See Section 01143 – Airport Project Procedures, and it's appendix "Airport Security During Construction" of these Specifications.

D) Lost/Stolen I.D. Badges and/or Card Keys must be reported to the Director of Aviation as soon as possible.

E) I will allow any authorized representative of the Airport to inspect the I.D. Badges and /or Card Key to be establish my personal identification.

F) I agree to surrender/return the I.D. Badge and/or Card Key to the Airport Security Administrator should I quit, be terminated, transferred, laid off, or for any other reason leave the employment of any air carrier, tenant or contractor involved in this program or upon or before the expiration date printed/typed on the front of the I.D. Badge.

G) I will challenge and report any unauthorized person or persons found within the restricted area where security is the responsibility of my company.

H) The Airport Restricted Area Identification Badge remains the property of August Regional Airport at all times.

THIS CERTIFIES that I have received from Augusta Regional Airport a Restricted Area Identification Badge [ ].

I UNDERSTAND that the Identification Badge remains at all times property of the Entebbe International Airport Security Office and may be reclaimed should misuse or abuse be disclosed.

I FURTHER UNDERSTAND and agree to abide by the Rules and Regulations set forth by the Entebbe International Airport Security Office and any other Rules and Regulations concerning the Restricted Area Identification Badge.

Employee Signature _____ Date _____

Representative of Airport _____ Date _____

# SECTION 01210 - ALLOWANCES

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

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

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

1. Lump-sum allowances.
2. Unit-cost allowances.
3. Quantity allowances.
4. Contingency allowances.
5. Testing and inspecting allowances.

C. Related Sections include the following:

1. Division 1 Section 01250 "Contract Modification Procedures" for procedures for submitting and handling Change Orders for allowances.
2. Division 1 Section 01400 "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.
3. Divisions 2 through 16 Sections for items of Work covered by allowances.

### 1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

## 1.4 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

## 1.5 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

## 1.6 LUMP-SUM, UNIT-COST AND QUANTITY ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner under allowance and shall include taxes, freight, and delivery to Project site.

B. Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner under allowance shall be included as part of the Contract Sum and not part of the allowance.

## 1.7 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

B. Contractor's related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.

C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.

D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

## 1.8 TESTING AND INSPECTING ALLOWANCES

A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.

B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.

C. Costs of services not required by the Contract Documents are not included in the allowance.

D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

1.9 UNUSED MATERIALS

A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Architect, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is Contractor's responsibility.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 1: Allow a Lump Sum equal to 15% of the original Contractor Tender.

B. Allowance No. 2: Allow a Lump Sum of $92, 500,000 UGS, for Interior Signage.

END OF SECTION 01210

# SECTION 01250 - CONTRACT MODIFICATION PROCEDURES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

### 1.2 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on an Information Notice Form ("IN"). Contractor requirements for clarification should be submitted in writing on an Information Request Form ("IR").

### 1.3 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
2. Within ten (10) days after receipt of Proposal Request, submit a quotation on a Cost Proposal Form ("CP)", estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change on a Cost Proposal Form ("CP").

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
5. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

1.4 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on a Change Order Form ("CO").

1.5 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on a Construction Change Directive Form ("CCD"). Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01250

# SECTION 01290 - PAYMENT PROCEDURES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

### 1.2 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including Application for Payment forms with Continuation Sheets.
2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the Schedule of Values:

   a. Project name and location.
   b. Name of Architect.
   c. Architect's project number.
   d. Contractor's name and address.
   e. Date of submittal.

2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

   a. Related Specification Section or Division.
   b. Description of the Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Contract value.

      1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project

Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.

4. Round amounts to nearest whole sum; total shall equal the Contract Sum.
5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

## 1.3 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

    1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Times: The date for each progress payment is the 1st day of each month. The period covered by each Application for Payment is one calendar month, ending on the last day of the month.

D. Payment Application Forms: Use application forms customarily used by CAA for Application For Payment.

E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

    1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
    2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

F. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested, before deduction for retainage, on each item.
2. When an application shows completion of an item, submit final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Delays: Submit each Application for Payment with Contractor's waiver of mechanic's lien for construction period covered by the application.

   a. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Submittals Schedule (preliminary if not final).
5. List of Contractor's staff assignments.
6. Copies of building permits.
7. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
8. Certificates of insurance and insurance policies.
9. Performance and payment bonds.
10. Data needed to acquire Owner's insurance.

I. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. Contractor's Affidavit of Payment of Debts and Claims.
5. Contractor's Affidavit of Release of Liens or Demands.
6. Consent of Surety to Final Payment.
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01290

# SECTION 01320 - CONSTRUCTION PROGRESS DOCUMENTATION

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's Construction Schedule.
2. Submittals Schedule.
3. Daily construction reports.
4. Field condition reports.

B. See Division 1 Section "Payment Procedures" for submitting the Schedule of Values.

### 1.2 SUBMITTALS

A. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:

1. Scheduled date for first submittal.
2. Specification Section number and title.
3. Submittal category (action or informational).
4. Name of subcontractor.
5. Description of the Work covered.
6. Scheduled date for Architect's final release or approval.

B. Contractor's Construction Schedule: Submit two printed copies of initial schedule, one a reproducible print and one a blue- or black-line print, large enough to show entire schedule for entire construction period.

C. Field Condition Reports: Submit at time of discovery of differing conditions.

### 1.3 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

## PART 2 - PRODUCTS

## 2.1 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.

1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
2. Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

## 2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 30 days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work Restrictions: Show the effect on the schedule of the following:

   a. Coordination with existing construction.
   b. Limitations of continued occupancies.
   c. Uninterruptible services.
   d. Use of premises restrictions.
   e. Provisions for future construction.
   f. Seasonal variations.
   g. Environmental control.

3. Work Stages: Indicate important stages of construction for each major portion of the Work.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.

## 2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within 7 days of date established for the Notice to Proceed. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

## 2.4 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording events at Project site, including the following:

1. List of subcontractors.
2. High and low temperatures and general weather conditions.
3. Accidents.
4. Stoppages, delays, shortages, and losses.
5. Meter readings and similar recordings.
6. Orders and requests of authorities having jurisdiction.
7. Services connected and disconnected.
8. Equipment or system tests and startups.

B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare a detailed report. Submit with a request for information on sample form (IR) at end of Section 01250. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

# PART 3 - EXECUTION

## 3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.

2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate Actual Completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01320

# SECTION 01330 - SUBMITTAL PROCEDURES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

B. See Division 1 Section "Closeout Procedures" for submitting warranties and Project Record Documents.

### 1.2 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect's responsive action.

B. Informational Submittals: Written information that does not require Architect's approval. Submittals may be rejected for not complying with requirements.

### 1.3 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

   a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal.

1. Initial Review: Allow 14 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Allow 7 days for processing each resubmittal.

B. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.

C. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.

D. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.

E. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.

F. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

G. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

H. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.

I. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken.

C. Informational Submittals: Architect will review each submittal and will not return it, or will reject and return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION 01330

# SECTION 01400 - QUALITY REQUIREMENTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.
2. Requirements for Contractor to provide quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. See Divisions 2 through 16 Sections for specific test and inspection requirements.

### 1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Architect.

C. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

### 1.3 DELEGATED DESIGN

### 1.4 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.

4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Ambient conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

## 1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.

C. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

D. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.

## 1.6 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of the types of testing and inspecting they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ the same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
5. Do not perform any duties of Contractor.

E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field-curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01400

# SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

## PART 1 - GENERAL

### 1.1 SUMMARY

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

B. Related Sections include the following:

1. Division 1 Section 01140 "Work Restrictions" for limitations on utility interruptions and other work restrictions.
2. Division 1 Section 01330 "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
3. Division 1 Section 01700 "Execution Requirements" for progress cleaning requirements.

### 1.2 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to Architect, testing agencies, and authorities having jurisdiction.

B. Water Service: Pay water service use charges for water used by all entities for construction operations.

C. Electric Power Service: Pay electric power service use charges for electricity used by all entities for construction operations.

### 1.3 QUALITY ASSURANCE

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

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

## PART 2 - PRODUCTS

### 2.1 MATERIALS

A. 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 sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

B. 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 sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

C. 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. 60 (0.250-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.

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

## 2.2 TEMPORARY FACILITIES

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

B. Common-Use Field Office: Of sufficient size to accommodate needs of construction personnel. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack board.
3. Drinking water.
4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
5. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

## 2.3 EQUIPMENT

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

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

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

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

### 3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

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

B. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

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

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

E. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead, unless otherwise indicated.
2. Connect temporary service to Owner's existing power source, as directed by Utility.

F. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.

1. At each telephone, post a list of important telephone numbers.

a. Police and fire departments.
b. Ambulance service.
c. Contractor's home office.
d. Architect's office.
e. Engineers' offices.
f. Owner's office.
g. Principal subcontractors' field and home offices.

2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

## 3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas as indicated on Drawings.

1. Place subbase and base course on subgrades free of mud, frost, snow, or ice.
2. On prepared subgrade, place subbase and base course as follows:

   a. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
   b. Shape subbase and base course to required crown elevations and cross-slope grades.
   c. Place subbase and base course 6 inches (150 mm) or less in compacted thickness in a single layer.
   d. Place subbase and base 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.
   e. Compact subbase and base 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 698.

3. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 698.
4. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

D. Parking: Use designated areas of Owner's existing site and parking areas for construction personnel.

E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

F. Project Identification and Temporary Signs: Provide Project identification and other signs per Section 01530. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.

1. Provide temporary, directional signs for construction personnel and visitors.
2. Maintain and touchup signs so they are legible at all times.

## 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

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

1. Comply with work restrictions specified in Division 1 Section "Work Restrictions."

B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

1. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

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

D. Site Enclosure Fence: Before demolition operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to prevent access to hotel portion of site from adjacent parking areas, Project site or portion determined sufficient to accommodate construction operations.

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

## 3.5 OPERATION, TERMINATION, AND REMOVAL

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

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

C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

END OF SECTION 01500

# SECTION 01530 - TEMPORARY MARKINGS AND BARRICADES

## PART 1 – GENERAL

1.1 Related Documents

A. Related work sections and drawings include:

1. Safety plan: Contract Drawings and General Requirements.
2. Division 1 Section 01140 "Work Restrictions".

1.1 DESCRIPTION:

A. Install temporary barricades and marker as required for safety of Airport and highway vehicle and pedestrian traffic and contractor's work forces, and to maintain use of the various portions of Airport during construction.

B. Comply with the safety plan.

## PART 2 - PRODUCTS

A. Type IV Barricades: 3 foot high, 6 feet long, one reflectorized rail with alternating orange and white stripes, two battery powered flashing lights.

B. Temporary Signage: Provide temporary signage to identify construction haul route entry / exit points and to indicate construction traffic crossing of the loop road. Coordinate exact location of signs with Airport's designated representative.

## PART 3 - EXECUTION

3.1 GENERAL:

A. Install at locations where directed by Owner. Generally, place barricades a maximum of 10 feet on centers. Anchor barricades and markers (if directed) with sandbags or other methods.

B. Maintain barricades, markers, and covers until removal is directed. The barricade flasher batteries shall be checked daily to insure that flashers are operational. Replace batteries as required.

END OF SECTION 01530

# SECTION 01600 - PRODUCT REQUIREMENTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes administrative and procedural requirements for selecting products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

B. See Division 1 Section 01770 "Closeout Procedures" for submitting warranties for contract closeout.

C. See Divisions 2 through 16 Sections for specific requirements for warranties on products and installations specified to be warranted.

### 1.2 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

D. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

E. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

1.3 SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified material or product cannot be provided.
b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time.
j. Cost information, including a proposal of change, if any, in the Contract Sum.
k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 14 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

a. Form of Acceptance: Change Order.
b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.

## 1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

## 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products to allow for inspection and measurement of quantity or counting of units.
6. Store materials in a manner that will not endanger Project structure.
7. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
9. Protect stored products from damage.

## 1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: Forms are included with the Specifications. Prepare a written document using appropriate form properly executed.
3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

## PART 2 - PRODUCTS

### 2.1 PRODUCT OPTIONS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.

B. Product Selection Procedures: Procedures for product selection include the following:

1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the product named.
2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product by the manufacturer or from the source named that complies with requirements.
3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
4. Manufacturers: Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. Available Products: Where Specification paragraphs or subparagraphs titled "Available Products" introduce a list of names of both products and manufacturers, provide one of the products listed or another product that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
6. Available Manufacturers: Where Specification paragraphs or subparagraphs titled "Available Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed or another manufacturer that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
7. Basis-of-Design Products: Where Specification paragraphs or subparagraphs titled "Basis-of-Design Product" are included and also introduce or refer to a list of manufacturers' names, provide either the specified product or a comparable product by

one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01600

# SECTION 01700 - EXECUTION REQUIREMENTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. General installation of products.
2. Progress cleaning.
3. Starting and adjusting.
4. Protection of installed construction.
5. Correction of the Work.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before demolition, verify the location and points of connection of utility services.

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

## 3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Existing Utility Interruptions: 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 Owner not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner's written permission.

C. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

## 3.3 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.

F. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

G. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

## 3.4 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

E. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

F. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

## 3.5 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

END OF SECTION 01700

# SECTION 01731 - CUTTING AND PATCHING

## 1.1 GENERAL

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

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

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

## 1.2 PRODUCTS

A. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

## 1.3 EXECUTION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

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

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

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

E. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid interruption of services to occupied areas.

F. Performance: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

G. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
5. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

END OF SECTION 01731

# SECTION 01732 - SELECTIVE DEMOLITION

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

B. Related Sections include the following:

1. Division 1 Section 01100 "Summary" for use of premises and Owner-occupancy requirements.
2. Division 1 Section 01500 "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
3. Division 1 Section 01731 "Cutting and Patching" for cutting and patching procedures.
4. Division 2 Section 02230 "Site Clearing" for site clearing and removal of above- and below-grade improvements.

### 1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

### 1.4 MATERIALS OWNERSHIP

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

Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1. Coordinate with Owner, who will establish special procedures for removal and salvage.

## 1.5 SUBMITTALS

A. Qualification Data: For demolition firm.

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owne's and other tenants' on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Locations of proposed dust- and noise-control temporary partitions and means of egress, including for other tenants affected by selective demolition operations.
6. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
7. Means of protection for items to remain and items in path of waste removal from building.

C. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.

D. Predemolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.

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

## 1.6 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

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

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

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

E. Predemolition Conference: Conduct conference at Project site. Review methods and procedures related to selective demolition including, but not limited to, the following:

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

## 1.7 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

1. Comply with requirements specified in Division 1 Section "Summary."

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

1. Before selective demolition, Owner will remove all items deemed necessary and will leave site ready for contractor.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

## 1.8 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

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

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.

F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.

1. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

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

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

1. Comply with requirements for existing services/systems interruptions specified in Division 1 Section "Summary."

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off indicated utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass

area of selective demolition and that maintain continuity of services/systems to other parts of building.

4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

   a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

## 3.3 PREPARATION

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

   1. Comply with requirements for access and protection specified in Division 1 Section "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

   1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
   2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
   3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
   4. Cover and protect furniture, furnishings, and equipment that have not been removed.
   5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 1 Section "Temporary Facilities and Controls."

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

   1. Strengthen or add new supports when required during progress of selective demolition.

## 3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

   1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
   2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction.

Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.

1. Building Structure and Shell: 100 percent.
2. Nonshell Elements: 50 percent.

C. Removed and Salvaged Items:

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

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

## 3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.

B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.

C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.

1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.

F. Roofing: Remove no more existing roofing than can be covered in one day by new roofing and so that building interior remains watertight and weathertight. Refer to Division 7 Section 07531 "EPDM Membrane Roofing" for new roofing requirements.

1. Remove existing roof membrane, flashings, copings, and roof accessories.
2. Remove existing roofing system down to substrate.

G. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.

## 3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

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

B. Burning: Do not burn demolished materials.

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

## 3.7 CLEANING

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

END OF SECTION 01732

# SECTION 01770 - CLOSEOUT PROCEDURES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Project Record Documents.
3. Warranties.
4. Final cleaning.

B. See Division 1 Section 01290 "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.

C. See Divisions2 through 16 Sections for specific closeout and special cleaning requirements for products of those Sections.

### 1.2 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents and similar final record information.
6. Submit test/adjust/balance records.
7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
8. Complete final cleaning requirements, including touchup painting.
9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

## 1.3 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

## 1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

## 1.5 PROJECT RECORD DOCUMENTS

A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

B. Record Drawings: Maintain and submit one set of blue- or black-line white prints of Contract Drawings and Shop Drawings.

1. Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

    a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.
    b. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
3. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.
4. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.

C. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications. Mark copy to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Note related Change Orders and Record Drawings, where applicable.

D. Miscellaneous Record Submittals: Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

## 1.6 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (115-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or

installation, including the name of the product and the name, address, and telephone number of Installer.

3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for areas affected by the work in the Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

B. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01770

## AFFIDAVIT OF PAYMENT

To All Whom It May Concern:

WHEREAS, the undersigned has been employed by **Civil Aviation Authority**, to furnish labor and materials for construction work, under a contract for improvements described as **the demolition of the two-story Old Terminal Building of approximately 4,802 square meters, fifteen adjacent support buildings of approximately 1,496 square meters in total, and associated utilities and pavement areas.** located at **Entebbe International Airport** in which the Civil Aviation Authority is the Owner,

**NOW, THEREFORE, this _____ day of _____**

The undersigned, as the Contractor for the above named Contract pursuant to the Conditions of the Contract hereby certified that, except as listed below, has paid in full or has otherwise satisfied all obligations for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or its property might in any way be held responsible.

EXCEPTIONS:(If none, write 'None'. The Contractor shall furnish a bond satisfactory to the Owner for each exception.)

ATTACHMENTS:
1. Consent of Surety to Final Payment. (Whenever Surety is involved, Consent of Surety is required.)
2. Contractor's Release or Waiver of Liens or Demands, conditional upon receipt of final payment.
3. Separate Releases or Waivers of Liens or Demands from Subcontractors and material and equipment suppliers.
4. Contractors Affidavit of Release of Liens or Demands.

(SEAL) _____

CONTRACTOR (Name of sole ownership, corporation or partnership)

_____

(Print name of Agent/Authorized Representative)

(SEAL) _____

(Signature of Authorized Representative (Agent)

(Affix corporate seal here)

TITLE_____

## AFFIDAVIT OF RELEASE OF LIEN OR DEMAND

To All Whom It May Concern:

WHEREAS, the undersigned has been employed by **Civil Aviation Authority**, to furnish labor and materials for construction work, under a contract for improvements described as **the demolition of the two-story Old Terminal Building of approximately 4,802 square meters, fifteen adjacent support buildings of approximately 1,496 square meters in total, and associated utilities and pavement areas.** located at **Entebbe International Airport** in which the Civil Aviation Authority is the Owner,

NOW, THEREFORE, this _____ day of _____

The undersigned, as the Contractor for the above-named Contract pursuant to the Conditions of the Contract hereby certifies that to the best of his/her knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services, who have or may have liens against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

EXCEPTIONS: (If none, write "None". The Contractor shall furnish a bond satisfactory to the Owner for each exception.)

ATTACHMENTS:

1. Contractor's Release or Waiver of Liens or Demands, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens or Demands from Subcontractors and material and equipment suppliers.

(SEAL) _____

CONTRACTOR (Name of sole ownership, corporation or partnership)

_____

(Print name of Agent/Authorized Representative)

(SEAL) _____

(Signature of Authorized Representative (Agent)

(Affix corporate seal here)

TITLE_____

## FINAL WAIVER OF LIEN OR DEMAND

To All Whom It May Concern:

WHEREAS, the undersigned has been employed by **Civil Aviation Authority**, to furnish labor and materials for construction work, under a contract for improvements described as **the demolition of the two-story Old Terminal Building of approximately 4,802 square meters, fifteen adjacent support buildings of approximately 1,496 square meters in total, and associated utilities and pavement areas.** located at **Entebbe International Airport** in which the Civil Aviation Authority is the Owner,

NOW, THEREFORE, this _____ day of _____ _____

for and in consideration of the sum of (UShs) _____ U Shillings paid simultaneously herewith, the receipt whereof is hereby acknowledged by the undersigned, the undersigned does hereby waive and release any lien rights to, or claim of lien with respect to and on said above-described premises, and the improvements thereon, and on the monies or other considerations due to become due from the owner, on account of labor, services, material, fixtures, apparatus of machinery heretofore or which may hereafter be furnished by the undersigned to or for the above-described premises by virtue of said contract.

(SEAL) _____

CONTRACTOR (Name of sole ownership, corporation or partnership)

_____

(Print name of Agent/Authorized Representative)

(SEAL) _____

(Signature of Authorized Representative (Agent)

(Affix corporate seal here)

TITLE_____

INSTRUCTIONS FOR FINAL WAIVER

(A)Person or company with whom you agreed to furnish either labor, or services, or materials, or both.
(B)Fill in nature and extent of work; strike the word labor or the word materials if not in your contract.
(C) If you have more than one contract on the same premises, describe the contract by number if available, date and extent of work.
(D) Furnish an accurate enough description of the improvement and location of the premises so that it can be distinguished from any other property.
(E) Amount shown should be the amount actually received and equal to total amount of contract as adjusted.
(F) If waiver is for a corporation, corporate name should be used, corporate seal affixed and title of officer signing waiver should be set forth; if waiver is for a partnership, the partnership name should be used, partner should sign and designate himself as partner.

# CONTRACTOR WARRANTY FORM

PROJECT:

LOCATION:

OWNER:

Contractor (Company Name)_____for the above-referenced project, do hereby warrant all labor and materials furnished and work performed are in accordance with the Contract Documents and authorized modifications thereto, and will be free from defects due to defective materials or workmanship for a period of one year from Date of Completion. This warranty commences on _____Date of Completion and expires on _____

This warranty covers that portion of the project described below:

Should any defect develop during the warranty period due to improper materials, workmanship or arrangement, the defect shall, upon written notice by the Owner, be made good by the Undersigned at no expense to the Owner.

Nothing in the above shall be deemed to apply to work, which has been abused or neglected by the Owner.

DATE

(SEAL) _____
CONTRACTOR (Name of sole ownership, corporation or partnership)

_____
(Print name of Agent/Authorized Representative)

(SEAL) _____
(Signature of Authorized Representative (Agent)

(Affix corporate seal here)

TITLE_____

**CONSENT OF SURETY For Final Payment**

Project Name

Location

Project No.

Type of Contract_____

Amount of Contract_____

In accordance with the provisions of the above-named contact between the Owner and the Contractor, the following named surety:

on the Payment Bond of the following named Contractor:

hereby approves of final payment to the Contractor, and further agrees that said final payment to the Contractor shall not relieve the Surety Company named herein of any of its obligations to the following named Owner: as set forth in said Surety company's bond:

IN WITNESS WHEREOF, the Surety Company has hereunto set its hand and seal this _____ day of _____ _____

(Name of Surety Company)

(Affix corporate seal here)
(Signature of Authorized Representative)

TITLE

IF SIGNED BY ATTORNEY-IN-FACT, POWER OF ATTORNEY IS REQUIRED

# 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, shrubs, groundcovers, plants and grass to remain.
2. Removing existing trees, hrubs, groundcovers, plants, and grass.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and removing site utilities.
7. Temporary erosion and sedimentation control measures.

B. Related Sections include the following:

1. Division 1 Section 01500 "Temporary Facilities and Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities.
2. Division 1 Section 01732 "Selective Demolition" for partial demolition of buildings or structures undergoing alterations.

### 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 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

### 1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

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

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

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 2 Sections covering site utilities.

## 2.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.

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. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches (450 mm) below exposed subgrade.
4. Use only hand methods for grubbing within tree protection zone.
5. Chip removed tree branches and dispose of off-site.

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 a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

## 2.6 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. Remove subsoil and nonsoil materials from 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 tree protection zones.

3. Dispose of excess topsoil as specified for waste material disposal.
4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

## 2.7 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.
2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

## 2.8 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.

1. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

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.

### 1.2 SUMMARY

A. This Section includes the following:

1. Preparing subgrades for slabs-on-grade, walks and pavements.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for slabs-on-grade.
4. Subbase course for concrete walks.
5. Subbase and base course for asphalt paving.
6. Subsurface drainage backfill for walls and trenches.
7. Excavating and backfilling for utility trenches.
8. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.

B. Related Sections include the following:

1. Division 1 Section 01500 "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities.
2. Division 2 Section 02230 "Site Clearing" for temporary erosion and sedimentation control measures, site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
3. Divisions 2, 15, and 16 Sections for installing underground mechanical and electrical utilities and buried mechanical and electrical structures.

### 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: Course placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

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

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

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. (0.57 cu. m) or more in volume that exceed a standard penetration resistance of 100 blows/2 inches (97 blows/50 mm) when tested by an independent geotechnical testing agency, according to ASTM D 1586.

I. 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.

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

K. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

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

## 1.4 SUBMITTALS

A. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.
2. Laboratory compaction curve according to ASTM D 698 for each on-site and borrow soil material proposed for fill and backfill.

B. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

## 1.5 QUALITY ASSURANCE

A. 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.

B. Pre-excavation Conference: Conduct conference at Project site prior to commencement of work.

## 1.6 PROJECT CONDITIONS

A. 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.

B. 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.

# 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: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM, 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. 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.

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

D. 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.

E. 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.

F. 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.

G. 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.

H. 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.

I. 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.

J. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.

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

## 2.2 CONTROLLED LOW-STRENGTH MATERIAL

A. Controlled Low-Strength Material: Low-density, self-compacting, flowable concrete material as follows:

1. Portland Cement: ASTM C 150, Type II.
2. Fly Ash: ASTM C 618, Class C or F.
3. Normal-Weight Aggregate: ASTM C 33, 3/4-inch (19-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), when tested according to ASTM C 495.

C. Produce conventional-weight, controlled low-strength material with 80-psi (550-kPa) compressive strength when tested according to ASTM C 495.

## 2.3 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:

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 earthwork operations.

B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 2 Section "Site Clearing."

C. Protect and maintain erosion and sedimentation controls, which are specified in Division 2 Section "Site Clearing," during earthwork operations.

D. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

### 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 as required, to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

### 3.3 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.

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 gainst grade.
   c. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.

## 3.13 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.

## 3.14 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) 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 structures, building slabs, steps, and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 92 percent.
3. Under lawn or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 85 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

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

1. Lawn or Unpaved Areas: Plus or minus 1 inch (25 mm).
2. Walks: Plus or minus 1 inch (25 mm).
3. Pavements: Plus or minus 1/2 inch (13 mm).

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.

## 3.16 SUBBASE AND BASE COURSES

A. Place subbase and base course on subgrades free of mud.

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

1. Place base course material over subbase course under hot-mix asphalt pavement.
2. Shape subbase and base course to required crown elevations and cross-slope grades.
3. Place subbase and base course 6 inches (150 mm) or less in compacted thickness in a single layer.
4. Place subbase and base 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.
5. Compact subbase and base 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 698.

## 3.17 DRAINAGE COURSE

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. Place drainage course 6 inches (150 mm) or less in compacted thickness in a single layer.
2. 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.
3. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

## 3.18 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

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

C. 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.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, 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 1 test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than 3 tests.
2. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet (30 m) or less of wall length, but no fewer than 2 tests.
3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet (46 m) or less of trench length, but no fewer than 2 tests.

E. 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 to depth required; recompact and retest until specified compaction is obtained.

## 3.19 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic 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.

## 3.20 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

B. Disposal: Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.

1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 02300

# SECTION 02361 - TERMITE CONTROL

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following for termite control:

1. Soil treatment.

### 1.2 DEFINITIONS

A. EPA: Environmental Protection Agency.

B. PCO: Pest control operator.

### 1.3 SUBMITTALS

A. Product Data: Treatments and application instructions, including EPA-Registered Label.

B. Product Certificates: Signed by manufacturers of termite control products certifying that treatments furnished comply with requirements.

C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

D. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's record information, including the following as applicable:

1. Date and time of application.
2. Moisture content of soil before application.
3. Brand name and manufacturer of termiticide.
4. Quantity of undiluted termiticide used.
5. Dilutions, methods, volumes, and rates of application used.
6. Areas of application.
7. Water source for application.

E. Warranties: Special warranties specified in this Section.

## 3.3 APPLICATION, GENERAL

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

## 3.4 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute the treatment evenly.

1. Slabs-on-Grade: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
2. Foundations: Adjacent soil including soil along entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footers, piers, and chimney bases; and along entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
3. Masonry: Treat voids.
4. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

D. Post warning signs in areas of application.

E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION 02361

# SECTION 03000 - CONCRETE AND CEMENT FINISH

## PART 1 - GENERAL

### 1.1 DESCRIPTION OF WORK

A. Furnish and install all materials, labor and equipment necessary to properly perform all concrete work required as specified herein and/or shown on the drawings. To include all concrete, metal reinforcing and finishes.

1. Related Items of Work: Particular attention is directed to the drawings and other construction documents, and to the contract documents, for information pertaining to required items of work which are related to and usually associated with the work of this section of the Project Manual, but which are to be provided as part of the work of other sections of the Project Manual.

1.2 Codes and Standards: Comply with the provisions of the following codes, specifications, and standards, except as otherwise shown or specified:

A. ACI 301 "Specifications for Structural Concrete for Buildings."

B. ACI 311 "Recommended Practice for Concrete Inspection."

C. ACI 318 "Building Code Requirements for Reinforced Concrete."

D. ACI 347 "Recommended Practice for Concrete Formwork."

E. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete."

F. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."

### 1.3 WORKMANSHIP

A. The Contractor is responsible for correction of concrete work that does not conform to the specified requirements, including strength, tolerances and finishes. Correct deficient concrete as directed by the Architect.

### 1.4 SUBMITTALS

A. Product Data: Submit data for proprietary materials and items, including reinforcement and forming accessories, admixtures, joint systems, curing compounds, and others as requested by Architect.

B. Shop Drawings; Reinforcement: Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, diagrams of bent bars,

## 2.4 RELATED MATERIALS

A. Preformed Expansion Joint Fillers: Provide closed-cell synthetic rubber joint filler.

B. Expansion joint material: ASTM D1056-2C.1

C. Joint Sealing Compound: Provide polyurethane-sealant (see Section 07920.)

D. Moisture Barrier: Provide moisture barrier cover over prepared base material. Use only materials which are resistant to decay when tested in accordance with ASTM E154, as follows:

1. Water-Resistant Barrier: Paper consisting of heavy kraft papers laminated together with glass fiber reinforcement and overcoated with black polyethylene on each side. Use under all concrete slabs-on-grade.
2. Moisture-Retaining Cover: One of the following, complying with ASTM C-171:

   a. Waterproof paper.
   b. Polyethylene film.
   c. Polyethylene-coated burlap.

E. Reglets: Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 26 gauge galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.

F. Chemical Hardener: Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent, containing not less than 2 lbs. of fluosilicates per gal.

1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

   a. "Surfhard"; Euclid Chemical Co.
   b. "Lapidolith"; Sonneborn-Rexnord.
   c. "Saniseal"; Master Builders.

G. Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound complying with ASTM C 309, Type I, Class A. Moisture loss not more than 0.555 gr./sq. cm. when applied at 200 sq. ft./gal.

H. Bonding Compound: Polyvinyl acetate or acrylic base.

## 2.5 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing. Limit use of fly ash to not exceed 25 percent of cement content by weight.

B. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until the design mixes have been reviewed and approved by the Architect.

C. Design mixes to provide normal weight concrete with the following properties, as indicated on drawings and schedules:

1. Regular Weight (150 PCF): Based upon 28 days psi compressive strength requirements, provide concrete having compressive strength of 4000 psi (30 MPa) for all concrete.

D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.

## 2.6 COMPRESSIVE PROPORTIONS AND CONSISTENCY

A. Intent of specifications is to secure, for every part of work, structural concrete of homogeneous structure which, when hardened, will have required strength and resistance to weathering.

B. All concrete shall have water-reducing type chemical, admix at place of mixing. Amount of chemical admix per each bag of cement used shall be in strict accordance with manufacturer's recommendations as related to temperature, humidity, and wind conditions prevailing at site at time of pouring, and dependent upon type of admixture being used.

C. Water-Cement Ratio: Provide concrete for following conditions with maximum water-cement (W/C) ratios as follows:
1. W/C 0.40.

D. Volumetric proportioning not allowable. Measurement of materials shall be by weight only and by methods that will permit proportions to be accurately controlled and easily checked at any time during work operations.

E. **The use of calcium chloride in concrete is prohibited.**

F. Use air-entraining admixture in exterior exposed concrete, unless otherwise shown or specified. Add air-entraining admixture at the manufacturer's prescribed rate to result in concrete at the point of placement having air content within the following limits:
   a. 6% for maximum 3/4-inch aggregate.
   b. 7% for maximum 1/2-inch aggregate.

G. Use super plasticizer in concrete for all slab construction. Also use in all pumped concrete and as required for placement and workability.

## 2.7 SLUMP LIMITS

A. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows: (Slump may be increased when chemical admixtures are used, provided that the

admixture-treated concrete has the same or lower water/cement or water/cementitious material ratio and does not exhibit segregation potential or excessive bleeding.) Concrete mix shall indicate slump without chemical admixtures and with chemical admixtures,

1. Ramps, slabs, and sloping surfaces: Not more than 3 inches.
2. Reinforced foundation systems: Not less than 1 inch and not more than 4 inches.
3. Concrete containing HRWR admixture (super-plasticizer): Not more than 8 inches after addition of HRWR to site-verified 2 inches - 3 inches slump concrete.
4. Other concrete: Not less than 1 inch nor more than 4 inches.

## 2.8 CONCRETE MIXING - READY-MIX CONCRETE

A. Comply with the requirements of ASTM C-94, and as herein specified.

B. Delete the references for allowing additional water to be added to the batch for material with insufficient slump. Addition of water to the batch will not be permitted.

C. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C-94 may be required.

D. When the air temperature is between 85 degrees F and 90 degrees F, reduce the mixing and delivery time from 1-1/2 hours to 75 minutes, and when the air temperature is above 90 degrees F, reduce the mixing and delivery time to 60 minutes.

# PART 3 - EXECUTION

## 3.1 FORMS

A. Design, erect, support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by the concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position.

B. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.

C. Construct forms complying with ACI 347, to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, keyways, recesses, moldings, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required on work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

D. Fabricate forms for easy removal without hammering or prying against the concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.

E. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Place temporary openings on forms at inconspicuous locations.

F. Chamfer all exposed corners and edges as directed by Architect if not shown, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

G. Form Ties:
1. Factory-fabricated, adjustable-length, removable or snapoff metal ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal.
2. Unless otherwise shown, provide ties so portion remaining within concrete after removal is at least 1-1/2 inches inside concrete.
3. Unless otherwise shown, provide form ties which will not leave holes larger than 1-inch diameter in concrete surface.

H. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such ties. Accurately place and securely support items built into forms.

3.2 Vapor Retarder Installation: Following leveling and tamping of base for slabs on grade, place vapor retarder sheeting with longest dimension parallel with direction of pour. Lap joints 6 inches and seal with appropriate tape.

3.3 CONCRETE WORK TOLERANCES

A. Except when close coordination and fitting of various trades' work precludes allowances of tolerances, maximum total permissible deviations from established lines, grades, and dimensions shall be as stated herein below. Set and maintain forms in such a manner as to ensure completed work within specified tolerance limits. (See Monolithic Slab Finish For Concrete Slab Tolerances.)
1. Variation from the plumb:
   a. In lines and surfaces of columns, piers, and in arrises, in 10 feet: 1/4 inch.
   b. For exposed corner columns, control-joint grooves and other conspicuous lines in any bay or 20-foot maximum: 1/4 inch.
2. Variations from the level or from indicated grades:
   a. In structural concrete ceiling, beam soffits, and in arrises, in 10 feet: 1/4 inch.
   b. For exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, in any bay or 20-foot maximum: 1/4 inch.
3. Variations of the linear building lines from established position in plan and related position of columns, walls, and partitions in any bay or 20-foot maximum: 1/4 inch.
4. Variations in sizes and locations of sleeves, floor openings, and wall openings: 1/4 inch.
5. Variations in cross-sectional dimensions of columns and beams and in thickness of walls: 1/4 inch.
6. Variations in footings:
   a. Variation in dimensions in plan: Minus 1/2 inch; Plus 2 inches (applies to concrete only - not to reinforcing bars or dowels).

b. Misplacement or eccentricity: 2 percent of footing width in direction of misplacement, but not more than 2 inches. (Concrete only.)

7. Reduction in thickness: Minus 5 percent of specified thickness.
8. Variation in steps: In a flight of stairs:
   a. Rise: 1/8 inch.
   b. Tread: 1/4 inch.

## 3.4 PLACING REINFORCEMENT

A. Comply with the specified codes and standards, the Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports, and as herein specified. Avoid cutting or puncturing vapor retarder during reinforcing placement and concreting operations.

B. Clean reinforcement of loose rust and mill scale, soil, ice and other materials that would reduce or destroy bond with concrete.

C. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.

D. Place reinforcement to obtain at least the minimum coverages for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcements in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Do not place reinforcing bars more than 2 inches beyond the last leg of continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

F. Do not splice reinforcement at points of maximum stress. At points where bars lap or splice, including distribution steel, provide sufficient lap to transfer stress between bars by bond and shear. Stagger splices in adjacent bars. Lap splices in piers, struts, sufficiently to transfer full stress by bond.

G. Protect metal reinforcement by thickness of concrete indicated. Where not otherwise shown, thickness of concrete over reinforcement shall be as follows:

1. Where concrete is deposited against ground without use of forms: not less than 3 inches.
2. Where concrete is exposed to weather, or exposed to ground but placed in forms: not less than 2 inches for bars more than 5/8 inch in diameter and 1-1/2 inch for bars 5/8 inch or less in diameter.
3. In slabs and walls not exposed to ground: not less than 3/4 inch.
4. In all cases, thickness of concrete over reinforcement shall be at least equal to diameter of bars.

H. Position all reinforcement accurately. Secure at intersections with annealed wire ties or bar clips. Support with metal supports, spacers, or hangers of approved type. Metal supports (for reinforcing) that are placed directly against horizontal forms, shall have plastic coated legs

wherever the finished concrete surfaces will be exposed in the completed work, and wherever the finished concrete surfaces are to receive any type of directly-applied finish material which could be subject to damage due to stain from rusting of non-plastic-coated materials.

I. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction. Arrange runways over slabs to avoid traffic directly on mesh during pouring operations. Rolled wire shall be straightened into flat sheets before being placed.

## 3.5 JOINTS

A. Construction Joints:
   1. Locate and install construction joints, which are not shown on the drawings, so as not to impair the strength and appearance of the structure, as acceptable to the Architect. Locations to be approved by Architect.
   2. Provide keyways at least 1-1/2 inches deep in all construction joints in walls, slabs, and between walls and footings; accepted bulkheads designed for this purpose may be used for slabs.
   3. Place construction joints perpendicular to the main reinforcement. Continue all reinforcement across construction joints, except as otherwise indicated.

B. Isolation Joints in Slabs-On-Ground:
   1. Construction isolation joints in slabs-on-ground at all points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.

C. Joint filler and sealant materials are specified in this section and Division 7 of this Project Manual.

D. Contraction (Control) Joints in Slabs-on-Ground and Framed Structural Slabs: Construct contraction joints in slabs-on-ground and framed slab as indicated on drawings.

E. If joint pattern not shown for slab-on-grade, provide joints not exceeding 15 feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).

## 3.6 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto. No aluminum conduit or inserts shall be embedded in concrete.

B. Install reglets to receive top edge of foundation sheet waterproofing, and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.

C. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and

1. Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating, system.
2. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of FF 25 - FL 20. Grind smooth surface defects which would telegraph through applied floor covering system.

D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.

E. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps, driveways, walks, and ramps, and elsewhere as indicated. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

F. Chemical-Hardener Finish:
1. Apply chemical-hardener finish to all interior exposed concrete floors. See plans for other indicated areas. Apply liquid chemical-hardener after complete curing and drying of the concrete surface. Dilute liquid hardener with water (parts of hardener/water as follows), and apply in 3 coats; first coat, 1/3-strength; second coat, 1/2-strength; third coat, 2/3-strength. Evenly apply each coat, and allow 24 hours for drying between coats.
2. Apply proprietary chemical hardeners, in accordance with manufacturer's printed instructions.
3. After final coat of chemical-hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.

## 3.10 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
1. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
2. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

B. Curing Methods: Water cure concrete slabs that are to receive a terrazzo topping. For other concrete perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified.
1. Provide moisture curing by following methods.
   a. Keep concrete surface continuously wet by covering with water.
   b. Continuous water-fog spray.
   c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide

coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.

2. Provide moisture-cover curing as follows: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape of adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Provide curing and sealing compound to exposed interior slabs and to exterior slabs, walks, and curbs, as follows: Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
4. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting, and other coatings and finish materials.
5. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
6. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing method.
7. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.
8. Sealer and Dustproofer: Apply a second coat of specified curing and sealing compound only to surfaces given a first coat.

## 3.11 REMOVAL OF FORMS

A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 degrees F (10 degrees C) for 4 days after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days and until concrete has attained design minimum compressive strength at 28 days.

## 3.12 MISCELLANEOUS CONCRETE ITEMS

A. Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

## 3.13 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas:
1. Repair and patch defective areas with cement mortar immediately after removal of forms, but only when acceptable to Architect.
2. Cut out honeycomb, rock pockets, voids over 1/2 inch in diameter, and holes left by tie-rods and bolts, down to solid concrete, but in no case to a depth of less than 1 inch. Make edge of cuts perpendicular to the concrete surface. Before placing cement mortar, thoroughly clean, dampen with water and brush-coat the area to be patched with neat cement grout. Proprietary patching compounds may be used when acceptable to Architect.
3. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color of surroundings.
4. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

B. Repair of Formed Surfaces:
1. Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets and holes left by tie-rods and bolts; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning.
2. Repair concealed formed surfaces where possible, that contain defects that adversely affect the durability of the concrete. If defects cannot be repaired, remove and replace the concrete.

C. Repair of Unformed Surfaces:
1. Test unformed surfaces, such as monolithic slabs, for smoothness and to verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surface sloped to drain for trueness of slope, in addition to smoothness, using a template having required slope.
2. Repair finished unformed surfaces that contain defects which adversely affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01 inch wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.
3. Correct high areas in unformed surfaces by grinding, after concrete cured at least 14 days.
4. Correct low areas in unformed surfaces during, or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete.

Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Architect.

5. Repair defective areas except random cracks and single holes not exceeding 1 inch diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete, and brush with a neat cement grout coating or concrete bonding agent. Place patching concrete before grout takes its initial set. Mix patching concrete of same materials to provide concrete of the same type or class as original concrete. Place, compact and finish to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.
6. Repair isolated random cracks and single holes not over 1 inch in diameter by dry-pack method. Groove top of cracks and cut-out holes to sound concrete and clean of dust, dirt and loose particles. Dampen cleaned concrete surfaces and brush with neat cement grout coating. Place dry-pack, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched areas continuously moist for not less than 72 hours.
7. Repair methods not specified above may be used, subject to acceptance of Architect.
8. Perform structural repairs with prior approval of Architect or Structural Engineer for method and procedure, using specified epoxy adhesive and mortar.

## 3.14 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. The Contractor will employ a testing laboratory, approved by the Architect, to perform tests and to submit test reports.

B. Sampling and testing for quality control during placement of concrete includes the following:
1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
2. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
3. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
4. Concrete Temperature: Test hourly when air temperature is 40 degrees F (4 degrees C) and below, and when 80 degrees F (27 degrees C) and above; and each time a set of compression test specimens made.
5. Compression Test Specimen: ASTM C 31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
6. Compressive Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. over and above the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
   a. When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
   b. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

c. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.

C. Test results will be reported in writing to Architect, Structural Engineer and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.

D. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests.

## 3.15 CLEAN-UP

A. Immediately after completion of concrete operations, remove all debris resulting from work.

B. Immediately prior to final inspection, preliminary to acceptance, wash/clean all exterior and interior uncovered concrete wearing surfaces. Leave all concrete in clean, acceptable condition.

END OF SECTION 03000

# SECTION 04810 - UNIT MASONRY ASSEMBLIES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes unit masonry assemblies consisting of the following:

1. Concrete masonry units.
2. Mortar and grout.
3. Reinforcing steel.
4. Masonry joint reinforcement.
5. Ties and anchors.
6. Miscellaneous masonry accessories.

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

1. Hollow-metal frames in unit masonry openings, furnished under Division 8 Section " Steel Doors and Frames."

### 1.2 DEFINITIONS

A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

### 1.3 SUBMITTALS

A. Product Data: For each different masonry unit, accessory, and other manufactured product specified.

B. Shop Drawings: Show fabrication and installation details for the following:

1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.

C. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Each type of masonry unit required.
2. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
3. Each combination of masonry unit type and mortar type. Include statement of net-area compressive strength of masonry units, mortar type, and net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
4. Each material and grade indicated for reinforcing bars.
5. Each type and size of joint reinforcement.
6. Each type and size of anchor, tie, and metal accessory.

## 1.4 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

C. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

## 1.6 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

C. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.

1. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

## PART 2 - PRODUCTS

### 2.1 CONCRETE MASONRY UNITS

A. General: Provide shapes indicated and as follows:

1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
2. Provide square-edged units for outside corners, unless indicated as bullnose.

B. Concrete Masonry Units: ASTM C 90 and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
2. Weight Classification: Normal weight, unless otherwise indicated.
3. Provide Type II, nonmoisture-controlled units.
4. Size (Width): Manufactured to the following dimensions:

   a. 4 inches nominal; 3-5/8 inches actual.
   b. 8 inches nominal; 7-5/8 inches actual.
   c. 12 inches nominal; 11-5/8 inches actual.

5. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.

## 2.2 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color cement.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.

D. Mortar Cement: ASTM C 1329.

E. Masonry Cement: ASTM C 91.

F. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

G. Aggregate for Grout: ASTM C 404.

H. Water: Potable.

## 2.3 REINFORCING STEEL

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M; ASTM A 616/A 616M, including Supplement 1; or ASTM A 617/A 617M, Grade 60.

## 2.4 MASONRY JOINT REINFORCEMENT

A. General: ASTM A 951 and as follows:

1. Hot-dip galvanized, carbon-steel wire for both interior and exterior walls.
2. Wire Size for Side Rods: W1.7 or 0.148-inch diameter.
3. Wire Size for Cross Rods: W1.7 or 0.148-inch (3.8-mm) diameter.
4. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units where indicated.

B. For single-wythe masonry, provide either ladder or truss type with single pair of side rods and cross rods spaced not more than 16 inches o.c.

## 2.5 TIES AND ANCHORS, GENERAL

A. General: Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, unless otherwise indicated.

B. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.

C. Steel Sheet, Galvanized after Fabrication: ASTM A 366/A 366M cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153.

## 2.6 ADJUSTABLE ANCHORS FOR CONNECTING TO STEEL FRAME

A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section: Crimped 1/4-inch diameter, hot-dip galvanized steel wire anchor section for welding to steel.
2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.25-inch diameter, hot-dip galvanized steel wire.

## 2.7 ADJUSTABLE MASONRY-VENEER ANCHORS

A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to metal studs, and as follows:

1. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.

B. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie section and a metal anchor section complying with the following requirements:

1. Anchor Section: Sheet metal plate with screw holes top and bottom and with raised rib-stiffened strap stamped into center to provide a slot between strap and plate for connection of wire tie.

   a. Plate 1-1/4 inches wide by 6 inches long with strap 5/8 inch wide by 3-5/8 inches long; slot clearance formed between face of plate and back of strap shall not exceed diameter of wire tie by more than 1/32 inch.

2. Wire Tie Section: Triangular shaped wire tie sized to extend at least halfway through veneer but with at least 5/8-inch cover on outside face.
3. Fabricate sheet metal anchor sections and other sheet metal parts from 0.0677-inch thick, steel sheet, galvanized after fabrication.
4. Fabricate wire tie sections from 0.1875-inch hot-dip galvanized steel wire.

C. Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene washer, No. 10 diameter by length required to penetrate steel stud flange by not less than 3 exposed threads, and with the following corrosion protective coating:

1. Organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.

D. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

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

1. Screw-Attached, Masonry-Veneer Anchors:

   a. D/A 213; Dur-O-Wal, Inc.
   b. DW-10; Hohmann & Barnard, Inc.
   c. RJ-711; Masonry Reinforcing Corporation of America.

2. Organic-Polymer-Coated, Steel Drill Screws:

   a. Dril-Flex; Elco Industries, Inc.
   b. Traxx; ITW-Buildex.

3. For Postinstalled Anchors in Concrete: Capability to sustain, without failure, a load equal to four times the loads imposed.
4. For Postinstalled Anchors in Grouted Masonry Units: Capability to sustain, without failure, a load equal to six times the loads imposed.

## 2.8 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Fabricate from the following metal complying with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim" and below:

1. Stainless Steel: 0.0156 inch thick.
2. Fabricate metal drip edges from sheet metal indicated above. Extend at least 3 inches into wall and 1/2 inch out from wall, with a hemmed outer edge bent down 30 degrees.

## 2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Preformed Control-Joint Gaskets: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

1. Styrene-Butadiene-Rubber Compound: ASTM D 2000, Designation M2AA-805.

C. Wicking Material: Cotton or polyester rope, 1/4 to 3/8 inch in diameter, in length required to produce 2-inch exposure on exterior and 18 inches in cavity between wythes.

D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.187-inch steel wire, hot-dip galvanized after fabrication.

E. Available Products: Subject to compliance with requirements, cavity drainage materials that may be incorporated into the Work include, but are not limited to, the following:

1. Reinforcing Bar Positioners:

   a. D/A 816; Dur-O-Wal, Inc.
   b. No. 376 Rebar Positioner; Heckman Building Products, Inc.
   c. #RB Rebar Positioner; Hohmann & Barnard, Inc.

## 2.10 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

## 2.11 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, or other admixtures, unless otherwise indicated.

   1. Do not use calcium chloride in mortar or grout.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification.

   1. Extended-Life Mortar for Unit Masonry: Mortar complying with ASTM C 1142 may be used instead of mortar specified above, at Contractor's option.
   2. Limit cementitious materials in mortar to portland cement, mortar cement, and lime.
   3. For reinforced masonry and where indicated, use Type S or RS.
   4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N or RN.

D. Grout for Unit Masonry: Comply with ASTM C 476.

   1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 5 of ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
   2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

## 3.2 INSTALLATION, GENERAL

A. Thickness: Build single-wythe walls to the actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this Section and in other Sections of the Specifications.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.

D. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide a continuous pattern and to fit adjoining construction. Where possible, use full-size units without cutting. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

1. Mix units from several pallets or cubes as they are placed.

## 3.3 CONSTRUCTION TOLERANCES

A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:

B. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4 inch in 20 feet maximum.

C. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet maximum.

D. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than 1/4 inch in 20 feet maximum.

E. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.

F. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

## 3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

1. One-half running bond with vertical joint in each course centered on units in courses above and below.

C. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.

D. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

E. Fill space between hollow-metal frames and masonry solidly with mortar, unless otherwise indicated.

F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

G. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

## 3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow masonry units as follows:

1. With full mortar coverage on horizontal and vertical face shells.
2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
3. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.

C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

## 3.6 MASONRY JOINT REINFORCEMENT

A. General: Provide continuous masonry joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.

   a. Reinforcement above is in addition to continuous reinforcement.

B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

## 3.7 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Provide an open space not less than 1 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

## 3.8 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joints in unit masonry where indicated, or if not indicated at distances not exceeding 24 feet. Build-in related items as masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

B. Form control joints in concrete masonry as follows:

1. Fit bond-breaker strips into hollow contour in ends of concrete masonry units on one side of control joint. Fill resultant core with grout and rake joints in exposed faces.
2. Install preformed control-joint gaskets designed to fit standard sash block.

## 3.9 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry lintels where shown and where openings of more than 24 inches for block-size units are shown without structural steel or other supporting lintels.

1. Provide prefabricated or built-in-place masonry lintels. Use specially formed bond beam units with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

## 3.10 FLASHING, WEEP HOLES, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Unless otherwise indicated, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.

C. Install flashing as follows:

1. At lintels and shelf angles, extend flashing a minimum of 4 inches into masonry at each end. At heads and sills, extend flashing 4 inches at ends and turn flashing up not less than 2 inches to form a pan.
2. Install metal drip edges beneath flashing at exterior face of wall. Stop flashing 1/2 inch back from outside face of wall and adhere flashing to top of metal drip edge.

D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashing and as follows:

1. Use wicking material to form weep holes.
2. Space weep holes 24 inches o.c.

E. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.

## 3.11 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores to support reinforced masonry elements during construction.

1. Construct formwork to conform to shape, line, and dimensions shown. Make it sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements of ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.

## 3.12 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Protect adjacent nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
4. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain on exposed surfaces.

## 3.13 MASONRY WASTE DISPOSAL

A. Recycling: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Excess Masonry Waste: Remove excess, clean masonry waste, broken masonry units, waste mortar, excess or soil contaminated sand, other material items associated with the masonry construction, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04810

# SECTION 05500 - METAL FABRICATIONS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:
   1. Steel framing and supports for mechanical and electrical equipment.
   2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
   3. Metal edgings.
   4. Edge angles at slab edges.
   5. Miscellaneous metal trim.
   6. Metal floor plate and supports.
   7. Pipe bollards.

B. Related Sections include the following:
   1. Division 5 Section "Pipe and Tube Railings" for metal pipe and tube handrails and railings.

### 1.2 SUBMITTALS

A. Product Data: For the following:

   1. Nonslip aggregates and nonslip-aggregate surface finishes.
   2. Paint products.
   3. Grout.

B. Shop Drawings: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

   1. Provide templates for anchors and bolts specified for installation under other Sections.

C. Samples for Verification: For each type and finish of extruded nosing and tread.

D. Welding Certificates: Copies of certificates for welding procedures and personnel.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

## 1.3 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.2, "Structural Welding Code--Aluminum."
3. AWS D1.3, "Structural Welding Code--Sheet Steel."
4. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

## 1.4 PROJECT CONDITIONS

A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

## 1.5 COORDINATION

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

# PART 2 - PRODUCTS

## 2.1 METALS, GENERAL

A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

## 2.2 FERROUS METALS

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

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

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

D. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500.

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

F. Slotted Channel Framing: Cold-formed metal channels with flange edges returned toward web and with 9/16-inch- (14.3-mm-) wide slotted holes in webs at 2 inches (51 mm) o.c.

1. Width of Channels: 1-5/8 inches (41 mm).
2. Depth of Channels: 1-5/8 inches (41 mm).
3. Metal and Thickness: Galvanized steel complying with ASTM A 653/A 653M, structural quality, Grade 33 (Grade 230), with G90 (Z275) coating; 0.079-inch (2-mm) nominal thickness.
4. Finish: Hot-dip galvanized after fabrication.

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

## 2.3 PAINT

A. Shop Primer for Ferrous Metal: Organic zinc-rich primer, complying with SSPC-Paint 20 and compatible with topcoat.

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

   a. Carboline 621; Carboline Company.
   b. Aquapon Zinc-Rich Primer 97-670; PPG Industries, Inc.
   c. Tneme-Zinc 90-97; Tnemec Company, Inc.

B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

C. Shop Primer for Galvanized Steel: Zinc-dust, zinc-oxide primer formulated for priming zinc-coated steel and for compatibility with finish paint systems indicated, and complying with SSPC-Paint 5.

D. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

## 2.4 FASTENERS

A. General: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.

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

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

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

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

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

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

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

I. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four 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: Alloy Group 1 or 2 stainless-steel bolts complying with ASTM F 593 (ASTM F 738M) and nuts complying with ASTM F 594 (ASTM F 836M).

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

## 2.5 GROUT

A. 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.

## 2.6 CONCRETE FILL

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

## 2.7 FABRICATION, GENERAL

A. 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.

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

C. 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.

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

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

E. 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.

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

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

H. Allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

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

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

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

## 2.8 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work.

B. General: Provide steel framing and supports indicated and as necessary to complete the Work.

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

1. Fabricate units from slotted channel framing where indicated.
2. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors 1-1/4 inches (32 mm) wide by 1/4 inch (6 mm) thick by 8 inches (200 mm) long at 24 inches (600 mm) o.c., unless otherwise indicated.
3. Furnish inserts if units must be installed after concrete is placed.

## 2.9 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 where possible.

B. Provide cutouts, fittings, and anchorages as needed 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.

## 2.10 METAL FLOOR PLATE

A. Abrasive-Surface Floor Plate: Fabricate from steel plate, of thickness indicated below, with abrasive material metallically bonded to steel by a proprietary process. Provide material with coefficient of friction of 0.6 or higher when tested according to ASTM C 1028.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

   a. Mebac; IKG Borden.
   b. SLIP-NOT; W. S. Molnar Company.

2. Thickness: 1/4 inch (6.4 mm).

B. Include steel angle stiffeners, as indicated and as required.

## 2.11 PIPE BOLLARDS

A. Fabricate pipe bollards from Schedule 40 steel pipe of size as indicated.

B. Fabricate bollards with 3/8-inch- (10-mm-) thick steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch (19-mm) anchor bolts.

1. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.

C. Fabricate sleeves for bollard anchorage from steel pipe with 1/4-inch (6-mm) thick steel plate welded to bottom of sleeve.

## 2.12 FINISHES, GENERAL

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

B. Finish metal fabrications after assembly.

## 2.13 STEEL AND IRON FINISHES

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

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

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

1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

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

# PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing 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.

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

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 surfaces of exterior units that have been hot-dip galvanized after fabrication and are 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 no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

## 3.2 SETTING BEARING AND LEVELING PLATES

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

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

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

## 3.3 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

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

## 3.4 INSTALLING PIPE BOLLARDS

A. Anchor bollards in concrete in formed or core-drilled holes not less than 8 inches (200 mm) deep and 3/4 inch (19 mm) greater than OD of bollard. After bollards have been inserted into holes, fill annular space surrounding bollard solidly with nonshrink, nonmetallic grout, mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch (3 mm) toward bollard.

B. Anchor bollards in place with concrete footings. Support and brace bollards in position in footing excavations until concrete has been placed and cured.

C. Fill bollards solidly with concrete, mounding top surface.

## 3.5 ADJUSTING AND CLEANING

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

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

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

END OF SECTION 05500

# SECTION 05521 - PIPE AND TUBE RAILINGS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:
   1. Steel pipe and tube handrails and railings.

### 1.2 PERFORMANCE REQUIREMENTS

A. General: In engineering handrails and railings to withstand structural loads indicated, determine allowable design working stresses of handrail and railing materials based on the following:
   1. Structural Steel: AISC S335, "Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design with Commentary."
   2. Cold-Formed Structural Steel: AISI SG-673, Part I, "Specification for the Design of Cold-Formed Steel Structural Members."

B. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads without exceeding allowable design working stresses of materials for handrails, railings, anchors, and connections:

   1. Top Rail of Guards: Capable of withstanding the following loads applied as indicated:

      a. Concentrated load of 200 lbf (890 N) applied at any point and in any direction.
      b. Uniform load of 50 lbf/ft. (730 N/m) applied horizontally and concurrently with uniform load of 100 lbf/ft. (1460 N/m) applied vertically downward.
      c. Concentrated and uniform loads above need not be assumed to act concurrently.

   2. Handrails Not Serving As Top Rails: Capable of withstanding the following loads applied as indicated:

      a. Concentrated load of 200 lbf (890 N) applied at any point and in any direction.
      b. Uniform load of 50 lbf/ft. (730 N/m) applied in any direction.
      c. Concentrated and uniform loads above need not be assumed to act concurrently.

   3. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 lbf (890 N) applied to 1 sq. ft. (0.09 sq. m) at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area.

      a. Load above need not be assumed to act concurrently with loads on top rails in determining stress on guard.

C. Thermal Movements: Provide handrails and railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

## 1.3 SUBMITTALS

A. Shop Drawings: Show fabrication and installation of handrails and railings. Include plans, elevations, sections, component details, and attachments to other Work.

1. For installed handrails and railings indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

## 1.4 QUALITY ASSURANCE

A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of handrails and railings that are similar to those indicated for this Project in material, design, and extent.

B. Source Limitations: Obtain each type of handrail and railing through one source from a single manufacturer.

## 1.5 STORAGE

A. Store handrails and railings in a dry, well-ventilated, weathertight place.

## 1.6 PROJECT CONDITIONS

A. Field Measurements: Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

## 1.7 COORDINATION

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

## 1.8 SCHEDULING

A. Schedule installation so handrails and railings are mounted only on completed walls. Do not support temporarily by any means that does not satisfy structural performance requirements.

## PART 2 - PRODUCTS

### 2.1 METALS

A. General: Provide metal free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.

B. Steel and Iron: Provide steel and iron in the form indicated, complying with the following requirements:

1. Steel Pipe: ASTM A 53; finish, type, and weight class as follows:

   a. Black finish, unless otherwise indicated.
   b. Galvanized finish for exterior installations and where indicated.
   c. Type F, or Type S, Grade A, standard weight (Schedule 40), unless another grade and weight are required by structural loads.

2. Steel Tubing: Cold-formed steel tubing, ASTM A 500, Grade A, unless another grade is required by structural loads.
3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
4. Iron Castings: Gray iron complying with ASTM A 48, Class 30 (ASTM A 48M, Class 200).

C. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

### 2.2 STEEL TUBE HANDRAILS AND RAILINGS

A. General: Fabricate handrails and railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.
1. Configuration: 1-1/2-inch- (38-mm-) square top and bottom rails, 1-1/2-inch- (38-mm-) square posts, and 1/2-inch- (13-mm-) square pickets spaced not more than 4 inches (101 mm) clear.
2. Configuration: 1-1/2-inch- (38-mm-) square top and bottom rails and posts, and 1/2-inch- (13-mm-) square pickets spaced not more than 6 inches (152 mm) clear.
3. Configuration: 1-1/2-inch- (38-mm-) square top, bottom, and intermediate rails and posts. Space intermediate rails not more than 12 inches (305 mm) clear.
4. Gates: Form gates from steel tube of same size and shape as top rails. Provide with hinges for fastening to wall and overlapping stop with rubber bumper to restrict gate to opening in the direction of egress.

B. Interconnect members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.

1. At tee and cross intersections, cope ends of intersecting members to fit contour of tube to which end is joined, and weld all around.

C. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

D. Close exposed ends of handrail and railing members with prefabricated end fittings.

E. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.

F. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting railings and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.

1. Connect railing posts to stair framing by direct welding, unless otherwise indicated.

G. For galvanized handrails and railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous-metal components.

H. For nongalvanized handrails and railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.

## 2.3 WELDING MATERIALS, FASTENERS, AND ANCHORS

A. Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Fasteners for Anchoring Handrails and Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring handrails and railings to other types of construction indicated and capable of withstanding design loads.
1. For steel handrails, railings, and fittings, use plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.

C. Fasteners for Interconnecting Handrail and Railing Components: Use fasteners fabricated from same basic metal as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.

1. Provide concealed fasteners for interconnecting handrail and railing components and for attaching them to other work, unless otherwise indicated.

D. Cast-in-Place and Postinstalled Anchors: Anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Cast-in-place anchors.
2. Expansion anchors.

## 2.4 PAINT

A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in 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. Shop Primer for Galvanized Steel: Zinc-dust, zinc-oxide primer formulated for priming zinc-coated steel and for compatibility with finish paint systems indicated, and complying with SSPC-Paint 5.

## 2.5 GROUT AND ANCHORING CEMENT

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

B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

## 2.6 FABRICATION

A. General: Fabricate handrails and railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble handrails and railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Welded Connections: Fabricate handrails and railings for connecting members by welding. Cope components at perpendicular and skew connections to provide close fit, or use fittings designed for this purpose. Weld connections 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 flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

D. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect handrail and railing members to other work, unless otherwise indicated.

E. Provide inserts and other anchorage devices for connecting handrails and railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.

F. For railing posts set in concrete, provide preset sleeves of steel not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (12 mm) greater than outside dimensions of post, and steel plate forming bottom closure.

G. For removable railing posts, fabricate slip-fit sockets from steel tube whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height. Provide socket covers designed and fabricated to resist being dislodged.

1. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.

H. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.

I. 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 the Work.

J. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.

K. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.

L. Fabricate joints that will be exposed to weather in a watertight manner.

M. Close exposed ends of handrail and railing members with prefabricated end fittings.

N. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of railing and wall is 1/4 inch (6 mm) or less.

O. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

## 2.7 FINISHES, GENERAL

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

## 2.8 STEEL FINISHES

A. Galvanized Handrails and Railings: Hot-dip galvanize exterior steel and iron handrails and railings to comply with ASTM A 123. Hot-dip galvanize hardware for exterior steel and iron handrails and railings to comply with ASTM A 153/A 153M.

B. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

C. For galvanized handrails and railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

D. For nongalvanized steel handrails and railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.

E. Preparation for Shop Priming: After galvanizing, thoroughly clean handrails and railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic-phosphate process.

F. 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 handrails and railings:

1. Exteriors (SSPC Zone 1B): SSPC-SP 6, "Commercial Blast Cleaning."

G. Apply shop primer to prepared surfaces of handrail and railing components, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

### 3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required to install handrails and railings. Set handrails and railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.

1. Do not weld, cut, or abrade surfaces of handrail and railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
3. Align rails so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).

C. Adjust handrails and railings before anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated, but not less than that required by structural loads.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings and for properly transferring loads to in-place construction.

## 3.3 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches (50 mm) beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches (150 mm) of post.

## 3.4 ANCHORING POSTS

A. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's written instructions:

1. Nonshrink, nonmetallic grout.

B. Leave anchorage joint exposed; wipe off surplus anchoring material; and leave 1/8-inch (3-mm) build-up, sloped away from post.

C. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

D. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

## 3.5 ANCHORING RAILING ENDS

A. Anchor railing ends into concrete and masonry with round flanges connected to railing ends and anchored into wall construction with postinstalled anchors and bolts.

B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces.

1. Weld flanges to railing ends.

## 3.6 ATTACHING HANDRAILS TO WALLS

A. Attach handrails to wall with wall brackets. Provide bracket with 1-1/2-inch (38-mm) clearance from inside face of handrail and finished wall surface.

B. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

C. Secure wall brackets to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.
3. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.

## 3.7 CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material.

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

## 3.8 PROTECTION

A. Protect finishes of handrails and railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05521

# SECTION 05580 - FORMED METAL FABRICATIONS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Furnish and install formed stainless steel baggage pass-through enclosures, stainless steel corner guards, and stainless steel bumper rails at ticket counters, oversize bag shelves, and overhead doors and shutters which are not a part of other metal systems specified in other sections of these specifications.

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

1. Division 6 Section "Interior Architectural Woodwork" for cabinets to receive sheet metal fabrication finishes.

### 1.2 SUBMITTALS

A. Shop drawings for each sheet metal fabrication specified, including plans, elevations and detail sections. Indicate jointing, fasteners, anchorage, and accessory items, and specify finishes.

B. Coordination drawings for sheet metal fabrications housing items specified under other sections of these specifications.

### 1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firm which employs skilled persons and which has successfully fabricated products similar to those required for this Project and which has sufficient capacity to produce required units without causing delay in the Work.

B. Single Source Responsibility: Obtain sheet metal fabrications from a single manufacturer.

C. Coordinate fabrication and installation of items specified in this section with other, adjoining units of work.

D. Shop Assembly: Preassemble items in the shop to the greatest extent possible, so as to minimize field splicing and assembly. Disassemble units only to the extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

E. Inserts and Anchorages: Furnish anchoring devices, which are appropriate for installing the stainless steel materials as drawn. Coordinate delivery with other work to avoid delay.

### 1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal fabrications as factory assembled units with protective crating and covering.

B. Store products on elevated platforms in a dry location.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify size, location, and placement of sheet metal fabrications with adjoining construction prior to fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering sheet metal products that may be incorporated in the Work include, but are not limited to, the following:

American Steel Products Corp.
Brandt-Airflex Corp.
Custom Enclosures, Inc.
Superior Fireproof Door Inc.

2.2 SHEET METALS

A. General: Provide sheet metals selected for their surface flatness, smoothness and freedom from surface blemishes where exposed to view in the finished unit. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, variations in flatness exceeding those permitted by referenced standards for stretcher-leveled metal sheet, stains, discoloration or other imperfections.

B. Stainless Steel Sheet: ASTM A 167, Type 302 or 304, stretcher leveled, with the following mill finish:

1. Polished for surfaces requiring little or no polishing after fabrication to produce the uniform polished finish specified under "Stainless Steel Finishes."

2.3. MISCELLANEOUS MATERIALS

A. Welding Electrodes and Filler Metal: Type and alloy of filler metal and electrodes as recommended by producer of metal to be welded, complying with applicable AWS specifications, and as required for strength and compatibility in the fabricated items.

1. Use filler metals and welding procedures which will blend with and match the color of sheet metal being joined and will avoid discoloration at welds.

B. Fasteners: Of same basic metal and alloy as fastened metal, unless otherwise indicated. Do not use metals, which are corrosive or incompatible with metals joined.

1. Provide concealed fasteners for interconnection of sheet metal fabrications and for their attachment to other work except where exposed fasteners are unavoidable.

2. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

C. Bituminous Paint: SSPC-Paint 12 (cold-applied asphalt mastic).

D. Lacquer: Clear methacrylate, of type recommended by metal producer for protection of the finished metal surface.

## 2.4 FABRICATION, GENERAL

A. General: Fabricate sheet metal fabrications to comply with requirements indicated for design, dimensions, materials, joinery, and performance.

B. Coordinate dimensions and attachment methods of sheet metal fabrications with those of adjoining products and construction to produce integrated assemblies with closely fitting joints, and edges and surfaces aligned with one another in relationship indicated.

C. Increase metal thickness or reinforce metal with concealed stiffeners or backing materials or both as required to produce surfaces whose variations in flatness exceed those permitted by referenced standards for stretcher-leveled metal sheet and to impart sufficient strength for use indicated.

1. Where stiffeners are used, fill space between them with sound deadening insulation permanently attached to face sheet.

E. Preassemble sheet metal fabrications in the shop to the greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

F. Form sheet metal fabrications to profiles indicated in maximum lengths to minimize joints and without exposed cut edges. Fold back exposed ends of unsupported sheet metal to form a 1/2-inch wide hem on the concealed side, or ease exposed edges with backing to a radius of approximately 1/32 inch. Produce flat, flush surfaces without cracking and grain separation at bends.

G. Continuously weld all joints and seams except where other methods of joining are indicated; grind, fill, and dress welds to produce smooth flush exposed surfaces in which welds are invisible after final finishing is completed.

H. Build-in straps, plates and brackets as required for support and anchorage of fabricated items to adjoining construction; reinforce sheet metal units as required for attachment and support of other construction.

## 2.5 STAINLESS STEEL FABRICATIONS

A. Form members from sheet metal of type and minimum nominal thickness as indicated below. Incorporate components required for support and installation of closures and trim. Fabricate closures and trim to tightly close with adjoining construction.

1. Metal for Interior Installations: Steel sheet, 0.0478 inch (18 gage).

B. Conceal fasteners where possible; otherwise locate where they will be as inconspicuous as possible. Size fasteners to support closures and trim, with fasteners spaced to prevent buckling or waviness in finished surfaces.

C. Drill and tap holes required for securing closures and trim to other surfaces.

D. Incorporate gaskets where indicated or required for concealed, continuous seal at abutting surfaces.

E. Support joints with concealed stiffeners as required to hold exposed faces of adjoining sheets in flush alignment.

F. Miter or cope trim members at corners to form tight joint.

2.6 FINISHES, GENERAL

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

2.7 STAINLESS STEEL FINISHES

A. Bright, Directional Polish: AISI No. 4 finish.

2.8 SHOP FINISHING

A. Corrosion Protection: Coat concealed surfaces that will be in contact with concrete, masonry, wood, or dissimilar metals, in exterior work and work to be built into exterior and below grade walls and decks, with a heavy coat of bituminous paint. Do not extend coating onto exposed surfaces.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for the installation of anchorages, such as concrete inserts, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to the project site.

3.2 GENERAL INSTALLATION

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing ornamental metal items to in-place construction; including, threaded fasteners, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect sheet metal surfaces and to make a weathertight connection.

B. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of the ornamental metal items. Set the work accurately in location, alignment and elevation, plumb, level, and true, measured from established lines and levels.

C. Locate and place sheet metal fabrications plumb, level and in alignment with adjacent construction.

D. Form tight joints with exposed connections accurately fitted with uniform reveals and spaces for sealants and joint fillers. Where cutting, welding and grinding are required for proper shop fitting and jointing of the work, restore finishes to eliminate any evidence of such corrective work.

E. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing or provide new units at Contractor's option.

F. Restore protective coverings that have been damaged during shipment or installation of the work. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at the same location. Retain protective coverings intact and remove simultaneously from similarly finished items to preclude nonuniform oxidation and discoloration.

G. Field Welding: Comply with AWS Code for the procedures of manual shielded metal-arc welding, the appearance and quality of welds made, and the methods used in correcting welding work.

## 3.3 ADJUSTING

A. Repair finishes damaged during installation and construction period so that no evidence remains of correction work. Return items which cannot be refinished in the field to the factory; make required alterations and refinish entire unit, or provide new units as required.

## 3.4 PROTECTION

A. Protect finishes of sheet metal fabrications from damage during construction period. Remove temporary protective coverings at time of Substantial Completion.

END OF SECTION 05580

# SECTION 06100 - ROUGH CARPENTRY

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:
   1. Wood blocking and nailers.
   2. Plywood panels.

### 1.2 DEFINITIONS

A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise indicated.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
   1. NLGA - National Lumber Grades Authority.
   2. SPIB - Southern Pine Inspection Bureau.
   3. WCLIB - West Coast Lumber Inspection Bureau.
   4. WWPA - Western Wood Products Association.

### 1.3 SUBMITTALS

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

   1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
   2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
   3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

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

   1. Preservative-treated wood.
   2. Power-driven fasteners.
   3. Expansion anchors.

## 1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

# PART 2 - PRODUCTS

## 2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber, S4S, unless otherwise indicated.
4. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.

## 2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA C2 (lumber) and AWPA C9 (plywood), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and one of the following:
   a. Ammoniacal, or amine, copper quat (ACQ).
   b. Copper bis (dimethyldithiocarbamate) (CDDC).
   c. Ammoniacal copper citrate (CC).
   d. Copper azole, Type A (CBA-A).
   e. Oxine copper (copper-8-quinolinolate) in a light petroleum solvent.

B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

3. Wood framing members less than 18 inches (460 mm) above grade.
4. Wood floor plates that are installed over concrete slabs directly in contact with earth.

## 2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, provide materials that comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures, when tested by a qualified independent testing agency according to ASTM D 5664, for lumber and ASTM D 5516, for plywood.
2. Use treatment that does not promote corrosion of metal fasteners.
3. Use Exterior type for exterior locations and where indicated.
4. Use Interior Type A High Temperature (HT), unless otherwise indicated.

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

## 2.4 MISCELLANEOUS LUMBER

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

1. Rooftop equipment bases and support curbs.
2. Blocking.
3. Nailers.

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

1. Mixed southern pine; SPIB.
2. Hem-fir or Hem-fir (north); NLGA, WCLIB, or WWPA.
3. Spruce-pine-fir (south) or Spruce-pine-fir; NELMA, NLGA, WCLIB, or WWPA.
4. Eastern softwoods; NELMA.
5. Northern species; NLGA.
6. Western woods; WCLIB or WWPA.
7. Spruce-pine-fir (south) or Spruce-pine-fir, D Select grade; NELMA, NLGA, WCLIB, or WWPA.
8. Western red cedar, A grade; NLGA or WWPA.

C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.
2. Hem-fir or Hem-fir (north), Construction or 2 Common grade; NLGA, WCLIB, or WWPA.

3. Spruce-pine-fir (south) or Spruce-pine-fir, Construction or 2 Common grade; NELMA, NLGA, WCLIB, or WWPA.
4. Eastern softwoods, No. 2 Common grade; NELMA.
5. Northern species, No. 2 Common grade; NLGA.
6. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

## 2.5 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 23/32 inch (18.3 mm) thick.

## 2.6 FASTENERS

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

1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: CABO NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

## 2.7 MISCELLANEOUS MATERIALS

A. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

# PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Do not use materials with defects that impair quality of rough carpentry or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

C. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. CABO NER-272 for power-driven fasteners.
2. Published requirements of metal framing anchor manufacturer.

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

F. Use finishing nails for exposed work, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

## 3.2 WOOD BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

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

END OF SECTION 06100

# SECTION 06402 - INTERIOR ARCHITECTURAL WOODWORK

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes interior woodwork including for the following applications:

1. Standing and running trim.
2. Plastic-laminate cabinets.
3. Plastic-laminate countertops.
4. Solid-surfacing-material countertops.

5. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips, unless concealed within other construction before woodwork installation.

### 1.2 SUBMITTALS

A. Product Data: For the following:

1. Cabinet hardware and accessories.
2. Handrail brackets.
3. Finishing materials and processes.

B. Shop Drawings: Include location of each item, plans and elevations, large-scale details, attachment devices, and other components.

C. Samples:

1. Lumber and panel products for transparent finish, for each species and cut, finished on one side and one edge.
2. Lumber and panel products with shop-applied opaque finish, for each finish system and color, with exposed surface finished.
3. Plastic-laminate-clad panel products, for each type, color, pattern, and surface finish.
4. Thermoset decorative-overlay surfaced panel products, for each type, color, pattern, and surface finish.
5. Solid-surfacing materials.

### 1.3 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of woodwork.

B. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.

1. Provide AWI certification labels or compliance certificate indicating that woodwork complies with requirements of grades specified.

C. Quality Standard: Unless otherwise indicated, comply with WIC's "Manual of Millwork" for grades of interior architectural woodwork, construction, finishes, and other requirements.

1. Provide WIC-certified compliance certificate indicating that woodwork complies with requirements of grades specified.
2. Provide WIC-certified compliance certificate for installation.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wood for Opaque Finish:

1. Species: Any closed-grain hardwood.

B. Wood Products:

1. Hardboard: AHA A135.4.
2. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
3. Particleboard: ANSI A208.1, Grade M-2.
4. Softwood Plywood: DOC PS 1, Medium Density Overlay.
5. Hardwood Plywood and Face Veneers: HPVA HP-1.

C. Thermoset Decorative Overlay: Particleboard or medium-density fiberboard with surface of thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

D. High-Pressure Decorative Laminate: NEMA LD 3.

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

a. Formica Corporation.
b. International Paper; Decorative Products Div.
c. Laminart.
d. Pioneer Plastics Corp.
e. Westinghouse Electric Corp.; Specialty Products Div.

f. Wilsonart International; Div. of Premark International, Inc.

E. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ANSI Z124.3, for Type 5 or Type 6 material and performance requirements, without a precoated finish.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

a. Avonite, Inc.; Avonite.
b. DuPont Polymers; Corian.
c. Formica Corporation; Surell.
d. International Paper, Decorative Products Div.; Fountainhead.
e. Swan Corporation (The); Swanstone.
f. Wilsonart International, Div. of Premark International, Inc.; Gibraltar.

## 2.2 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Lumber and Plywood: Materials impregnated with fire-retardant chemical formulations to comply with AWPA C20 (lumber) and AWPA C27 (plywood), Exterior Type or Interior Type A. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Kiln-dry material after treatment.

B. Fire-Retardant Particleboard: Panels made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture with flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E 84.

C. Fire-Retardant Fiberboard: ANSI A208.2 medium-density fiberboard panels made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture with flame-spread index of 25 or less and smoke-developed index of 200 or less per ASTM E 84.

## 2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials for a complete installation of architectural woodwork, except for items specified in Division 8 Section "Door Hardware."

B. Hardware Standard: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers or items referenced to this standard.

C. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, self-closing.

D. Wire Pulls: Back mounted, 4 inches (100 mm) long, 5/16 inches (8 mm) in diameter.

E. Catches: Magnetic, BHMA A156.9, B03141.

F. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.

G. Drawer Slides: Side-mounted, full-extension, zinc-plated steel drawer slides with steel ball bearings, BHMA A156.9, B05091, and rated for the following loads:

1. Box Drawer Slides: 75 lbf (330 N).

H. Door Locks: BHMA A156.11, E07121.

I. Drawer Locks: BHMA A156.11, E07041.

J. Exposed Hardware Finishes: Complying with BHMA A156.18 for BHMA finish number indicated.
1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.

## 2.4 INSTALLATION MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

B. Rough Carriages for Stairs: Comply with requirements in Division 6 Section "Rough Carpentry ." Kiln-dry to less than 15 percent moisture content.

## 2.5 FABRICATION

A. General: Complete fabrication to maximum extent possible before shipment to Project site. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.

1. Interior Woodwork Grade: Custom complying with the referenced quality standard.
2. Shop cut openings to maximum extent possible. Sand edges of cutouts to remove splinters and burrs.
3. Seal edges of openings in countertops with a coat of varnish.
4. Install glass to comply with applicable requirements in Division 8 Section "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.
5. For trim items wider than available lumber, use veneered construction. Do not glue for width.
6. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
7. Assemble casings in plant except where limitations of access to place of installation require field assembly.

B. Plastic-Laminate Cabinets:

1. AWI Type of Cabinet Construction: Flush overlay.
2. WIC Construction Style: Style A, Frameless.
3. WIC Construction Type: Type I, multiple self-supporting units rigidly joined together.
4. WIC Door and Drawer Front Style: Flush overlay.
5. Reveal Dimension: 1/2 inch (13 mm).
6. Laminate Cladding for Exposed Surfaces: High-pressure decorative of grade indicated.

a. Horizontal Surfaces Other Than Tops: HGS.
b. Postformed Surfaces: HGP.
c. Vertical Surfaces: HGS.
d. Edges: HGS.

7. Materials for Semiexposed Surfaces Other Than Drawer Bodies: Thermoset decorative overlay.

a. Drawer Sides and Backs: Thermoset decorative overlay.
b. Drawer Bottoms: Hardwood plywood.

8. Colors, Patterns, and Finishes: As selected from manufacturer's full range.
9. Provide dust panels of 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

C. Plastic-Laminate Countertops:

1. High-Pressure Decorative Laminate Grade: HGS.
2. Colors, Patterns, and Finishes: As selected from manufacturer's full range.
3. Edge Treatment: Same as laminate cladding on horizontal surfaces.
4. Core Material at Sinks: Exterior-grade plywood.

D. Solid-Surfacing-Material Countertops:

1. Solid-Surfacing-Material Thickness: 3/4 inch (19 mm).
2. Colors, Patterns, and Finishes: As selected from manufacturer's full range.
3. Fabricate tops in one piece with shop-applied backsplashes and edges, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
4. 75] [25] or less and smoke-developed index of 450 or less per ASTM E 84.

## 2.6 SHOP FINISHING

A. Finish architectural woodwork at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.

B. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling.

C. Opaque Finish: Comply with requirements indicated below for grade, finish system, color, effect, and sheen, with sheen measured on 60-deg ree gloss meter per ASTM D 523.

1. Grade: Custom.
2. AWI Finish System: OP-6, catalyzed polyurethane.
3. WIC Finish System: #3, catalyzed polyurethane.
4. Color: As selected in finish system specified.
5. Sheen: Semigloss, 55-75 gloss units.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Condition woodwork to average prevailing humidity conditions in installation areas and examine and complete work as required, including removal of packing and backpriming before installation.

B. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in this Section for type of woodwork involved.

C. Quality Standard: Install woodwork to comply with WIC Section 26 for the same grade specified in this Section for type of woodwork involved.

D. Install woodwork level, plumb, true, and straight to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm). Shim as required with concealed shims.

E. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.

F. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails [or finishing screws] for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

G. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base, if finished.

H. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.

1. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c. with No. 10 wafer-head screws sized for 1-inch (25-mm) penetration into wood framing, blocking, or hanging strips.

2. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop. Calk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."

END OF SECTION 06402

# SECTION 07100 – WATERPROOFING MEMBRANE

## PART I GENERAL

### 1.01 SUMMARY

A. This specification serves as a guideline and should be adapted to suit the needs of each individual project by the architect. It is prepared in accordance with the CSI three-part section format and should be included as a separate section under DIVISION 7 - Thermal and Moisture Protection. Improvements and other changes to the contents may be made only with the written approval of the architect.

### 1.02 RELATED SECTIONS

A. DIVISION 3 - Concrete Section 03300.

The coordination of this section is necessary to facilitate the successful installation of the waterproofing membrane.

Cast In Place Concrete/Composite Deck

A. Strength/density: minimum 2,500 psi (17,235 kPa) compressive strength
minimum 115 pcf (1842 kg/m$^3$) density

B. Finish: Wood-float or wood-troweled equivalent finish. Steel troweled is not desirable.

C. Concrete Hydration (Cure):

1. Method of Cure: Water cure, wet coverings, paper sheets, plastic sheets or approved liquid curing compound (sodium silicate preferred). Contact Manufacturer for other alternatives.
2. Duration of Cure/Dry:
   a. Structural Weight Concrete: recommend 28 days, minimum 14 days, prior to application of the membrane.
   c. The above minimum cure/dry times are recommended based upon basic concrete fundamentals and experience. Depending on conditions (i.e., ambient temperature, humidity) the concrete may be dry enough to receive application of the membrane in less than the 14 day minimum recommendation. Consult Manufacturer for specifics when less than the minimum is desired.
3. Form Release Agents: Contact Manufacturer

D. DIVISION 06100 – Rough Carpentry

E. DIVISION 07605 – Flashing and Sheet Metal

F. DIVISION 07920 - Caulking and sealants

### REFERENCES

A. American Society for Testing and Materials (ASTM).

B. Canadian Government Specification Board CGSB-37.50-M89, Standard for "Asphalt, Rubberized, Hot Applied, for Roofing and Waterproofing."

### SYSTEM DESCRIPTION

A. Furnish and install a completed waterproofing assembly including surface conditioner, a monolithic, reinforced rubberized asphalt membrane, protection course and flashings. To ensure total system compatibility all products must by purchased from a single-source manufacturer.

1.05 SUBMITTALS

A. Certification from an approved independent testing laboratory experienced in testing this type material, that th material meets the CGSB-37.50-M89 standard for rubberized asphalt membranes, including applicable ASTM procedures. Testing shall be done by Ortech International or other national testing laboratory acceptable to the engineer.

B. Certification showing full time quality control of production facilities and that each batch of material is tested to insure conformance with the manufacturer's published physical properties.

C. Certification showing that all waterproofing components are being supplied and warranted by a single-source manufacturer.

D. The plant manufacturing this type material must have ISO9002 approval as evidenced by a notarized copy of the official certificate.

1.06 QUALITY ASSURANCE

A. Refer to Section 1.05 SUBMITTALS. Include items A., B., C. & D.

B. The Waterproofing Contractor shall demonstrate qualifications to perform the work of this Section by submitting the following documentation:

1. Certification or license by the membrane manufacturer as a locally based, authorized applicator of the product the installer intends to use, for a minimum of five (5) years.

2. List of at least three (3) projects, satisfactorily completed within the past five (5) years, of similar scope and complexity to this project. Previous experience submittal shall correspond to specifi membrane system proposed for use by applicator.

C. Refer to Section 1.04 SYSTEM DESCRIPTION. Include single-source for all components from the manufacturer.

D. The rubberized asphalt membrane product shall contain an inert clay filler to enable the product to be resistant to acids (fertilizers, building washes and acid rain).

E. Membrane Manufacturer shall have available an in-house technical staff to assist the contractor, when necessary, in application of the products and final inspection of the assembly.

F. Membrane Manufacturer Qualification: Manufacturer shall demonstrate qualifications to supply materials of this section by certifying the following:

1. Membrane Manufacturer must show evidence that the specified rubberized asphalt has been manufactured by the same source for fifteen (15) years and successfully installed on a yearly basis for a minimum of fifteen (15) years on projects of similar scope and complexity.

2. Membrane Manufacturer must not issue warranties for terms longer than they have been manufacturing their hot fluid rubberized asphalt membrane.

G. Pre-Construction Conferences. The manufacturer will meet with the necessary parties at the jobsite to review and discuss project conditions as it relates to the integrity of the waterproofing assembly.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original unopened containers of packaging clearly labeled with manufacturer's name, brand name, instruction for use and all identifying numbers.

B. Materials shall be stored in a neat, safe manner, not to exceed the allowable structural capacity of the storage area.

C. Store materials in a clean, dry area protected from water and direct sunlight.

D. Store all adhesives at temperatures between 60°F (15.5°C) and 80°F (26.6°C). If exposed to lower temperatures, restore materials to 60°F (15.5°C) minimum temperature before using.

1.08 PROJECT CONDITIONS

A. Application of the membrane shall not commence nor proceed during inclement weather. All surfaces to receive the membrane shall be free of water, dew, frost, snow and ice.

B. Application of membrane shall not commence nor proceed when the ambient temperature is below 0°F (-17.7°C).

C. Preparation and application of membrane must be conducted in well ventilated areas.

D. Over its service life, do not expose membrane or accessories to a constant temperature in excess of 180°F (82°C) (i.e., hot pipes and vents or direct steam venting, etc.).

E. Adhesives contain petroleum distillates and are extremely flammable. Do not breathe vapors or use near an open fire. Do not use in confined areas without adequate ventilation. Consult container or packaging labels and Material Safety Data Sheets (MSDS) for specific safety information.

F. Do not allow waste products (petroleum, grease, oil, solvents, vegetable or mineral oil, animal fat, etc.) to come in contact with the waterproofing membrane. Any exposure to foreign materials or chemical discharges must be presented to membrane manufacturer for evaluation to determine any impact on the waterproof membrane assembly performance.

G. Concrete Deck/Wall Surface Condition. IMPORTANT - Refer to 1.02 Related Sections.

H. Deck/Wall Preparation; refer to Section 3.02 Preparation.

I. General contractor shall assure adequate protection during installation of the waterproofing assembly.

WARRANTY

A. Upon completion of the work, the contractor must supply the owner with a single-source warranty of U.S. origin direct from the manufacturer.

B. Each warranty varies in scope and terms. Contact Manufacturer for exact warranty terms and conditions to meet the specific project requirements.

C. Warranties available from the manufacturer:

1. Material Warranties; excludes labor.
Duration: 10-year

2. Watertightness Warranties; includes labor and material.
Duration: 10-year

3. Total System Warranties; covers components of the waterproofing assembly, including membrane, flashing, insulation and pavers. Includes removal and replacement of the pedestal installed pavers when installed per Hydrotech's requirements.

C. Flashing/Reinforcing
1. 60-mil (1.5 mm) thick, uncured neoprene flashing/(heavy duty) reinforcing sheet.
- American Hydrotech, Inc., Flex Flash UN

D. Adhesives/Sealant
1. Contact adhesive to bond elastomeric flashing together.
- American Hydrotech, Inc., Splicing Cement
2. Contact adhesive to bond elastomeric flashing to an approved substrate.
- American Hydrotech, Inc., Bonding Adhesive
3. Sealant to seal elastomeric flashing seam edge.
- American Hydrotech, Inc., Lap Sealant

E. Protection Course
1. A fiberglass reinforced rubberized asphalt sheet.
- American Hydrotech, Inc., Hydroflex 30

***Certain project conditions may warrant additional protection. CONTACT Hydrotech's Technical Service Department.***

H. Filter Fabric Sheet

1. Water permeable polymeric fabric.
- American Hydrotech, Inc., Filter Fabric Sheet

I. Topping Materials (Edit to project requirements)

1. Concrete Pour Topping

Dow Chemical Company, manufacturers of STYROFOAM® Brand insulation, recommends the incorporation of an air layer between the insulation and concrete. Hydrotech suggests the use of Hydrodrain AL for this purpose. CONTACT Hydrotech for specific recommendations.

2. Asphalt Paving Overlay

When asphalt paving will be placed directly over the waterproofing, CONTACT Hydrotech for suggestions and recommendations.

PART III EXECUTION

3.01 INSPECTION

A. The waterproofing contractor shall examine all surfaces to receive the waterproofing assembly to verify it is acceptable and proper for the application of the membrane. Refer to American Hydrotech's Pre-Installation & Application Guidelines.

B. The waterproofing contractor shall not proceed with the installation of the waterproofing membrane assembly until all deck defects have been corrected.

3.02 PREPARATION

A. All surfaces must be dry, smooth, free of depressions, voids, protrusions, clean and free of unapproved curing compounds, form release agents and other surface contaminants.

1. Cast in-place concrete/Composite deck

   a. Poured in place concrete must be monolithic, smooth, free of voids, spalled areas, laitance, honeycombs, and sharp protrusions.
   b. Refer to Section 1.02 of this specification, Division 3.

2. Precast concrete decks

   a. Precast units shall be mechanically secured to minimize differential movement and all joints between units shall be grouted.

3. Retrofit/Tear-Off Application

   a. Asphalt, coal tar pitch or other existing membrane must be removed. CONTACT Hydrotech.
   b. Deck type acceptable to Hydrotech.

B. Substrate cleaning

1. Thoroughly sweep the substrate which is to receive the waterproofing membrane.

2. Substrate must also be blown clean using an air compressor to remove any remaining loose debris.

3. Final check to determine if concrete has been properly cleaned is to apply a test patch of Monolithic Membrane 6125 to the surface and check its adhesion.

## 3.03 INSTALLATION

A. Surface conditioner application (to concrete)

1. Apply the surface conditioner to the concrete using a hand held sprayer evenly at a rate of 300 to 600 SF/gallon (7.4 - 14.7 $m^2$/L) depending on surface texture. Surface conditioner should "tan" the surface, not blacken it.

2. Allow sufficient time for the surface conditioner to thoroughly dry prior to the membrane application.

B. Membrane preparation

1. The membrane shall be heated in double jacketed, oil bath or air jacketed melter with mechanical agitation, specifically designed for the preparation of a rubberized asphalt membrane.

2. Heat membrane until membrane can be drawn-free flowing at a temperature range between 350°F (176°C) and 400°F (204°C).

C. Detailing/Flashing

1. All detailing and flashing shall be done in accordance with the manufacturer's standard guideline details.

2. All detailing and flashing shall be completed before installing the membrane over the field of the substrate.

D. Membrane Application

1. a. Apply the rubberized asphalt membrane at a rate to provide a continuous, monolithic coat of 90 mil minimum (approximately 2.3 mm), into which is fully embedded a layer of the spunbonded polyester fabric reinforcing sheet, followed by another continuous monolithic coat of membrane at an average thickness of 125 mil (approx. 3.2 mm). Total membrane thickness is to be 215 mils average (approx. 5.5 mm), 180 mils minimum.

   b. For foundation wall application woven fiberglass, fabric reinforcing sheet may be used in lieu of spunbonded polyester.

2. Overlap fabric reinforcing sheet 1-2 inches (25.4 mm - 50.8 mm) with membrane between sheets.

3.04 SEPARATION/PROTECTION LAYER INSTALLATION

A. Protection layer shall be installed as follows:

1. Embed the protection sheet/rigid insulation board into the membrane while it is still hot to insure a good bond.

2. Overlap adjoining sheet edges (dry) a minimum of 2"-3" (50.8 mm - 76.2 mm) to insure complete coverage. Rigid insulation board materials are not to be overlapped.

3. The completed membrane/protection assembly must be covered with subsequent topping materials as soon as possible, within 30 days of membrane installation.

3.05 WATER TEST

A. It is strongly recommended that the deck area or portions thereof be water tested by means of electronic testing or ponding water to a minimum depth of 2" (50.8 mm) for a period of 48 hours to check the integrity of the membrane installation.

B. VERIFY that the structure can support the deadload weight of a watertest before testing.

C. If leaks should occur, the water must be drained completely and the membrane installation repaired.

3.06 JOB COMPLETION

A. Contractor and a representative of the membrane manufacturer shall inspect the waterproofing assembly and notify the contractor of any defects. All defects must be corrected.

B. Clean up all debris and equipment.

END OF SECTION

# SECTION 07210 - BUILDING INSULATION

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:
   1. Cavity wall insulation.
   2. Concealed building insulation.
   3. Loose-fill building insulation.
   4. Vapor retarders.

### 1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Product test reports.

### 1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84 for surface-burning characteristics and other methods indicated with product, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

## PART 2 - PRODUCTS

### 2.1 INSULATING MATERIALS

A. General: Provide insulating materials that comply with requirements and with referenced standards and, for preformed units, in sizes to fit applications indicated, selected from manufacturer's standard thicknesses, widths, and lengths.

B. Molded-Polystyrene Board Insulation: ASTM C 578, Type II, 1.35 lb/cu. ft. (22 kg/cu. m)], with maximum flame-spread and smoke-developed indices of 75 and 450, respectively.

C. Glass-Fiber Board Insulation:

   1. Foil-Faced, Glass-Fiber Board Insulation: ASTM C 612, Type IA or Types IA and IB; faced on one side with foil-scrim-kraft or foil-scrim-polyethylene vapor retarder, with maximum flame-spread and smoke-developed indices of 25 and 50, respectively; and of the following properties:
      a. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), thermal resistivity of not less than 4.34 deg F x h x sq. ft./Btu x in. at 75 deg F (30.1 K x m/W at 24 deg C).

D. Mineral-fiber blanket insulation consisting of fibers manufactured from glass, slag wool, or rock wool:

1. Faced Mineral-Fiber Blanket Insulation: ASTM C 665, Type III, Class A; Category 1, faced with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on one face.

## 2.2 VAPOR RETARDERS

A. Fire-Retardant, Reinforced-Polyethylene Vapor Retarders: 2 outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either a nonwoven grid of nylon cord or polyester scrim and weighing not less than 22 lb/1000 sq. ft. (10 kg/100 sq. m), with maximum permeance rating of 0.1317 perm (7.53 ng/Pa x s x sq. m), and flame-spread and smoke-developed indices of not more than 5 and 60, respectively.

B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

## 2.3 AUXILIARY INSULATING MATERIALS

A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. General: Install insulation to comply with insulation manufacturer's written instructions applicable to products and application indicated. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

B. Installation of General Building Insulation: Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

1. Seal joints between closed-cell (nonbreathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant.
2. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.

   a. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

3. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:

a. Use blanket widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
b. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

4. Retain insulation in place by metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width of
5. Stuff glass-fiber insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).

C. Installation of Vapor Retarders: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

1. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs. Fasten vapor retarders to framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches (406 mm) o.c.
2. Seal overlapping joints in vapor retarders with adhesives or vapor-retarder tape according to vapor-retarder manufacturer's instructions. Seal butt joints and fastener penetrations with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
3. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor-retarder manufacturer.
4. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.
5. Repair any tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

END OF SECTION 07210

# SECTION 07411 - METAL FASCIA PANELS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Factory-formed and field-assembled, metal facia panels.

### 1.2 PERFORMANCE REQUIREMENTS

A. Wind-Uplift Resistance: Comply with UL 580 for wind-uplift resistance class indicated.

B. Structural Performance: Capable of withstanding the effects of gravity loads and the following loads and stresses, based on testing according to ASTM E 330:

1. Wind Loads: Minimum design wind pressures of 44-lbf/sq. ft., acting inward or outward.
2. Deflection Limits: Vertical deflections no greater than 1/240 of the span.

### 1.3 SUBMITTALS

A. Product Data: For each type of metal panel and accessory indicated.

B. Shop Drawings: Show layouts of metal panels, including plans, elevations, sections, details, and attachments to other work.

1. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories.
2. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Coordination Drawings: Drawn to scale and coordinating metal fascia panel installation with penetrations and fascia-mounted items.

D. Samples: For each exposed finish.

E. Material certificates.

F. Field quality-control inspection reports.

G. Product test reports.

H. Maintenance data.

## 1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1. Installer's responsibilities include fabricating and installing metal fascia panel assemblies and providing professional engineering services needed to assume engineering responsibility.

## 1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal fascia panel assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including rupturing, cracking, or puncturing.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal fascia panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Applicator Warranty on Watertightness: Applicator shall furnish a written guarantee covering watertightness of the system.

1. Warranty Period: Two years from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

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

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2. Manufacturers:

a. Atas Metal Panels.
b. CENTRIA Architectural Systems.
c. Garland Co., Inc. (The).
d. Merchant & Evans, Inc.
e. Morin Corporation; a Metecno Group Company.

## 2.2 METAL FASCIA PANELS

A. Metal Fascia Panels: Factory-formed, designed to be field assembled by mechanically fastening metal touge and groove panels, interconnecting and lapping over concealed anchors. Include trims and accessories required for weather tight installation.

1. Manufacturers:

   a. Atas Metal Wall Panels, OPF060, with smooth flat finish (used as design standard). www.atas.com.

2. Type: Opaline, 6" mechanically fastened vertical tongue and groove.
3. Material: Factory painted steel sheet, 24 gauge thick.

   a. Panel Finish: Kynar 500, Patina Green (To Match Existing Panels).

4. Joint Type: As standard with manufacturer.
5. Panel Coverage: 6 inch on center.
6. Panel Height: 3/4 inch high.
7. Uplift Rating: UL 90.

B. Panel Sealants:

1. Sealant Tape: Pressure-sensitive, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
2. Joint Sealant: ASTM C 920; as recommended in writing by metal fascia panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

## 2.3 UNDERLAYMENT MATERIALS

A. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felts.

## 2.4 SUBSTRATE BOARDS

A. Substrate-Board: ¾" exterior grade plywood.

## 2.5 MISCELLANEOUS METAL FRAMING

A. Cold-Rolled Furring Channels: 0.0538-inch (1.37-mm) bare steel thickness, with minimum 1/2-inch- (13-mm-) wide flange.

1. Depth: As indicated.
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare steel thickness of 0.0312 inch (0.79 mm).
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- (1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.

## 2.6 MISCELLANEOUS MATERIALS

A. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal fascia panels by means of plastic caps or factory-applied coating.

1. Fasteners for Fascia Panels: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with a stainless-steel cap or zinc-aluminum-alloy head and EPDM or neoprene sealing washer.
2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
3. Blind Fasteners: High-strength stainless-steel rivets.

B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

## 2.7 ACCESSORIES

A. Fascia Panel Accessories: Provide components required for a complete metal fascia panel assembly including trim, copings, fascia, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal fascia panels, unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal fascia panels.
2. Clips: Minimum 0.0625-inch- (1.6-mm-) thick, stainless steel panel clips designed to withstand negative-load requirements.
3. Cleats: Mechanically seamed cleats formed from minimum 0.0250-inch- (0.64-mm-) thick, stainless steel or nylon-coated aluminum sheet.
4. Closure Strips: Closed-cell, expanded, cellular, rubber or cross linked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal fascia panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

B. Flashing and Trim: Formed from 0.0179-inch- (0.45-mm-) thick, metallic-coated steel sheet. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include corners, bases, framed openings and fillers. Finish flashing and trim with same finish system as adjacent metal fascia panels.

C. Vinyl Weather seal Insert: By Manufacturer.

## 2.8 FABRICATION

A. General: Fabricate and finish metal fascia panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile for full length of panel.

C. Where indicated, fabricate metal fascia panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will minimize noise from movements within panel assembly.

D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

E. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

## PART 3 - EXECUTION

### 3.1 PREPARATION

A. Substrate Board: Install ¾" plywood fascia sheathing onto lightweight framing to cover entire fascia surface area.

1. Install plywood sheathing with long joints in continuous straight lines, perpendicular to fascia surface with end joints staggered between rows. Tightly butt plywood sheathing boards together.
2. Comply with UL requirements for fire-rated construction.

B. Install flashings and other sheet metal to comply with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim."

### 3.2 UNDERLAYMENT INSTALLATION

A. Felt Underlayment: Install felt underlayment sheet on plywood sheathing under metal fascia panels. Use adhesive for temporary anchorage. Apply at locations indicated on Drawings, in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

### 3.3 METAL FACIA PANEL INSTALLATION, GENERAL

A. General: Provide metal fascia panels of full length from top to bottom, unless otherwise indicated or restricted by shipping limitations. Anchor metal fascia panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Field cutting of metal fascia panels by torch is not permitted.
2. Rigidly fasten metal facia panels and allow free movement due to thermal expansion and contraction. Predrill panels.
3. Provide metal closures at caps and edges.
4. Flash and seal metal fascia panels with weather closures as required. Fasten with self-tapping screws.

5. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
6. Lap metal flashing over metal fascia panels to allow moisture to run over and off the material.

B. Fasteners:

1. Steel Fascia Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal fascia panel manufacturer.

1. Coat back side of aluminum fascia panels with bituminous coating where fascia panels will contact wood, ferrous metal, or cementitious construction.

D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal fascia panel assemblies.

1. Seal metal fascia panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal fascia panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

## 3.4 FIELD-ASSEMBLED METAL FASCIA PANEL INSTALLATION

A. Metal Fascia Panels: Fasten metal fascia panels to substrate with concealed fasteners at each joint at location, spacing, and with fasteners recommended by manufacturer.

1. Panel Joint: Nest tongue and groove into place and fasten together by interlocking and completely engaging field-applied sealant.

## 3.5 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal fascia panel assembly including trim, copings, closures, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners as required, and set units true to line and level as indicated. Install work with joints, and seams that will be permanently watertight and weather resistant.

## 3.6 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal fascia panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal fascia panel installation, clean finished surfaces as recommended by metal fascia panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 07411

# SECTION 07531 – EPDM MEMBRANE ROOFING

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes adhered membrane roofing system.

### 1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.

C. Samples: For each product included in membrane roofing system.

D. Research/evaluation reports.

E. Maintenance data.

### 1.3 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.

B. Source Limitations: Obtain components for membrane roofing system from same manufacturer as roofing membrane.

C. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Exterior Fire-Test Exposure: Class C; ASTM E 108, for application and roof slopes indicated.

D. Preinstallation Conference: Conduct conference at Project site.

### 1.4 PROJECT CONDITIONS

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

## 1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.

1. Warranty Period: 15 years from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 EPDM ROOFING MEMBRANE

A. EPDM Roofing Membrane: ASTM D 4637, Type II, scrim or fabric internally reinforced uniform, flexible sheet made from EPDM, and as follows:

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

   a. Carlisle SynTec Incorporated.
   b. Celotex Corporation.
   c. ERSystems.
   d. Firestone Building Products Company.
   e. GenFlex Roofing Systems.
   f. International Diamond Systems.
   g. Johns Manville International, Inc.
   h. Mule-Hide Products Co., Inc.
   i. Protective Coatings, Inc.
   j. Roofing Products International, Inc.
   k. Stafast Roofing Products.
   l. Versico Inc.

3. Thickness: 60 mils (1.5 mm), nominal.
4. Exposed Face Color White-on-black.

## 2.2 AUXILIARY MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.

B. Sheet Flashing: 60-mil- (1.5-mm-) thick EPDM, partially cured or cured, according to application.

C. Bonding Adhesive: Manufacturer's standard bonding adhesive.

D. Seaming Material: Single-component butyl splicing adhesive and splice cleaner.

E. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.

F. Miscellaneous Accessories: Provide lap sealant, water cutoff mastic, metal termination bars, metal battens, pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

## 2.3 ROOF INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, 1.6-lb/cu. ft. (26-kg/cu. m) minimum density, square edged.

B. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48), unless otherwise indicated.

C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

## 2.4 INSULATION ACCESSORIES

A. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

B. Cold Fluid-Applied Adhesive: Manufacturer's standard cold fluid-applied adhesive formulated to adhere roof insulation to substrate.

C. Cover Board: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, 1/2 inch (13 mm) thick.

D. Cover Board: DOC PS 2, Exposure 1, oriented strand board, 7/16 inch (11 mm) thick.

E. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/4 inch (6 mm) thick.

## 2.5 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch (5 mm) thick, and acceptable to membrane roofing system manufacturer.

## PART 3 - EXECUTION

### 3.1 SUBSTRATE BOARD

A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.

1. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions.

### 3.2 INSULATION INSTALLATION

A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with membrane roofing system manufacturer's written instructions for installing roof insulation.

C. Install tapered insulation under area of roofing to conform to slopes indicated.

D. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 1 inch (25 mm) or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.

E. Loosely Laid Insulation: Loosely lay insulation units.

F. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:

1. Prime surface of concrete deck with asphalt primer at rate of 3/4 gal./100 sq. ft. (0.3 L/sq. m) and allow primer to dry.
2. Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F (14 deg C) of equiviscous temperature.
3. Set each layer of insulation in a cold fluid-applied adhesive.

G. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

H. Mechanically Fastened and Adhered Insulation: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.

2. Install subsequent layers of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F (14 deg C) of equiviscous temperature.
3. Install subsequent layers of insulation in a cold fluid-applied adhesive.

I. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Loosely butt cover boards together and fasten to roof deck.

1. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

## 3.3 ADHERED ROOFING MEMBRANE INSTALLATION

A. Install roofing membrane over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.

B. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

C. Bonding Adhesive: Apply bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry. Do not apply bonding adhesive to splice area of roofing membrane.

D. Mechanically or adhesively fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.

E. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.

F. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.

G. Repair tears, voids, and lapped seams in roofing that does not meet requirements.

## 3.4 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.

E. Terminate and seal top of sheet flashings.

## 3.5 WALKWAY INSTALLATION

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

B. Roof-Paver Walkways: Install walkway roof pavers according to manufacturer's written instructions in locations indicated, to form walkways. Leave 3 inches (75 mm) of space between adjacent roof pavers.

## 3.6 FIELD QUALITY CONTROL

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

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.

C. Repair or remove and replace components of membrane roofing system where test results or inspections indicate that they do not comply with specified requirements.

END OF SECTION 07531

# SECTION 07605 – FLASHING AND SHEET METAL, EXTRUDED METALS

## PART 1 - SUMMARY

### 1.1 SUMMARY

A. This Section includes flashing and sheet metal items, preformed or extruded metal items and elastomeric materials for wall and roof areas and specific items as follows:

a. Sheet Metal Items:
   1. Laminated through wall flashing.
   2. Counterflashings
   3. Scuppers
   4. Flashings through roofs

b. Elastomeric Materials and Products
   1. Sheet flashing

c. Miscellaneous materials
   1. Related work specified elsewhere
      a. Built-up roofing:

B. REFERENCES

1. Applicable Standards:

a. American Iron and Steel Institute (AISI).

b. American Society for Testing and Materials
   1. A167 – Stainless and Heat Resisting Chromium Nickel Steel Plate, Sheet, and Strip
   2. A446 – Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process, Structural (Physical) Quality
   3. A525 – Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process, General Requirements
   4. A526 – Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process, Commercial Quality
   5. B69 – Rolled Zinc
   6. B101 – Lead Coated Copper Sheet
   7. B209 – Aluminum and Aluminum Alloy Sheet and Plate
   8. B370 – Copper Sheet and Strip for Building Construction
   9. D41 – Asphalt Primer Used in Roofing and Waterproofing

c. Federal Specifications (FS):

1. QQ-L-201 – Lead Sheet
2. SS-C-153 – Cement, Bituminous, Plastic
3. TT-C-494 – Coating Compound, Bituminous, Solvent Type, Acid Resistant

d. National Roofing Contractors Association (NRCA).

e. Sheet Metal and air Conditioning Contractors' National Association (SMACNA)

C. SUBMITTALS

.1. Submit as specified in GENERAL CONDITIONS

2. Include, but not limited to, the following:

a. Product data and specifications of materials and installation

b. Catalog cuts

c. Shop drawings indicating thicknesses, dimensions, fastenings and anchoring methods, and expansion provisions where applicable.

D. DELIVERY, STORAGE AND HANDLING

1. Adequately package and protect materials during shipment and storage.

2. Store materials in dry, weathertight, ventilated areas and in accordance with manufacturers or fabricators instructions for each item.

3. Replace all damaged or permanently stained materials that cannot be restored to like-new condition.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

A. Zinc-Coated Steel Sheet:

a. Commercial quality carbon steel sheet with minimum of 0.20 percent copper content conforming to ASTM-A526; hot-dip-galvanized conforming to ASTM-A525, designation G90.

b. 26 gauge

c. Use for the following items:
   1. Sheet metal indicated
   2. Relief scuppers

B. Copper Sheet:

a. Cold-rolled copper sheet conforming to ASTM-B370, cold-rolled unless soft temper is required for forming.
b. 16 ounces per square foot
c. Use for the following items:
   1. Counterflashing

2.2 ELASTOMERIC MATERIALS

A. Sheet Flashing:

a. Flexible weather elements, self-extinguishing, -20 degree F brittleness temperature. 60-mil thickness minimum. Provide with applicable bonding adhesive.
b. Use for the following items:
   1. Vent stack flashing
   2. Perimeter-flashing where indicated
c. Manufacturers:
   1. B.F. Goodrich Company – B/W Flexible Flashing
   2. Perimeter flashing where indicated
   3. York Manufacturing, Inc. – Superflash Elastic Roof Flashing

B. Pipe and Conduit Penetrations Flashings:

a. Preformed EPDM and neoprene units with effective temperature range of 60 degrees F to +270 degrees F.
b. (Low-profile) (8-inch high) base
c. Provide with base and cap for proper opening size and number or openings required.
d. Provide with adhesive, adapters and clamp as required for complete and weathertight installation
e. Use for penetrations indicated
f. Manufacturer:
   1. York Manufacturing, Inc. – superflash Mult-Seal

## 2.3 MISCELLANEOUS MATERIALS

A. Solder and fasteners for metal work as recommended by sheet metal manufacturer and as required by installation.

B. Primers, adhesives, tapes and fasteners for nonmetallic work as recommended by flashing manufacturer and as required by installation.

C. Roofing cement to conform to FS-SS-C-153, (Type I – asphaltic) (Type II – coal tar)

D. Bituminous coating to conform to FS-TT-C-494, cold applied bituminous mastic, compounded for 15-mil dry film thickness.

# PART 3 - EXECUTION

## 3.1 GENERAL

A. Fabricate all metal work required by this section conforming to profiles and details indicated. Installation of items not shown in detail or not covered by specification shall meet standard industry practices as shown by SMACNA in the Architectural Sheet Metal Manual. (and NRCA in "Here's How to Make A Roof Drain.")

B. Coordinate the work with other work for the correct sequencing of items which make up the weatherproofing system.

C. Install sheet metal work with lines, arises and angles sharp and true. Exposed surfaces shall be free from visible wave, warp, buckle and tool marks.

D. Install all exterior flashing and sheet metal to make the work weathertight and with provisions for expansion and contraction.

## 3.2 PREPARATION

A. "Broom-clean" roof surfaces, nailers, blocking, tops of parapets and other areas receiving flashing or sheet metal work.

B. Tighten and realign loose wood nailers and blocking. Surfaces to receive sheet metal must be plumb and true, clean, smooth, dry and free from defects and projections which might affect the installation.

C. Clean reglets free of mortar, dirt, grease, and other foreign materials.

D. Straighten warped or bent metal sheets and preformed metal flashings.

3.3 FABRICATION AND INSTALLATION: Sheet metal and pre-painted fabricated metals products.

A. Through-Wall Scuppers and Overflow Scuppers in Masonry Walls:

a. Join liner to inside and outside flange, with flat-lock seams.

b. Extend flange 9-inches on top of roofing and r-inches in all other directions. Secure flange to nailer with nails spaced 6-inches oc.

c. Extend outside flange one-inch in all directions. Seal edges of flange with sealant placed between flange and wall face.

d. Counterflash top of inside flange.

B. Pipe Flashing through roof – 4-inches and Smaller:

a. Install at all locations where conduit, or small pipe projections penetrate the roof, except plumbing vents

b. Fabricate and in two pieces. Lap joints one=inch, fasten ad solders. Provide collar with flared top to fit projection, and a drawband. Install after base flashing is in place.

c. Seal around pipe collar with sealant.

C. Plumbing Vent Flashing through Roof: Install as indicated at locations where plumbing vents penetrate the roof.

3.4 INSTALLATION – ELASTOMERIC MATERIALS:

A. Sheet Flashing:

1. Install at all locations where small piping 2-inches in diameter or less and plumbing vents penetrate the roof.

2. Fabricate at least 14-inches larger than the outside diameter of pipe.

3. Cut a round hole in the center of flashing approximately ½ to 2/3 the outside diameter of the pipe.

4. Apply 1/8-inch layer of plastic flashing cement to built up roof and bottom 3-inches of pipe.

5. Install flashing over pipe and embed into flashing cement, ensuring adequate bond to roof and pipe.

6. Trowel-back over flashing edges and install a 4-inch wide strip of roofing felt centered over flashing edge. Cover felt strip with plastic cement.

B. Pipe and Conduit Penetrations:

1. Conform to manufacturer's installation instructions

2. Secure base flange to insulation in accordance with roof system specified.

3. Install cap, secure to base and to pipe or conduit with clamps to provide a weathertight installation.

3.5 REPAIRING AND CLEANING:

A. As work progresses, clean surfaces of all dirt, grease, oils, flux, excess adhesives, sealants, and foreign substances.

B. Leave work clean and free of stains, dents, waves, scratch marks and solder or weld marks.

C. Scratches, abrasions and minor surface defects of finish may be repaired in accordance with the manufacturer's instructions and as approved. Repaired surfaces shall be uniform and free from blemishes, and from variations of color and surface texture.

END OF SECTION 07605

# SECTION 07920 - JOINT SEALANTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes sealants for the following:

1. Exterior joints in vertical surfaces.
2. Exterior joints in horizontal traffic surfaces.
3. Interior joints in vertical surfaces and horizontal nontraffic surfaces.
4. Interior joints in horizontal traffic surfaces.

### 1.2 SUBMITTALS

A. Product Data: For each joint sealant product indicated.

B. Samples: For each joint sealant product indicated.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

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

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.

### 2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: As indicated or as selected by Architect from manufacturers full range for this characteristic.

### 2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants, General: ASTM C 920.

B. Low-Modulus Nonacid-Curing Silicone Sealant:

1. Available Products:

a. Dow Corning; 790.
b. GE Silicones; Silpruf, UltraPruf SCS2300.
c. NUCO Industries, Inc.; HiFlex 331, NuFlex 309.
d. Ohio Sealants, Inc.; VP 275.
e. Pecora Corporation; 864, 890.
f. Polymeric Systems, Inc.; PSI-641.
g. Sonneborn Building Products Div., ChemRex Inc.; Omniseal.
h. Tremco; Spectrem 1.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Exposure: Use NT (nontraffic).
5. Substrates: Uses M, G, A, and, as applicable to joint substrates indicated, O.

C. Medium-Modulus Neutral-Curing Silicone Sealant:

1. Available Products:

a. Dow Corning; 791, 795.
b. NUCO Industries, Inc.; HiFlex 393.
c. Polymeric Systems, Inc.; PSI-631.
d. Schnee-Morehead, Inc.; SM5731, SM5733 Poly-Glaze.
e. Tremco; Spectrem 2,Tremsil 600.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Exposure: Use NT (nontraffic).
5. Substrates: Uses M, G, A, and, as applicable to joint substrates indicated, O.

D. Multicomponent Nonsag Urethane Sealant:

1. For joints not subject to traffic and requiring additional movement capability, provide the following:

a. Available Products:

1) Mameco International; Vulkem 922.
2) Pecora Corporation; Dynatrol II.
3) Polymeric Systems, Inc.; Flexiprene 2000.
4) Sika Corporation; Sikaflex - 2c NS.
5) Tremco; DYmeric 511.

b. Type and Grade: M (multicomponent) and NS (nonsag).
c. Class: 25.
d. Additional Movement Capability: 50 percent movement in extension and 50 percent in compression when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719.
e. Exposure: Use NT (nontraffic).
f. Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

2. For joints subject to traffic and nontraffic joints, provide the following:

a. Available Products:

1) Bostik Inc.; Chem-Calk 2641.
2) Mameco International; Vulkem [227] [922].
3) Pacific Polymers, Inc.; Elasto-Thane 920 Gun Grade.
4) Pecora Corporation; Dynatred.
5) Polymeric Systems, Inc.; PSI-270.
6) Sonneborn Building Products Div., ChemRex Inc.; NP 2.

b. Type and Grade: M (multicomponent) and NS (nonsag).
c. Class: 25.
d. Exposure: Use T (traffic) and NT (nontraffic).
e. Substrates: Uses M, G, A, and, as applicable to joint substrates indicated, O.

## 2.4 SOLVENT-RELEASE JOINT SEALANTS

A. Butyl-Rubber-Based Solvent-Release Joint Sealant: ASTM C 1085.

1. Available Products:

a. Bostik Inc.; Bostik 300.
b. H.B. Fuller Company; PTI 707, 757.
c. NUCO Industries, Inc.; NuFlex 232.
d. Pecora Corporation; BC-158.
e. Polymeric Systems, Inc.; PSI-301.
f. Sonneborn Building Products Div., ChemRex, Inc.; Sonneborn Multi-Purpose Sealant.
g. Tremco; Tremco Butyl Sealant.

## 2.5 LATEX JOINT SEALANTS

A. Latex Sealant: ASTM C 834.

1. Available Products:

a. Bostik Inc.; Chem-Calk 600.
b. NUCO Industries, Inc.; NuFlex 330.
c. Ohio Sealants, Inc.; LC 160 All Purpose Acrylic Caulk.
d. Pecora Corporation; AC-20.
e. Polymeric Systems, Inc.; PSI-701.
f. Sonneborn Building Products Div., ChemRex, Inc.; Sonolac.
g. Tremco; Tremflex 834.

## 2.6 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

1. Type: C (closed-cell material with a surface skin), O (open-cell material), B, (bicellular material with a surface skin), C, O, or B.

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F (minus 32 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

## 2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.

1. Remove foreign material from joint substrates that could interfere with adhesion of joint sealant.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues could interfere with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

D. Sealant Installation: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

E. Install sealant backings to support sealants during application and at position required to produce optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

F. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.

G. Place sealants so they directly contact and fully wet joint substrates.

1. Completely fill recesses provided for each joint configuration.
2. Produce uniform, cross-sectional shapes and depths that allow optimum sealant movement capability.

H. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.
2. Use tooling agents that are approved by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Joint Configuration: Concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

I. Clean excess sealants or sealant smears adjacent to joints as installation progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

## 3.2 JOINT SEALANT SCHEDULE

A. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:

1. Control and Expansion Joints in Cast-in-Place Concrete: Single component neutral cure silicone sealant.

2. Joints between Metal Panels: Neutral cure silicone sealant.

3. Perimeter Joints between Materials Listed above and Frames of Doors and Windows: Single component neutral cure silicone sealant.

B. Exterior joints in the following horizontal traffic surfaces:

1. Control, Expansion, and Isolation Joints in Cast-in-Place Concrete Slabs: multi-component nonsag urethane sealant.

C. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:

1. Perimeter Joints between Interior Wall Surfaces and Frames of Interior Doors and Windows: Latex sealant.
2. Joints between Plumbing Fixtures and Adjoining Walls, Floors, and Counters: Butyl-rubber sealant.

D. Interior joints in the following horizontal traffic surfaces:

1. Control and Expansion Joints in Cast-in-Place Concrete Slabs: multi-component nonsag urethane sealant.

END OF SECTION 07920

# SECTION 08110 - STEEL DOORS AND FRAMES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Steel doors.
2. Steel door frames.
3. Fire-rated door and frame assemblies.

B. Related Sections include the following:

1. Division 4 Section "Unit Masonry" for installing anchors and grouting frames in masonry construction.
2. Division 8 Section "Door Hardware " for door hardware and weather stripping.
3. Division 9 Section "Painting" for field painting factory-primed doors and frames.

### 1.2 DEFINITIONS

A. Steel Sheet Thicknesses: Thickness dimensions, including those referenced in ANSI A250.8, are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic-coated steel sheets.

### 1.3 SUBMITTALS

A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.

B. Shop Drawings: Show the following:

1. Elevations of each door design.
2. Details of doors including vertical and horizontal edge details.
3. Frame details for each frame type including dimensioned profiles.
4. Details and locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, accessories, joints, and connections.

C. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.

### 1.4 QUALITY ASSURANCE

A. Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect. Remove and replace damaged items that cannot be repaired as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4-inch- (100-mm) high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch (6-mm) spaces between stacked doors to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Steel Doors and Frames:

a. Amweld Building Products, Inc.
b. Benchmark Commercial Doors; a division of General Products Co., Inc.
c. Ceco Door Products; a United Dominion Company.
d. Curries Company.
e. Deansteel Manufacturing, Inc.
f. Kewanee Corporation (The).
g. Mesker Door, Inc.
h. Pioneer Industries Inc.
i. Republic Builders Products.
j. Steelcraft; a division of Ingersoll-Rand.

2.2 MATERIALS

A. Metallic-Coated Steel Sheets: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with an A40 (ZF120) zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.

2.3 DOORS

A. General: Provide doors of sizes, thicknesses, and designs indicated.

B. Exterior and Interior Doors: Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:

1. Level 4 and Physical Performance Level A (Maximum Duty), Model 2 (Seamless).

## 2.4 FRAMES

A. General: Provide steel frames for doors that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.

B. Frames of 0.093-inch- (2.3-mm-) thick steel sheet for:

1. Level 4 steel doors.

C. Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.

D. Plaster Guards: Provide 0.016-inch- (0.4-mm-) thick, steel sheet plaster guards or mortar boxes to close off interior of openings; place at back of hardware cutouts where mortar or other materials might obstruct hardware operation.

E. Supports and Anchors: Fabricated from not less than 0.042-inch- (1.0-mm-) thick, electrolytic zinc-coated or metallic-coated steel sheet.

1. Wall Anchors in Masonry Construction: 0.177-inch- (4.5-mm-) diameter, steel wire complying with ASTM A 510 (ASTM A 510M) may be used in place of steel sheet.

F. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153/A 153M, Class C or D as applicable.

## 2.5 FABRICATION

A. General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.

B. Door Construction: For all exterior locations, fabricate doors, panels, and frames from galvannealed metallic-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053-inch- (1.3-mm-) thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.

C. Core Construction: One of the following manufacturer's standard core materials that produce a door complying with SDI standards:

1. Polyurethane.
2. Polystyrene.

D. Single-Acting, Door-Edge Profile: Square edge.

E. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

F. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.

G. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

H. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.

1. For concealed overhead door closers, provide space, cutouts, reinforcement, and provisions for fastening in top rail of doors or head of frames, as applicable.

I. Frame Construction: Fabricate frames to shape shown.

1. Fabricate frames with mitered or coped and continuously welded corners and seamless face joints.
2. Provide welded frames with temporary spreader bars.

J. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.

K. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

## 2.6 FINISHES

A. Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

B. Placing Frames: Comply with provisions in SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

1. Except for frames located in existing walls or partitions, place frames before construction of enclosing walls and ceilings.

2. In masonry construction, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.
3. Install fire-rated frames according to NFPA 80.

C. Door Installation: Comply with ANSI A250.8. Fit hollow-metal doors accurately in frames, within clearances specified in ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/DHI A115.1G.

3.2 ADJUSTING AND CLEANING

A. Prime-Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-drying primer.

B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION 08110

# SECTION 08210 - WOOD DOORS

## PART 1 - GENERAL

A. SUMMARY:
1. This Section includes wood doors and accessories.
2. Related Work Specified Elsewhere:
a. Finish Hardware: SECTION 08710.
b. Protective Coatings: SECTION 09900.

B. REFERENCES:
1. Applicable Standards:
a. Architectural Woodwork Institute (AWI):
(1) Architectural Woodwork Quality Standards, Guide Specifications and Quality Certification Program - Section 1300: Architectural Flush Doors.
b. Door and Hardware Institute (DHI):
(1) Abbreviations and Symbols.
(2) Recommended Procedure for Processing Hardware Schedules and Templates.
(3) Wood Door Standards Series W1/W5 and Series WDHS-1/WDHS-3.
c. National Woodwork Manufacturer's Association (NWMA):
(1) I.S.-1 - Wood Flush Doors.
d. National Fire Protection Association (NFPA):
(1) No. 80 - Standards for Fire Doors and Windows.
e. Underwriters' Laboratories (UL).
(1) Building Materials Directory.

C. SUBMITTALS:
1. Submit as specified in GENERAL CONDITIONS.
2. Includes, but not limited to, the following:
a. Product data and specifications.
b. Details, elevations.
c. Door schedule showing type, size, swing, undercut.
3. Certificates:
a. Include certifications as may be required to show compliance with specifications.

D. QUALITY ASSURANCE:
1. Acceptable products are those which comply with the acceptance criteria and recommended standards of the above References, and which satisfy the performance requirements specified in PART 2 - MATERIALS and as indicated.
2. All doors, regardless of core types specified, shall be products of a single manufacturer.

3. This is a performance specification. Manufacturers products expected to conform to work of this section are specified in PART - 2. Product to designations and descriptions of individual manufacturers are given for purposes of reference. Acceptability of products depends on conference with features, characteristics, and performance parameters specified herein as indicated.

E. GUARANTEES:

1. Submit 2 copies of written guarantee on door manufacturer's standard form signed by the manufacturer, installer and Contractor.
2. Length of guarantee shall be as follows:
   a. Solid-core exterior doors: Two years.

F. DELIVERY, STORAGE AND HANDLING:

1. Provide protective covering at the factory prior to shipping. Mark with identification required for proper installation.
2. Store flat on a level surface on a minimum of three sleepers raised above floor surface in a well ventilated building to prevent warping, soiling, damage and deterioration. Cover to keep clean, but allow air circulation.
3. Store in area where there will be no abnormal heart, extreme dryness, humid conditions or sudden changes therein. Condition to average prevailing relative humidity before hanging.

## PART 2 - PRODUCTS

A. GENERAL:

1. Door construction types are identified in accordance with criteria established in AWI Quality Standards, Guide Specifications and Quality Certification Program.
2. Specification particulars regarding types of materials, dimensions, tolerance, term definitions, and construction methods shall conform to NWMA Industry Standard - Wood Flush Doors, ANSI/NWMA I.S.-1.
3. Hardware preparations shall conform to Door and Hardware Institute (DHI) W1/W5 and WDHS-1/WDHS-5 Wood Door Hardware Standards. Mineral core wood fire doors are specified in Finish Hardware to receive half-surface hinges. In the event such doors are provided with the Cal-Wood SLM Edge System, so advise the builders hardware supplier for conversion to full-mortise hinges.

B. TYPES:

1. Exterior Type Solid Core:
   a. SLC, stiles edge-glued, rails edge-glued or tongue-in-groove, glued staved lumber core; 5-ply minimum construction. Glue Bond Type I, waterproof for face assembly.
   b. Provide flashing and/or chemical treatment as required to obtain the specified warranty of 2 years.

c. Manufacturers:
(1) Algoma: Grade SLC.
(2) Cal-Wood: ILC.
(3) Eggars: Master Flush - Stave.
(4) Graham: GSLC.
(5) Mohawk: Architectural Grade Bonded Stave.
(6) Oshkosh: Edge Glued SLC.
(7) Weyerhauser: DSC-1.

C. VENEERS: Exposed Surfaces of Stain Finish: NEMA good grade of oak species. Rotary sliced. Random match face veneer joints. (Sharp contrast note permitted at veneered joints.) Exposed edges of manufacturer's standard hardwood. Plain stiles or manufacturer's thicknesss stile edgebands of species affording color compatibility with face veneers.

D. VISION PANELS:
1. Flush moldings and glass stops of hardwood (same as face veneer where transparent finish specified).
2. Provide metal flashing and lipped moldings for exterior doors.

E. PREFITTING AND PREPARATION FOR HARDWARE:
1. The utility or structural strength of the door must not be impaired in the fitting of the door, application of hardware, or cutting the door for lights, louvers, panels or other special details.
2. Comply with the tolerance requirements of NWMA for prefitting. Machine doors for hardware requiring cutting of doors. Comply with final hardware schedules and door frame shop drawings, and with final hardware templates and other essential information required to ensure proper fit of doors and hardware.
3. (Fire-rated doors and plastic laminated doors shall be factory prefit and premachined). (All doors shall be prefit and premachined).
4. Check hardware layout templates and take accurate field measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with any field preparations.

F. SHOP TRANSPARENT FINISH:
1. Where transparent finish is specified, prefinish all doors at the factory.
2. Comply with recommendations of AWI factory finishing of doors.
3. Provide finish of varnish type, clear, and standard of the manufacturer.

G. SHOP AND FIELD STAIN FINISH: Apply all finish coats as specified in SECTION 09901 before installing door.

PART 3 - EXECUTION

A. PREPARATION:

1. Condition doors to average prevailing relative humidity prior to hanging.

B. INSTALLATION:

1. Conform to manufacturer's printed instructions and as indicated.
2. Fit doors to frame and machine for hardware as required for proper fit and uniform clearance at each edge. Seal cut surfaces after fitting and machining.
3. Provided clearances of:
   a. 1/8-inch at jambs and heads.
   b. 1/8-inch at meeting stiles for pairs of doors.
   c. 1/2-inch from bottom of door to top of floor covering, except1/8-inch from bottom of door to top of threshold.
4. Restore finish on edges of shop-finished doors before installation, if fitting and machining is required at the jobsite.

C. ADJUSTMENT AND CLEANING:

1. Adjust doors for proper operation and fit.
2. Rehang or replace doors which do not swing or operate freely.
3. Restore finish or replace doors damaged during or after installation, as required by County.
4. Protect doors from damage or deterioration after installation until acceptance of the Work.

END OF SECTION 08210

# SECTION 08311 - ACCESS DOORS AND FRAMES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Wall access doors and frames.
2. Ceiling access doors and frames.

### 1.2 SUBMITTALS

A. Product Data: For each type of door and frame indicated. Include construction details relative to materials, individual components and profiles, finishes, and fire ratings (if required) for access doors and frames.

B. Schedule: Provide complete door and frame schedule, including types, general locations, sizes, construction details, latching or locking provisions, and other data pertinent to installation.

### 1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain doors and frames through one source from a single manufacturer.

B. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are labeled and listed by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction:

C. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

### 1.4 COORDINATION

A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed equipment, and indicate on schedule specified in "Submittals" Article.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Access Doors:
   a. Jensen Industries.
   b. J. L. Industries, Inc.
   c. Karp Associates, Inc.
   d. Milcor Limited Partnership.
   e. Nystrom Building Products Co.
   f. Williams Bros. Corporation of America (The).

## 2.2 MATERIALS

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

B. Hot-Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B; free of scale, pitting, and surface defects; pickled and oiled; with minimum thickness indicated representing specified nominal thickness according to ASTM A 568/A 568M.

C. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified nominal thickness according to ASTM A 568/A 568M. Electrolytic zinc-coated steel sheet, complying with ASTM A 591/A 591M, Class C coating, may be substituted at fabricator's option.

D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), with Class C coating and phosphate treatment to prepare surface for painting; with minimum thickness indicated representing specified nominal thickness according to ASTM A 568/A 568M for uncoated base metal.

E. Drywall Beads: Edge trim formed from 0.0299-inch (0.76-mm) zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of .

## 2.3 PAINT

A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in 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.

## 2.4 ACCESS DOORS AND FRAMES

A. Flush Access Doors and Frames with Exposed Trim: Fabricated from steel sheet.

1. Locations: Concrete masonry wall and metal or plaster ceiling surfaces.
2. Door: Minimum 0.060-inch- (1.5-mm-) thick sheet metal, set flush with exposed face flange of frame.
3. Frame: Minimum 0.060-inch- (1.5-mm-) thick sheet metal with 1-inch- (25-mm-) wide, surface-mounted trim.
4. Hinges: Continuous piano hinge.
5. Latch: Screwdriver-operated cam latch.

## 2.5 FABRICATION

A. General: Provide access door assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Steel Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.

1. Exposed Flanges: Nominal 1 inch (25 mm) wide around perimeter of frame.
2. For trimless frames with drywall bead for installation in gypsum board assembly, provide edge trim for gypsum board securely attached to perimeter of frames.
3. Provide mounting holes in frames to attach frames to metal or wood framing in drywall construction.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

## 2.6 FINISHES, GENERAL

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

B. Finish metal fabrications after assembly.

## 2.7 STEEL FINISHES

A. Surface Preparation: 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. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

B. Apply shop primer to uncoated surfaces of metal fabrications. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

# PART 3 - EXECUTION

## 3.1 PREPARATION

A. Advise installers of other work about specific requirements relating to access door and floor door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices.

## 3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Install access doors with trimless frames flush with adjacent finish surfaces or recessed to receive finish material.

## 3.3 ADJUSTING AND CLEANING

A. Adjust doors and hardware after installation for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08311

# SECTION 08334 - OVERHEAD COILING GRILLES

## PART 1 - SUMMARY

### 1.1 GENERAL

A. Performance Requirements: Design overhead coiling grille components and operator to operate for not less than 10,000 cycles. One complete cycle of a grille begins with the grille in the closed position. The grille is then moved to the open position and back to the closed position.

B. Submittals: Submit manufacturer's product data, rough-in diagrams, templates, and installation instructions for each type of product specified, include operating instructions and maintenance data.

C. Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled as defined in NFPA 70, Article 100.

D. Furnish each overhead coiling grille as a complete unit produced by one manufacturer, including hardware, accessories, mounting, and installation components.

E. Related Sections include the following:

1. Division 8 Section "Door Hardware" for lock cylinders and keying.

2. Division 16 Sections for electrical service and connections for powered operators and accessories.

## PART 2 PRODUCTS

### 2.1 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alpine Overhead Doors, Inc.
2. Atlas Door Corp.; Div. of Clopay Building Products Co.
3. The Cookson Company.
4. McKeon Rolling Steel Door Company, Inc.
5. Overhead Door Corporation.

B. Grille Curtain: Consisting of a network of 5/16-inch- (8-mm-) minimum diameter horizontal rods, or rods covered with tube spacers, spaced as indicated. Interconnect rods by vertical links approximately 5/8 inch (16 mm) wide, spaced as indicated and rotating on rods.
1. Space rods at approximately 2 inches (51 mm) o.c.
2. Space links in line at approximately 6 inches (152 mm).
3. Stainless-Steel Grilles: ASTM A 666, Type 300 series.

a. Endlocks: Continuous end links, chains, or other devices at ends of rods, locking and retaining grille curtain in guides against excessive pressures, maintaining curtain alignment, and preventing lateral movement.

b. Bottom Bar: Consisting of extruded shape or 2 angles, not less than 1/8 inch (3 mm) thick, metal to match slats.

   i. Astragal: Provide a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene at underside of bar.
   ii Provide motor-operated grilles with combination bottom astragal and sensor edge.

c. Curtain Jamb Guides: Manufacturer's standard extruded-aluminum shape, with continuous integral wear strips and removable stops on guides.

d. Hood: Metal to match slats. Manufacturer's standard metal thickness and hood shape. Provide closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sag. Furnish removable metal soffit when hood is mounted above ceiling of same material and finish as slats.

   i. Lock cylinder is specified in another Division 8 Section.

e. All grille units are power operated, provide safety interlock switch to disengage power supply when grille is locked.

f. Counterbalance: Adjustable, oil-tempered, heat-treated steel helical torsion springs mounted around structural carbon-steel pipe, and contained in barrel of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. (2.5 mm/m) of span under full load. With grease-sealed bearings or self-lubricating graphite bearings.

g. Brackets: Manufacturer's standard design, either cast-iron or cold-rolled steel plate.

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

i. Stainless-Steel Finish: No. 4.

j. Electric Grille Operator: Type, size, and capacity recommended and provided by grille manufacturer for grille and operational life specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking grille, disconnect device, emergency auxiliary operator, and accessories required for proper operation. Comply

with NFPA 70. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.

i. Electric Motors: Provide polyphase, medium-induction type with high-starting torque, reversible, continuous-duty, Class A insulated, electric motors, complying with NEMA MG 1, with overload protection, sized to start, accelerate, and operate grille in either direction, from any position, at not less than 2/3 fps (0.2 m/s) or more than 1 fps (0.3 m/s), without exceeding nameplate ratings or considering service factor. Coordinate wiring requirements and electric characteristics of motors with building electrical system.

   1. Provide totally enclosed, nonventilated or fan-cooled motors, fitted with plugged drain, and controller with NEMA ICS 6, Type 4 enclosure where indicated.

ii. Remote-Control Station: Provide key-operated momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."

   1. Provide interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
   2. Control Equipment must interface with building Access Control System, requiring card reader approval before system will open grille.

iii. Obstruction Detection Device: Provide each motorized grille with self-monitoring, 4-wire-configured-type, electrically actuated, external automatic safety sensor able to protect full width of grille opening. Activation of sensor immediately stops and reverses downward grille travel.

iv. Adjustable Limit Switches: Interlocked with motor controls and set to automatically stop grille at fully opened and fully closed positions.

k. Provide electric operators with ADA-compliant audible alarm and visual indicator lights.

l. Emergency Egress Release: Provide grille with flush, wall-mounted handle mechanism, for ADA-compliant egress feature, not dependant on electric power, that allows grill to open to permit passage and automatically resets motor drive, without affecting limit switches, with return of handle to original position.

PART 3 EXECUTION

## 3.1 EXECUTION

A. Installation: Install grille and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified.

B. Lubricate bearings and sliding parts; adjust grilles to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

END OF SECTION 08334

# SECTION 08411 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Exterior aluminum-framed storefronts.

   a. Glazing is retained mechanically with gaskets on four sides.

2. Exterior manual-swing aluminum doors.

B. Related Sections include the following:

1. Division 7 Section "Joint Sealants" for installation of joint sealants installed with aluminum-framed systems and for sealants to the extent not specified in this Section.
2. Division 8 Section "Door Hardware" for hardware to the extent not specified in this Section.
3. Division 8 Section "Glazing" for glazing requirements to the extent not specified in this Section.

### 1.2 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:

1. Structural loads.
2. Thermal movements.
3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
4. Dimensional tolerances of building frame and other adjacent construction.
5. Failure includes the following:

   a. Deflection exceeding specified limits.
   b. Thermal stresses transferred to building structure.
   c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
   d. Glazing-to-glazing contact.
   e. Noise or vibration created by wind and thermal and structural movements.
   f. Loosening or weakening of fasteners, attachments, and other components.
   g. Sealant failure.
   h. Failure of operating units to function properly.

B. Structural Loads:

1. Wind Loads: 30 psf/90 mph whichever is greater applied in accordance with IBC 2003.

2. Seismic Loads: Per Chapter 16, IBC 2003.

C. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches (4.1 m) and to 1/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 13 feet 6 inches (4.1 m) or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.

D. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

E. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. (0.03 L/s per sq. m) of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft. (75 Pa).

F. Water Penetration Under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).

G. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 53 when tested according to AAMA 1503.

## 1.3 SUBMITTALS

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

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.

1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. Include details of provisions for system expansion and contraction and for draining moisture occurring within the system to the exterior.
3. For entrances, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

C. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

D. Warranties: Special warranties specified in this Section.

## 1.4 QUALITY ASSURANCE

A. Installer Qualifications: Capable of assuming engineering responsibility and performing work of this Section and who is acceptable to manufacturer.

1. Engineering Responsibility: Preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer's standard assemblies.

## 1.5 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating aluminum-framed systems without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

## 1.6 WARRANTY

A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Structural failures including, but not limited to, excessive deflection.
   b. Noise or vibration caused by thermal movements.
   c. Deterioration of metals and other materials beyond normal weathering.
   d. Water leakage through fixed glazing and framing areas.
   e. Failure of operating components to function properly.

2. Warranty Period: One year from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Arch Aluminum & Glass Co., Inc.
2. CMI Architectural Products, Inc.
3. Kawneer.
4. United States Aluminum.

5. Vistawall Architectural Products.
6. YKK AP America Inc.

## 2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209 (ASTM B 209M).
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.

B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

## 2.3 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Framing members are composite assemblies of two separate extruded-aluminum components permanently bonded by an elastomeric material of low thermal conductance.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.

E. Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to

match framing and of sufficient thickness to maintain a flat appearance without visible deflection.

F. Framing System Gaskets and Sealants: Manufacturer's standard recommended by manufacturer for joint type.

## 2.4 GLAZING SYSTEMS

A. Glazing: As specified in Division 8 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types, replaceable, molded or extruded, that maintain uniform pressure and watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric types.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

## 2.5 DOORS

A. Doors: Manufacturer's standard glazed doors, for manual swing operation.

1. Door Construction: 2-inch (50.8-mm) overall thickness, with minimum 0.188-inch- (4.8-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie rods.

2. Door Design: Medium stile; 3-1/2-inch (88.9-mm) nominal width.

   a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches (255 mm) above floor or ground plane.

3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.

   a. Provide nonremovable glazing stops on outside of door.

## 2.6 DOOR HARDWARE

A. General: Provide heavy-duty units in sizes and types recommended by entrance system and hardware manufacturers for entrances and uses indicated.

1. Opening-Force Requirements:

   a. Egress Doors: Not more than 30 lbf (133 N) required to set door in motion and not more than 15 lbf (67 N) required to open door to minimum required width.
   b. Accessible Interior Doors: Not more than 5 lbf (22.2 N).

B. Scheduled Door Hardware: Provide door hardware according to the Door Hardware Schedule below.

1. References to BHMA Standards: Provide products complying with standards referenced in this Article and with requirements for description, quality, type, and function listed in the Door Hardware Schedule.

2. Hardware set for exterior doors to include 11/2 pair ball bearing butts, tubular push / pulls, hookbolt lock device with interior thumbturn and cylinder per section 08710, strike box, surface mounted overhead closer, weather stripping, weather sweep, and threshold.

C. Ball-Bearing Butts:

1. Standard: BHMA A156.1, Grade 1, radius corner.
2. Provide nonremovable pins at hinges exposed to outside of door.
3. Provide nonferrous hinges where hinges are exposed to weather.
4. Quantities:

a. For doors with heights up to 87-inches 2210 mm, provide 3 hinges per leaf.

D. Locking Devices, General: Do not require use of key, tool, or special knowledge for operation.

1. Opening-Force Requirements:

a. Latches and Exit Devices: Not more than 15 lbf (67 N) required to release latch.

2. Locking device to be Adams-Rite MS 1853A-50 hookbolt, standard backset.

E. Cylinders: As specified in Division 8 Section "Door Hardware."

F. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

G. Closers: With accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use, and adjustable to meet field conditions and requirements for opening force.

1. Standard: BHMA A156.4, Grade 1.

H. Weather Stripping: Manufacturer's standard replaceable components.

1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
2. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

I. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

J. Thresholds: Raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch (13 mm).

1. Standard: BHMA A156.21.

K. Push / Pulls: C style pulls of 1" diameter extruded aluminum, 90 degree offset, 9" on center mounting (concealed), projection 2 ¾ " from door face, US32D stainless finish. Bar style horizontal push of 1" diameter extruded aluminum, bent at each end, concealed mounting, projection 2 ¾" from door face, US32D stainless finish.

## 2.7 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 7 Section "Joint Sealants."

B. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

## 2.8 FABRICATION

A. Form aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from interior.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing (without projecting stops).

E. Door Frames: Reinforce as required to support loads imposed by door operation and for installing hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.
2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

F. Doors: Reinforce doors as required for installing hardware.

1. At exterior doors, provide weather sweeps applied to door bottoms.

G. Hardware Installation: Factory install hardware to the greatest extent possible. Cut, drill, and tap for factory-installed hardware before applying finishes.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.9 ALUMINUM FINISHES

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. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

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

## 3.2 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight, unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, without warp or rack.

F. Install glazing as specified in Division 8 Section "Glazing."

G. Entrances: Install to produce smooth operation and tight fit at contact points.

1. Exterior Entrances: Install to produce tight fit at weather stripping and weathertight closure.
2. Field-Installed Hardware: Install surface-mounted hardware according to hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install perimeter joint sealants as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.

I. Erection Tolerances: Install aluminum-framed systems to comply with the following maximum tolerances:

1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.
2. Alignment:

   a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm).
   b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).

3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).

## 3.3 ADJUSTING

A. Entrances: Adjust operating hardware for smooth operation according to hardware manufacturers' written instructions.

1. For doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches (75 mm) from the latch measured to the leading door edge.

END OF SECTION 08411

# SECTION 08461 - SLIDING AUTOMATIC ENTRANCE DOORS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes automatic entrance door systems with bi-parting sliding operation.

B. See Division 8 Section "Aluminum Entrances and Storefront" for adjacent related work.

C. See Division 8 Section "Door Hardware" for lock cylinders.

D. See Division 8 Section "Glazing" for glazing requirements for automatic entrance doors.

### 1.2 PERFORMANCE REQUIREMENTS

A. General: Provide automatic entrance door systems that have the following capabilities based on testing manufacturer's standard units in assemblies similar to those indicated for this Project:

1. Operating Temperature Range: Door operators capable of operating between minus 10 deg F and plus 120 deg F (minus 23 deg C and plus 49 deg C).
2. Maximum Opening Force:

   a. Exterior Doors: 15 lbf (67 N).
   b. Interior Doors: 5 lbf (22.2 N).

### 1.3 SUBMITTALS

A. Product Data: For each type of sliding automatic entrance door indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, wiring diagrams, and attachments to other Work.

C. Hardware Schedule: Organize schedule into sets based on hardware specified. Include name of item and manufacturer, and complete designation of every item required for each automatic entrance door.

D. Samples: For each exposed finish and for each color and texture required.

E. Product Certificates: Certifying that products furnished comply with emergency exit door requirements.

F. Maintenance data.

### 1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer, approved by manufacturer to install and maintain manufacturer's products.

B. Manufacturer's Certificate: Issued by the American Association of Automatic Door Manufacturers.

C. Welding Standards: Comply with AWS D1.2, "Structural Welding Code--Aluminum."

D. ANSI/BHMA Standard: ANSI/BHMA A156.10, "Power Operated Pedestrian Doors."

E. UL Standard: Provide power door operators that comply with UL 325.

F. Emergency Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrance doors serving as a required means of egress.

## 1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturers agrees to repair or replace components of automatic entrance door system that fail in materials or workmanship, excessive air leakage, faulty operation of operators and hardware, or deterioration of metals, metal finishes, and other materials beyond normal weathering within three years from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Besam Inc.
2. Horton Automatics; Div. of Overhead Door Corporation.
3. KM Systems, Inc.

## 2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Extruded: ASTM B 221 (ASTM B 221M).
2. Sheet and Plate: ASTM B 209 (ASTM B 209M).
3. Welding Rods and Bare Electrodes: AWS A5.10.

B. Glazing: As specified in Division 8 Section "Glazing."

C. Sealants and Joint Fillers: Refer to Division 7 Section "Joint Sealants" for joints at perimeter of entrance system.

D. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, premixed, nonmetallic, noncorrosive, nonstaining grout; of consistency suitable for application.

E. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30-mil (0.76-mm) thickness per coat.

## 2.3 AUTOMATIC ENTRANCE DOOR SYSTEM

A. General: Manufacturer's standard automatic entrance door system, complete with doors, sidelite and transom framing, operators, controls, activation devices, safety devices, and accessories as indicated.

1. Configuration: Bi-parting sliding doors, with sidelite on each side of door.

   a. Traffic Pattern: Two-way.
   b. Emergency Breakaway Capability
   c. Mounting: Between jambs.

B. Activation Devices:

1. Infrared-scanner presence detector.

C. Operator Safety Devices:

1. Photoelectric beams.

## 2.4 COMPONENTS

A. Doors: Manufacturer's standard 1-3/4-inch- (44.5-mm-) thick glazed doors with minimum 0.125-inch- (3.2-mm-) thick, extruded tubular stile and rail members. Fabricate corners with mechanically fastened reinforcing brackets or by welding. Incorporate concealed tie-rods that span full length of top and bottom rails.

1. Glazing Stops and Gaskets: Manufacturer's standard snap-on, extruded-aluminum, bevel glazing stops and preformed resilient glazing gaskets.
2. Stile Design: Medium stile.
3. Rail Design: 6-1/2-inch (165-mm) nominal height, 10 inch minimum at sill member.
4. Muntin Bars: Horizontal tubular rail member for each door; match stiles and rails.

B. Framing Members: Fabricate from extruded aluminum or formed-aluminum sheet or plate.

1. Main Extrusions: Minimum wall thickness of 0.125 inch (3.2 mm).
2. Extruded Glazing Stops and Applied Trim: Minimum wall thickness of 0.062 inch (1.6 mm).
3. Muntin Bars: Horizontal tubular rail members for sidelites; match stiles and rails.

C. Headers: Fabricated from minimum 0.125-inch- (3.2-mm-) thick, extruded aluminum or formed-aluminum sheet or plate. Conceal operator and roller track in header, providing access by means of hinged or removable access panel to permit service and adjustment. Secure panel to prevent unauthorized access.

1. Header Type: Concealed, fabricated to match depth of framing and to extend full width of door opening.

D. Carrier Assembly and Overhead Roller Track: Manufacturer's standard carrier assembly that allows vertical adjustment; consisting of nylon- or delrin-covered ball-bearing-center steel wheels operating on a continuous roller track, or ball-bearing-center steel wheels operating on a nylon- or delrin-covered continuous roller track. Support doors from carrier assembly by cantilever and pivot assembly.

1. Rollers: Minimum two ball-bearing roller wheels and two antirise rollers for each active leaf.

E. Sills: Manufacturer's standard sill members and bottom guide system, with stainless-steel ball-bearing-center roller wheels, and threshold and configuration indicated below:

1. Configuration: Saddle type threshold across door opening and pin-guide track system at sidelites.

F. Brackets and Reinforcements: Manufacturer's standard; compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.

G. Fasteners and Accessories: Manufacturer's standard corrosion resistant, nonstaining, nonbleeding; compatible with adjacent materials.

1. Reinforcement: Reinforce members as required to retain fastener threads.
2. Exposed Fasteners: Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.

H. Signage: Comply with ANSI/BHMA A156.10.

## 2.5 DOOR OPERATORS

A. General: Of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.

1. Type: Power operated, complying with ANSI/BHMA A156.10.
2. Connections: For power and control wiring.
3. Adjustment Features: Fully adjustable without removing entrance doors, including adjustable speed, adjustable time delay for length of time door remains open, automatic door re-open if stopped while closing.
4. On/Off Feature: On/off/hold-open switch controls electric power to operator.

B. Electromechanical Operators: Self-contained overhead units, with power opening and closing mechanism, with checking in both opening and closing cycles, with safety-release clutch for obstructed closing, and that slides manually when power is off.

1. Closing Mechanism: Spring or Power operated.
2. Mounting: Concealed.

## 2.6 ACTIVATION AND SAFETY DEVICES

A. Infrared-Scanner Presence Detector: Self-contained, infrared-scanner presence-sensing device that activates door operator; that is adjustable to provide detection patterns and sensitivity equivalent to those required for control mats; and with metal or plastic housing in black finish.

## 2.7 HARDWARE

A. General: Refer to Division 8 Section "Door Hardware" for requirements for hardware items other than those indicated to be provided by automatic entrance door manufacturer.

B. Heavy-Duty Hardware: Provide units as indicated in size, number, and type recommended by manufacturer for entrances required. Finish exposed parts to match door finish, unless otherwise indicated.

C. Emergency Breakaway Hardware: Provide release hardware that allows panel to swing out in the direction of egress to a full 90 degrees from any position in the sliding mode with maximum force required to open panel of 50 lbf (222 N) according to ANSI/BHMA A156.10. Interrupt operation of breakaway panel operator while in breakaway mode.

D. Deadlocks: Manufacturer's standard mortise hook bolt with 5-ply laminated steel, hook-shaped throw bolt, complying with ANSI/BHMA A156.5, Grade 1 requirements.

1. Cylinders: On door exterior, as specified in Division 8 Section "Door Hardware."
2. Two-Point Locking: Provide bottom bolt and mechanism that automatically throws active-leaf bottom bolt into threshold when deadlock engages inactive leaf and that provides one-stage unlocking.

E. Push Bars: As selected from manufacturer's full range.

F. Compression Weather Stripping: Manufacturer's standard replaceable, compressible gaskets of molded neoprene or molded PVC. Include bumper-type gaskets at door stops and laps.

G. Sliding Weather Stripping: Manufacturer's standard replaceable weather stripping of wool, polypropylene, or nylon woven pile, with nylon-fabric or aluminum-strip backing, complying with AAMA 701.

## 2.8 FABRICATION

A. Prefabrication: Complete automatic door fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.

1. Perform fabrication operations, including cutting, fitting, forming, drilling, and grinding of metalwork in manner that prevents damage to exposed finish surfaces. For hardware, perform these operations before applying finishes.
2. Prepare components to receive concealed fasteners and anchor and connection devices.

B. Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to GANA's "Glazing Manual."

D. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

E. Hardware: Install hardware, except surface-mounted hardware, at fabrication plant. Remove only as required for final finishing operation and for delivery to and installation at Project site.

F. Doors: Fabricate doors in profiles indicated. Reinforce as required to support imposed loads and for installing hardware. Factory assemble door and frame units.

1. Exterior Doors: Provide compression weather stripping at fixed stops. At locations without fixed stops, provide sliding weather stripping retained in adjustable strip mortised into door edge.

G. Framing: Fabricate tubular and channel frame assemblies in configuration indicated, with welded or mechanical joints according to manufacturer's standards. Provide subframes and reinforcement of types indicated or, if not indicated, as needed for a complete system to support required loads.

1. Exterior Framing: Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior. Provide anchorage and alignment brackets for concealed support of assembly from the building structure. Allow for thermal expansion of exterior units.

## 2.9 FINISHES

A. Aluminum High-Performance Organic Finish: Three-coat, thermocured system with fluoropolymer coats containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 605.2.

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

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. Templates and Diagrams: Furnish templates, diagrams, and other data to fabricators and installers of related work, as necessary for coordinating automatic entrance door installation.

B. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.

C. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

D. Entrances: Install entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place. Lubricate operating hardware and other moving parts.

1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
2. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

E. Door Operators: Install door operator system, including control wiring. Refer to Division 16 Sections for connection to electrical power distribution system.

F. Activation and Safety Devices: Install control devices and wiring, including connections to door operators, as follows:

1. Infrared-Scanner Presence Detectors: Install scanners on both interior and exterior sides of each sliding automatic entrance door as indicated.

G. Glazing: Comply with installation requirements in Division 8 Section "Glazing."

H. Sealants: Comply with requirements in Division 7 Section "Joint Sealants" for installing sealants, fillers, and gaskets.

1. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction.
2. Seal frame perimeter with sealant to provide weathertight construction.

I. Adjusting: Adjust door operators, controls, and hardware for smooth and safe operation and for weathertight closure.

## 3.2 DEMONSTRATION

A. Engage manufacturer's certified inspector to train Owner's maintenance personnel to adjust, operate, and maintain automatic entrance doors and operators.

END OF SECTION 08461

# SECTION 08521 - ALUMINUM PROJECTED WINDOWS

## PART 1 - GENERAL

A. WORK INCLUDED:

1. Provide all materials, labors, equipment and services necessary to furnish, deliver and install all work of this section as shown on the drawings, as specified and as required by job conditions including, but not limited to, the following:
   a. Extruded aluminum windows, complete with glass and glazing.
   b. Sealants for windows.

B. RELATED WORK:

2. Section 08411: Aluminum Storefront.
3. Section 08800: Glass and Glazing.
4. Section 07920: Joint Sealant.

C. REFERENCE STANDARDS:

1. ANSI/AAMA 302.9 Voluntary Specifications for Aluminum Prime Windows.

D. SHOP DRAWINGS AND PRODUCT DATA:

1. Submit shop drawings and product data in accordance with Section 01300.
2. Indicate pertinent dimensioning, general construction, component connections and locations, anchorage methods and locations, hardware locations, installation details.

E. DELIVERY OF MATEIRALS:

1. Delivery windows in manufacturer's packaging complete with installation instructions.

F. SAMPLES:

1. Submit, in accordance with Section 01300, 6 inch square sample of window, corner construction, indicating finish, profile, size and jointing method. Also submit sample of each type of operable hardware, indicated style and finish.

G. GARANTEE/WARRANTY:

1. Provide written guarantee in accordance with General Conditions.
2. Guarantee: Provide for replacing, at no cost to Owner, new hermetically sealed glass units for all units which exhibit interpane dusting or misting within minimum period of ten (10) years from date of substantial completion date.

## PART 2 - PRODUCTS

A. ACCEPTABLE MANUFACTURERS:
1. Manufacturer and Type: #8225T Projected (Terminal) type manufactured by Kawneer Window Co.
2. Substitutions: Items of same function and performance are acceptable inconformance with Section 01300.

B. WINDOWS:
1. Type: Extruded aluminum; ASTM B221 - GS 10A-T5 alloy, with fixed lights and projecting bottom such as indicated on drawing, complete with operable hardware, weatherstripping and insect screens.
2. Finish: Factory apply to exposed surfaces a clear anodized finish conforming to AA-M12 C22 A31.

C. GLASS AND GLAZING:
1. In accordance with Section 08800 - Glass and Glazing.

D. COMPONENTS:
1. Glazing Materials: Manufacturer's standard type, to suit location and applications.
2. Insect Screens: Aluminum mesh, FS RR-W-365 readily removable.
3. Weatherstripping: Manufacturer's standard type, water repellent, rot proof, resilient.
4. Operable Sash Hardware: Manufacturer's standard type to suit sash operation; corrosion resistant.
5. Bituminous Paint: Acid alkali resistant type, black color.

E. FABRICATION:
1. Fabricate window units in conformance with ANSI/AAMA 302.9 for window type P-A3.
2. Fabricate aluminum windows to allow for adequate clearances and shim spacing around perimeter of assemblies to enable proper installation. Allow for thermal movement within window construction.
3. Provide sufficient corrosion resistant anchorage devices to securely and ridigly fit windows in place.
4. Accurately and rigidly fit together joints and corners. match components carefully ensuring continuity of line and design. Ensure joints and connections are flush, hair line and weatherproof.
5. Provide internal reinforcing where required to maintain rigidity.
6. Provide for moisture entering joints, and condensation occuring within frame construction to drain exterior.

7. Apply coat of bituminous paint on concealed aluminum surfaces in contact with cementitious or dissimilar materials.

PART 3 - EXECUTION

A. INSTALLATION:

1. Install aluminum windows in accordance with manufacturer's recommendations, to achieve weathertight installation. Ensure assemblies are plumb, level and free of wrap or twist. Maintain dimensional tolerances and alignment wit adjacent work.
2. Install sufficient corrosion resistant anchorage devices to securely and rigidly fasten windows to building, without causing detrimental effects to shape or performance.
3. Set Window sills level and uniform. Accurately and rigidly fit joints. Ensure joints are flush, hair line and weatherproof.
4. Place batt insulation in shim spaces around perimeter, to maintain continuity of thermal barrier.
5. Install sealants and related backing materials around perimeter of windows in accordance with workmanship and installation requirements indicated in Sealant Section.

END OF SECTION 08521

# SECTION 08711 - DOOR HARDWARE

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Commercial door hardware for the following:

   a. Swinging doors.
   b. Aluminum storefront doors.
   c. Other doors to the extent indicated.

2. Cylinders for doors specified in other Sections.

B. Related Sections include the following:

1. Division 8 Section "Steel Doors and Frames" for astragals provided as part of a fire-rated labeled assembly and for door silencers provided as part of the frame.
2. Division 8 Section "Aluminum Entrances and Storefronts" for entrance door hardware, except cylinders.

### 1.2 SUBMITTALS

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

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening.

   a. Organize door hardware sets in same order as in the Door Hardware Schedule at the end of Part 3.

3. Content: Include the following information:

   a. Type, style, function, size, label, hand, and finish of each door hardware item.
   b. Manufacturer of each item.
   c. Fastenings and other pertinent information.

d. Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware.
g. Door and frame sizes and materials.
h. Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.

1) 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.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the 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 Schedule.

C. Keying Schedule: Prepared by or under the supervision of supplier, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

D. Product Certificates: Signed by manufacturers of electrified door hardware certifying that products furnished comply with requirements.

1. Certify that door hardware approved for use on types and sizes of labeled fire doors complies with listed fire door assemblies.

E. Maintenance Data: For each type of door hardware to include in maintenance manuals specified in Division 1.

F. Warranties: Special warranties specified in this Section.

## 1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Supplier Qualifications: Door hardware supplier with warehousing facilities in Project's vicinity and who is or employs a qualified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

1. Scheduling Responsibility: Preparation of door hardware and keying schedules.

C. Architectural Hardware Consultant Qualifications: A person who is currently certified by the Door and Hardware Institute as an Architectural Hardware Consultant and who is experienced

in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

1. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer.

D. Regulatory Requirements: Comply with provisions of the following:

1. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," as follows:

   a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
   b. Door Closers: Comply with the following maximum opening-force requirements indicated:

      1) Interior Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
      2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

   c. Thresholds: Not more than 1/2 inch (13 mm) high.

2. NFPA 101: Comply with the following for means of egress doors:

   a. Latches, Locks, and Exit Devices: Not more than 15 lbf (67 N) to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
   b. Door Closers: Not 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. Thresholds: Not more than 1/2 inch (13 mm) high.

E. Keying Conference: Conduct a conference at Project site coordinate keying requirements. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
2. Preliminary key system schematic diagram.
3. Requirements for key control system.
4. Address for delivery of keys.

## 1.4 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 Schedule, and include basic installation instructions with each item or package.

C. Deliver keys to Owner.

1.5 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements. Verify location of existing door hardware to be replaced and coordinate with frame manufacturing.

1.6 WARRANTY

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

B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of operators and door hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

C. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.

D. Warranty Period for Manual Closers: 10 years from date of Substantial Completion.

1.7 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in this Section, door hardware sets indicated in door and frame schedule, and the Door Hardware Schedule at the end of Part 3.

1. Door Hardware Sets: Requirements for quantity, item, design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Schedule at the end of Part 3. Products are identified by descriptive titles corresponding to requirements specified in Part 2.

2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

## 2.2 HINGES, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hinges:
   a. Hager Companies.
   b. McKinney Products Company; Div. of ESSEX Industries, Inc.
   c. Mont-Hard Corporation; Div. of Fanal, SA.
   d. PBB, Inc.
   e. Stanley Commercial Hardware; Div. of The Stanley Works.

C. Standards: Comply with the following:

1. Butts and Hinges: BHMA A156.1.
2. Template Hinge Dimensions: BHMA A156.7.
3. Self-Closing Hinges: BHMA A156.17.

D. 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).

E. Size: 4-1/2" x 4-1/2" Unless noted otherwise.

F. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

G. Hinge Applications: Unless otherwise indicated, provide the following:

1. Doors with Closers: Antifriction-bearing hinges.
2. Interior Doors: Standard-weight hinges.
3. Exterior Doors (All hollow metal doors): Heavy-weight hinges.

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

1. Interior Hinges: Stainless steel, with stainless-steel pin.
2. Exterior Doors (All hollow-metal doors): Stainless steel, with stainless-steel pin.
3. Hinges for Fire-Rated Assemblies: Stainless steel, with stainless-steel pin.

I. Hinge Options: Comply with the following where indicated in the Door Hardware Schedule 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.
2. Corners: Square.

J. 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 screws; Finish screw heads to match surface of hinges.

K. Antifriction-Bearing, Standard-Weight, Full-Mortise, Slip-in-Type Hinges: BHMA Grade 2, equipped with 2 ball bearings:

1. Base Metal: Stainless Steel.

2. Pins: Non-Removable

L. Finish – All Hinges: US32D

2.3 LOCKS AND LATCHES, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Mechanical Locks and Latches:
   a. Corbin Russwin Architectural Hardware; Div. of Yale Security Inc.
   b. Schlage Lock Company; an Ingersoll-Rand Company.
   c. Yale Security Inc.; Div. of Williams Holdings.

C. Standards: Comply with the following:

1. Bored Locks and Latches: BHMA A156.2.
2. Exit Locks: BHMA A156.5.
3. Auxiliary Locks: BHMA A156.5

D. Bored Locks: BHMA Grade 1 Series 4000.

E. Certified Products: Provide door hardware listed in the following BHMA directories:

1. Mechanical Locks and Latches: BHMA's "Directory of Certified Locks & Latches."

F. Lock Trim: Comply with the following:

1. Lever: Cast, 4-1/2" long, returned to within ½" of the door face.

2. Escutcheon (Rose): Wrought.
3. Dummy Trim: Match lever lock trim and escutcheons.

G. Lock Functions: Function numbers and descriptions indicated in the Door Hardware Schedule comply with the following:

1. Bored Locks: BHMA A156.2.

H. Lock Throw: Comply with testing requirements for length of bolts to comply with labeled fire door requirements, and as follows:

1. Bored Locks: Minimum 1/2-inch (12.7-mm) latchbolt throw.
2. Deadbolts: Minimum 1-inch (25-mm) bolt throw.

I. Rabbeted Doors: Provide special rabbeted front and strike on locksets for rabbeted meeting stiles.

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

K. Finish – All Locksets – 630

## 2.4 MECHANICAL LOCKS AND LATCHES

A. Bored Auxiliary Locks: Comply with the following:

1. Material: Stainless steel.
2. Deadlocks: Deadbolt operated by key either side.

## 2.5 DOOR BOLTS, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Flush Bolts:
   a. Door Controls International.
   b. Hager Companies.
   c. Hiawatha, Inc.
   d. Ives: H. B. Ives.

B. Standards: Comply with the following:

1. Surface Bolts: BHMA A156.16.
2. Automatic and Self-Latching Flush Bolts: BHMA A156.3.
3. Manual Flush Bolts: BHMA A156.16.

C. Flush Bolts: BHMA designed for mortising into door edge.

D. Bolt Throw: Comply with testing requirements for length of bolts to comply with labeled fire door requirements, and as follows:

1. Dutch-Door Bolts: Minimum 3/4-inch (19-mm) throw.
2. Mortise Flush Bolts: Minimum 3/4-inch (19-mm) throw.

## 2.6 DOOR BOLTS

A. Dutch-Door Surface Bolts: Polished brass bolt and knob, minimum 3/4-inch (19-mm) throw, with standard strike.

B. Automatic Flush Bolts: Fabricated from steel and brass components, with spring-activated bolts that automatically retract when active leaf is opened and that automatically engage when active door depresses bolt trigger listed and labeled for fire-rated doors. Provide brass or stainless-steel cover plate, top and bottom strikes, guides, guide supports, wear plates, and shims.

C. Manual-Extension Flush Bolts: Fabricated from extruded brass or aluminum, with 12-inch (305-mm) rod actuated by flat lever listed and labeled for fire-rated doors. Provide matching strike.

D. Slide Flush Bolts: Cast brass, with rod actuated by slide. Provide matching strike.

## 2.7 EXIT DEVICES, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc.
2. Von Duprin; an Ingersoll-Rand Company.

C. Standard: BHMA A156.3.

1. BHMA Grade: Grade 1

D. Certified Products: Provide exit devices listed in BHMA's "Directory of Certified Exit Devices."

E. 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.

F. Outside Trim: Lever with cylinder material and finish to match locksets, unless otherwise indicated.

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

G. Through Bolts: For exit devices and trim on metal doors.

## 2.8 EXIT DEVICES

A. Rim Exit Devices: Comply with the following:
   1. Actuating Bar: Push pad.
   2. Material: Stainless steel.

2.9 CYLINDERS AND KEYING

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   1. Cylinders: Same manufacturer as for locks and latches.

C. Standards: Comply with the following:

   1. Cylinders: BHMA A156.5.

D. Cylinder Grade: BHMA Grade 1

E. 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. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
   3. Bored-Lock Type (Key in Lever): Cylinders with tailpieces to suit locks.

      a. High-Security Grade: BHMA Grade 1A, listed and labeled as complying with pick- and drill-resistant testing requirements of UL 437 (Suffix A).

F. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:

   1. Interchangeable Cores: Core insert, removable by use of a special key, and usable with other manufacturers' cylinders.

G. Construction Keying: Comply with the following:

   1. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.
   2. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

      a. Replace construction cores with permanent cores, as directed by Owner.

H. Keying System: Unless otherwise indicated, provide a factory-registered keying system complying with the following requirements.

1. System: Master key or grand master key locks to Owner's airport campus system requirements.

I. Keys: Provide nickel-silver keys complying with the following:

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

a. Notation: "DO NOT DUPLICATE."

2. Quantity: In addition to one extra blank key for each lock, provide the following:

a. Cylinder Change Keys: Three.
b. Master Keys: Five.
c. Grand Master Keys: Five.
d. Great-Grand Master Keys: Five.

## 2.10 STRIKES

A. Standards: Comply with the following:

1. Strikes for Bored Locks and Latches: BHMA A156.2.
2. Strikes for Auxiliary Deadlocks: BHMA A156.5.
3. Dustproof Strikes: BHMA A156.16.

B. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.

C. Dustproof Strikes: BHMA Grade1, complying with the following:

1. Floor Type: Polished wrought bras, with ¾-inch (19mm) diameter, spring-tension plunger.

## 2.11 ACCESSORIES FOR PAIRS OF DOORS, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Coordinators:
a. Door Controls International.
b. Glynn-Johnson; an Ingersoll-Rand Company.
c. Ives: H. B. Ives.

C. Standards: Comply with the following:

1. Coordinators: BHMA A156.3.

D. Coordinators: Consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release and with internal override.

## 2.12 CLOSERS, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Surface-Mounted Closers:
   a. LCN Closers; an Ingersoll-Rand Company.
   b. Norton Door Controls; Div. of Yale Security Inc.
   c. Yale Security Inc.; Div. of Williams Holdings.

C. Standards: Comply with the following:

1. Closers: BHMA A156.4.

D. Surface Closers: BHMA Grade 1.

E. Certified Products: Provide door closers listed in BHMA's "Directory of Certified Door Closers."

F. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

## 2.13 CLOSERS

A. Modern-Type-without-Cover Surface Closers: Rack-and-pinion hydraulic type; with adjustable sweep and latch speeds controlled by key-operated valves; with forged-steel main arm; enclosed in a cast-aluminum alloy shell; complying with the following:

1. Mounting: Hinge side.
2. Type: Regular arm.
3. Backcheck: Adjustable, effective between 60 and 85 degrees of door opening.
4. Closing Power Adjustment: At least 15 percent more than minimum tested value.

## 2.14 PROTECTIVE TRIM UNITS, GENERAL

A. Standard: Comply with BHMA A156.6.

B. Materials: Fabricate protection plates from the following:

1. Stainless Steel: 0.050 inch (1.3 mm) thick; beveled top and 2 sides.

C. Fasteners: Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine or self-tapping screws.

D. Furnish protection plates sized 1-1/2 inches (38 mm) less than door width on push side and 1/2 inch (13 mm) less than door width on pull side, by height specified in schedule.

## 2.15 PROTECTIVE TRIM UNITS

A. Armor Plates: 36 inches (914 mm) high by door width, with allowance for frame stops.

B. Kick Plates: 12 inches (305 mm) high by door width, with allowance for frame stops.

## 2.16 STOPS AND HOLDERS, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hager Companies.
2. Ives: H. B. Ives.
3. Rockwood Manufacturing Company.
4. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc.
5. Yale Security Inc.; Div. of Williams Holdings.

C. Standards: Comply with the following:

1. Stops and Bumpers: BHMA A156.16.

D. Stops and Bumpers: BHMA Grade 1.

E. Floor Stops: For doors, unless wall or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic.

1. Where floor or wall stops are not appropriate, provide overhead holders.

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

## 2.17 STOPS AND HOLDERS

A. Wall Bumpers: Polished cast brass or aluminum with rubber bumper; 2-1/2-inch (64-mm) diameter, minimum 3/4-inch (19-mm) projection from wall, with backplate for concealed fastener installation; with concave bumper configuration.

B. Dome-Type Floor Stop: Polished cast brass, bronze, or aluminum, with rubber bumper; and as follows:

1. Height: Minimum 1 inch (25 mm) high, for doors without threshold] [1-3/8 inches (35 mm) high, for doors with threshold.
2. Riser: Extruded aluminum for carpet installations.

2.18 DOOR GASKETING, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Door Gasketing and Bottoms:

a. Hager Companies.
b. National Guard Products, Inc.
c. Pemko Manufacturing Co., Inc.
d. Zero International, Inc.

C. Standard: Comply with BHMA A156.22.

D. General: Provide continuous weather-strip gasketing on doors scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

E. 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.

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: Comply with ASTM D 2000 and AAMA 701/702.

2.19 DOOR GASKETING

A. Adhesive-Backed Perimeter Gasketing: Gasket material applied to frame rabbet with self-adhesive.

1. Gasket Material: Neoprene bulb.

B. Door Sweeps: Gasket material held in place by flat metal housing or flange; surface mounted to face of door with screws.

1. Gasket Material: Neoprene.
2. Housing Material: Aluminum.

## 2.20 THRESHOLDS, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hager Companies.
2. National Guard Products, Inc.
3. Pemko Manufacturing Co., Inc.
4. Reese Enterprises, Inc.
5. Zero International, Inc.

C. Standard: Comply with BHMA A156.21.

## 2.21 THRESHOLDS

A. Saddle Thresholds: Type and base metal as follows:

1. Type: Fluted top.
2. Base Metal: Aluminum.

## 2.22 FABRICATION

A. Manufacturer's Nameplate: Do not provide manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise approved by Architect.

1. Manufacturer's identification will be 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 for finishes. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Steel Machine or Wood Screws: For the following fire-rated applications:

    a. Mortise hinges to doors.
    b. Strike plates to frames.
    c. Closers to doors and frames.

3. Steel Through Bolts: For the following fire-rated applications, unless door blocking is provided:

    a. Surface hinges to doors.
    b. Closers to doors and frames.
    c. Surface-mounted exit devices.

4. Spacers or Sex Bolts: For through bolting of hollow metal doors.
5. Fasteners for Wood Doors: Comply with requirements of DHI WDHS.2, "Recommended Fasteners for Wood Doors."

2.23 FINISHES

A. Standard: Comply with BHMA A156.18.

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.

D. BHMA Designations: Comply with base material and finish requirements indicated by the following:
    1. BHMA 619: Satin nickel plated, clear coated, over brass or bronze base metal.
    2. BHMA 626: Satin chromium plated over nickel, over brass or bronze base metal.
    3. BHMA 627: Satin aluminum, clear coated, over aluminum base metal.
    4. BHMA 628: Satin aluminum, clear anodized, over aluminum base metal.
    5. BHMA 630: Satin stainless steel, over stainless-steel base metal.
    6. BHMA 652: Satin chromium plated over nickel, over steel base metal.
    7. BHMA 718: Satin aluminum, uncoated; aluminum base metal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance of door hardware.

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

## 3.2 PREPARATION

A. Steel Doors and Frames: Comply with DHI A115 series.

1. Surface-Applied Door Hardware: Drill and tap doors and frames according to SDI 107.

B. Wood Doors: Comply with DHI A115-W series.

## 3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Key Control System: Place keys on markers and hooks in key control system cabinet, as determined by final keying schedule.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

## 3.4 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. Door Closers: 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. Six-Month Adjustment: Approximately six months after date of Substantial Completion, Installer shall perform the following:

1. Examine and readjust each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.
2. Consult with and instruct Owner's personnel on recommended maintenance procedures.
3. Replace door hardware items that have deteriorated or failed due to faulty design, materials, or installation of door hardware units.

## 3.5 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 door hardware is without damage or deterioration at time of Substantial Completion.

## 3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

## 3.7 DOOR HARDWARE SCHEDULE

Contractor to provide a Door Hardware Shop Drawings indicating Door Hardware Sets for approval. Contractor to coordinate Door Hardware with Access Control System – Section 16708

END OF SECTION 08711

# SECTION 08800 – GLASS AND GLAZING

## PART 1 - SUMMARY

### 1.1 SUMMARY

A. This section includes glass and glazing for the following items:

1. Interior windows
2. Exterior windows
3. Storefronts

B. Related work specified elsewhere:

1. Aluminum storefronts

### 2.1 REFERENCES

A. Applicable standards:

1. American National Standards Institute, Inc. (ANSI):
   a. Z97.1 – Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings.
2. American Society for Testing and Materials (ASTM):
   a. C509 – Cellular Elastomeric Preformed Gasket and Sealing Material.
   b. C542 – Lock Strip-Gaskets.
   c. C864 – Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
   d. C920 – Elastomeric Joint Sealants
   e. C1048 – Heat Treated Flat Glass – Kind HS. Kind FT-Coated and Uncoated Glass.
3. Consumer Product Safety Commission (CPSC):
   a. 16 CFR 1201 – Safety Standard for Architectural Glazing Materials.
4. Flat-Glass Marketing Association (FGMA):
   a. Glazing Manual.

### 2.2 SUBMITTALS

A. Submit as specified in GENERAL CONDITIONS.

B. Include, but not limited to, the following:
   a. Product Data: Technical data for each glazing material and fabricated glass product required, including installation and maintenance instructions.

2.3 QUALITY ASSURANCE

A. Glazing Standards: Comply with recommendations of Flat Glass Marketing Association (FGMA) "Glazing Manual" and "Sealant Manual" except where more stringent requirements are indicated. Refer to those publications for definitions of glass and glazing terms not otherwise defined in this section or other referenced standards.
B. Safety Glazing Standard: Where safety glass is indicated or required by authorities having jurisdiction, provide type of products indicated which comply with ANSI A97.1 and testing requirements of 16 CFR Part 1201 for category II materials.
C. Single Source Responsibility for Glass: To ensure consistent quality of appearance and performance, provide materials produced by a single manufacturer or fabricator for each king and condition of glass indicated or specified.

2.4 DELIVERY, STORAGE AND HANDLING: Protect glass and glazing materials during delivery, storage and handling to comply with manufacturer's directions and as required to prevent edge damage to glass, and damage to glass and glazing materials from effects of moisture including condensation, of temperature changes, of direct exposure to sun, and from other causes.

2.5 PROJECT CONDITIONS:

A. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when joint substrates are wet due to rain, frost, condensation or other causes.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Primary and Heat Treated Glass Products:

1. Cardinal
2. Falconer Glass Industries
3. Ford Glass
4. Guardian Industries Corp.
5. Libby-Owens Ford Company
6. PPG Industries, Inc.

7. Spectrum Glass Products

B. Lock-Strip Gaskets:

1. Cadillac Rubber and Plastics, Inc.
2. The Standard Products Co.

C. Preformed Gaskets:

1. D.S. Brown Co.
2. Tremco

D. Glazing Sealants and Tapes

E.

1. Bostik Construction Products Inc.
2. Dow Corning Corp.
3. General Electric
4. W.R. Meadows, Inc.
5. Pecora Corp.
6. Sonneborn Building Products
7. Tremco Inc.

2.2 GLASS PRODUCTS, GENERAL

A. Primary Glass Standard: Provide glass which complies with FS-DD-G-1403 requirements, including those indicated by reference to type, class, quality and form.

B. Heat-Treated Glass Standard: Provide heat-treated glass which complies with FS DD-G-1403 requirements, including those indicated by reference to grade, style, type, quality, and class.

C. Sizes: Fabricate glass to sizes required for glazing openings indicated, with edge clearances and tolerances complying with recommendations of glass manufacturer. Provide thicknesses indicated or, if not otherwise indicated, as recommended by glass manufacturer for application indicated.

2.3 PRIMARY GLASS PRODUCTS:

A. Tinted Float Glass: Type I, class 2 (heat absorbing and light reducing), quality q3 (glazing select), of tint and with performance characteristics for 1/4" thick glass listed Below:

1. Solar Cool Gray: Manufacturer's standard tint, with visible light transmittance of 56% and shading coefficient of 0.69-0.71.

2.4 HEAT-TREATED GLASS PRODUCTS:

A. Manufacturing Process: Manufacture heat-treated glass as follows:

1. By vertical (tong-held) or horizontal (roller health) process, at manufacturer's option, except provide horizontal process where indicated as "tongless" or "free of tong marks".

2.5 ELASTOMERIC GLAZING SEALANTS AND PREFORMED GLAZING TAPES:

A. General: Provide products of type indicated and complying with the following requirements:

1. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials with which they will come into 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 recommendations of sealant and glass manufacturers for selection of glazing sealants and tapes which have performance characteristics suitable for application indicated and conditions at time of installation.
3. Elastomeric Sealant Standard: Provide chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C920 requirements, including those for Type, Grade, Class and Uses.
4. Colors: Provide color or exposed sealants as selected by County from manufacturer's standard colors.

B. Silicone-Glazing Sealant:

1. Conform to ASTM-C920, Type S, Grade NS, Class 25.
2. One part, nonacid curing type, medium modulus. Color to be selected.
3. General Electric GESIL N.
4. Use in the following locations:
   a. Exterior insulation glass in frames with stops.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. Provide materials with proven record of compatibility with surfaces contacted in installation.
B. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.
C. Setting Blocks: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealants, 80 to 90 Shore A durometer hardness.
D. Spacers: Neoprene, EPDM or silicone blocks, or continuous extrusions, as required for compatibility with glazing sealant, of size, shape and hardness recommended by glass and sealant manufacturers for application indicated.
E. Edge Blocks: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealant, of size and hardness required to limit lateral movement (side-walking) of glass.

PART 3 - EXECUTION

3.1 PREPARATION:

A. Examine framing and glazing channel surfaces, for compliance with manufacturing and installation tolerances, including those for size, squareness, offsets at corners, face or edge clearances, presence and functioning of weep system, for effective sealing of joinery and conditions under which glazing is to be performed.

B. Clean sash and glazing channel, or other framing members to receive glass, immediately before glazing.

C. Remove any coatings not firmly bonded to the substrate, moisture, frost, oil, grease, dust, dirt, and all foreign substances. Remove lacquer from metal surfaces where elastomeric sealants are specified for use.

3.2 PERFORMANCE REQUIREMENTS: Watertight and airtight installation of each piece of glass is required, except as otherwise specified or indicated. All sized to be firerated. Each installation must withstand normal temperature changes, wind loading, and impact loading (for operating sash and doors) without failure including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials and other defects in the work.

3.3 GLAZING - SEALANTS:

A. Cut glass accurately to size from measurements taken at the building, and follow glass bite requirements recommended by the glass manufacturer.

B. Conform to FGMA Glazing Manual, combined printed recommendations of glass manufacturers, glazing sealants, gaskets and other glazing material except as otherwise indicated or specified.

C. Inspect each piece of glass immediately before installation, and eliminate pieces which have observable edge damage or face imperfections.

D. Protect glass from edge damage during handling and installation; 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 with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so that these are located at top of opening. Remove from project and dispose of glass units with edge damage or other imperfections of king that, when installed weakens glass and impairs performance and appearance.

E. Apply primer or sealer to joint surfaces wherever required by glazing material manufacturer.

F. Install setting blocks of proper size in sill rabbet, located one quarter of glass width from each corner, but no closer than 6 inches, unless otherwise required. Set blocks in thin course of sealant which is acceptable for heel bead use.

G. Provide spacers inside and out, of correct size and spacing to preserve required face clearances, for glass sizes larger than 50 united inches, except where gaskets or glazing tapes with continuous spacer rods are used for glazing. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1. Gypsum Base for Veneer Plaster: Stack panels flat to prevent sagging.

## 1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 843 requirements or gypsum veneer plaster manufacturer's written recommendations, whichever are more stringent.

B. Room Temperatures: Maintain not less than 55 deg F (13 deg C) or more than 80 deg F (27 deg C) for 7 days before application of gypsum base and gypsum veneer plaster, continuously during application, and after application until veneer plaster is dry.

C. Avoid conditions that result in gypsum veneer plaster drying too rapidly.

1. Distribute heat evenly; prevent concentrated or uneven heat on veneer plaster.
2. Maintain relative humidity levels for prevailing ambient temperature that produces normal drying conditions.
3. Ventilate building spaces in a manner that prevents drafts of air from contacting surfaces during veneer plaster application and until it is dry.

# PART 2 - PRODUCTS

## 2.1 STEEL FRAMING, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Clark Steel Framing Systems.
2. Consolidated Systems, Inc.
3. Dale Industries, Inc. - Dale/Incor.
4. Dietrich Industries, Inc.
5. Marino Ware; Division of Ware Ind.
6. National Gypsum Company.
7. Scafco Corporation.
8. Unimast, Inc.
9. Western Metal Lath & Steel Framing Systems.

B. Steel Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
2. Protective Coating: manufacturer's standard corrosion-resistant zinc coating, unless otherwise indicated.

## 2.2 STEEL SUSPENDED CEILING AND SOFFIT FRAMING

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- (1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.

B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch (4.12-mm) diameter.

C. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch (1.37 mm) and minimum 1/2-inch- (12.7-mm-) wide flanges.

1. Depth: 1-1/2 inches (38.1 mm).

D. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.0538-inch (1.37-mm) bare steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flanges, 3/4 inch (19.1 mm) deep.

## 2.3 GYPSUM VENEER PLASTER MATERIALS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Two-Component Gypsum Veneer Plaster:

a. National Gypsum Company:

1) Base Coat: Kal-Kote Base Plaster.
2) High-Strength, Smooth Finish Coat: Uni-Kal 3000 Plaster.

b. United States Gypsum Co.:
1) High-Strength Base Coat: IMPERIAL Basecoat Plaster.
2) High-Strength, Smooth Finish Coat: IMPERIAL Finish Plaster.

B. Two-Component Gypsum Veneer Plaster: Separate formulations complying with ASTM C 587; one for base coat and one for finish coat application over substrates indicated.

1. High-Strength Base Coat: Ready-mixed, base-coat plaster containing mill-mixed, fine silica sand; with a compressive strength of 3000 psi (20 MPa) when tested according to ASTM C 472.
2. High-Strength Finish Coat: Ready-mixed, smooth, finish-coat veneer plaster containing mill-mixed, fine silica sand; with a compressive strength of 3000 psi (20 MPa) when tested according to ASTM C 472.

## 2.4 PANEL PRODUCTS

A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

B. Gypsum Base for Veneer Plaster: ASTM C 588 and products of same manufacturer as plaster.

1. Abuse-Resistant Base: With specially reinforced core for increased indentation and penetration resistance and with 5/8-inch- (15.9-mm-) thick, Type X core.

## 2.5 TRIM ACCESSORIES

A. Standard Trim: ASTM C 1047, provided or approved by manufacturer for use in gypsum veneer plaster applications indicated.

1. Material: Plastic.
2. Shapes:

a. Cornerbead: Use at outside corners, unless otherwise indicated.
b. LC-Bead (J-Bead): Use at exposed panel edges.
c. Expansion (Control) Joint: Use where indicated.

## 2.6 JOINT REINFORCING MATERIALS

A. General: Comply with joint strength requirements in ASTM C 587 and with gypsum veneer plaster manufacturer's written recommendations for each application indicated.

B. Joint Tape:

1. Gypsum Base for Veneer Plaster: In material recommended by gypsum veneer plaster manufacturer for applications indicated.

C. Embedding Material for Joint Tape:

1. Gypsum Base for Veneer Plaster: Material produced and recommended by gypsum veneer plaster manufacturer for use with joint tape material and gypsum veneer plaster applications indicated.

## 2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Bonding Compound for Gypsum Veneer Plaster: ASTM C 631.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.

## 2.8 GYPSUM VENEER PLASTER MIXES

A. Mechanically mix gypsum veneer plaster materials to comply with ASTM C 843 and with gypsum veneer plaster manufacturer's written recommendations.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

A. Suspended Ceilings: Coordinate installation of ceiling suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers at spacing required to support ceilings and that hangers will develop their full strength.

B. Masonry Substrates: Prepare for gypsum veneer plastering according to gypsum veneer plaster manufacturer's written recommendations. Clean surfaces to remove dirt, grease, oil, and other foreign matter and deposits that could impair bond with plaster.

## 3.3 INSTALLING STEEL FRAMING, GENERAL

A. Installation Standards: ASTM C 754, and ASTM C 844 requirements that apply to framing installation.

B. Install supplementary framing, blocking, and bracing at terminations in gypsum veneer plaster assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with gypsum veneer plaster manufacturer's written recommendations or, if none available, with United States Gypsum's "Gypsum Construction Handbook."

C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement.

1. Isolate ceiling assemblies where they abut or are penetrated by building structure.
2. Isolate partition framing and wall furring where they abut structure, except at floor. Install slip-type joints at head of assemblies that avoid axial loading of assemblies and laterally support assemblies.

D. Do not bridge building control and expansion joints with steel framing or furring members. Frame both sides of joints independently.

## 3.4 INSTALLING STEEL SUSPENDED CEILING AND SOFFIT FRAMING

A. Suspend ceiling hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers 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
3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel deck tabs.
6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
7. Do not connect or suspend steel framing from ducts, pipes, or conduit.

B. Installation Tolerances: Install steel framing components for suspended ceilings so members for panel attachment are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member and transversely between parallel members.

C. Sway-brace suspended steel framing with hangers used for support.

D. Install suspended steel framing components in sizes and spacings indicated, but not less than those required by referenced steel framing and installation standards.

1. Hangers: 48 inches (1200 mm) o.c.
2. Carrying Channels (Main Runners): 48 inches (1200 mm)o.c.
3. Furring Channels (Furring Members): 24 inches (600 mm) o.c.

## 3.5 APPLYING PANELS, GENERAL

A. Gypsum Base for Veneer Plaster: Apply according to ASTM C 844, unless manufacturer's written recommendations are more stringent.

1. Do not allow gypsum base to fade from exposure to light.
2. Erection Tolerance: No more than 1/16-inch (1.6-mm) offsets between planes of gypsum base faces, and 1/8 inch in 8 feet (3 mm in 2.4 m) for level, plumb, warp, and bow.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Attach panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

F. Attach panels to framing provided at openings and cutouts.

G. Form control and expansion joints with space between edges of adjoining panels.

H. Fastener Spacing: According to referenced gypsum base for gypsum veneer plaster application standard, manufacturer's written recommendations, and fire-resistance-rating requirements.

1. Space screws a maximum of 12 inches (304.8 mm) o.c. for vertical applications.
2. Space fasteners in panels that are tile substrates a maximum of 8 inches (203.2 mm) o.c.

## 3.6 PANEL APPLICATION METHODS

A. Single-Layer Application:

1. On ceilings, apply gypsum base panels before wall/partition panels to the greatest extent possible and at right angles to framing, unless otherwise indicated.

B. Single-Layer Fastening Methods: Apply gypsum base panels to supports with steel drill screws.

## 3.7 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 844 and in specific locations approved by Architect for visual effect.

## 3.8 INSTALLING JOINT REINFORCEMENT

A. Gypsum Base for Veneer Plaster: Reinforce interior angles and flat joints with joint tape and embedding material to comply with ASTM C 843 and gypsum veneer plaster manufacturer's written recommendations.

## 3.9 GYPSUM VENEER PLASTERING

A. Gypsum Veneer Plaster Application: Comply with ASTM C 843 and veneer plaster manufacturer's written recommendations.

1. Where gypsum veneer plaster abuts metal door frames, windows, and other units in veneer plaster, groove finish coat to eliminate spalling.

B. Concealed Surfaces: Omit gypsum veneer plaster in the following areas where veneer plaster will be concealed from view in the completed Work, unless otherwise indicated or required to maintain fire-resistance rating. Do not omit veneer plaster behind cabinets, furniture, furnishings, and similar removable items.

1. Above suspended ceilings.

C. Gypsum Veneer Plaster Finish: Smooth-trowelled finish, unless otherwise indicated.

END OF SECTION 09215

# SECTION 09220 - PORTLAND CEMENT PLASTER (STUCCO)

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Metal lath and accessories.
2. Plastic accessories.
3. Portland cement plaster.
4. Stucco finishes.

### 1.2 SUBMITTALS

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

B. Product Data for each product specified.

### 1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver cementitious materials to Project site in original packages, containers, or bundles, labeled with manufacturer's name, product brand name, and lot number.

B. Store materials inside, under cover, and dry, protected from weather, direct sunlight, surface contamination, aging, corrosion, and damage from construction traffic and other causes.

### 1.4 PROJECT CONDITIONS

A. Environmental Requirements, General: Comply with requirements of referenced plaster application standards and recommendations of plaster manufacturer for environmental conditions before, during, and after plaster application.

B. Warm-Weather Requirements: Protect plaster against uneven and excessive evaporation and from strong flows of dry air, both natural and artificial. Apply and cure plaster as required by climatic and job conditions to prevent dry out during cure period. Provide suitable coverings, moist curing, barriers to deflect sunlight and wind, or combinations of these, as required.

C. Protect contiguous work from soiling and moisture deterioration caused by plastering. Provide temporary covering and other provisions necessary to minimize harmful spattering of plaster on other work.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Expanded-Metal Lath:

   a. Alabama Metal Industries Corp. (AMICO).
   b. Dale//Incor Industries, Inc.
   c. Dietrich Industries, Inc.
   d. National Gypsum Co.
   e. Unimast, Inc.
   f. United States Gypsum Co.

2. Plastic Accessories:

   a. Alabama Metal Industries Corp. (AMICO).
   b. Plastic Components, Inc.
   c. Vinyl Corp.

3. Stucco:

   a. Florida Stucco Corp.
   b. Highland Stucco.
   c. IPA Systems, Inc.
   d. United States Gypsum Co.

### 2.2 LATH

A. Expanded-Metal Lath: Comply with ASTM C 847 for material, type, configuration, and other characteristics indicated below.

1. Material: Fabricate expanded-metal lath from sheet metal conforming to the following:

   a. Galvanized Steel: Structural-quality, zinc-coated (galvanized) steel sheet complying with ASTM A 653, G60 (ASTM A 653M, Z180) minimum coating designation, unless otherwise indicated.

2. Diamond-Mesh Lath: Comply with the following requirements:

   a. Configuration: Self-furring.

      1) Weight: 3.4 lb/sq. yd. (1.8 kg/sq. m).

B. Paper Backing: Provide the following material factory bonded to back of lath. Comply with FS UU-B-790, Type I, grade and style as indicated below:

1. Vapor-Retardant Paper: Grade B, Style 1a.

## 2.3 ACCESSORIES

A. General: Comply with material provisions of ASTM C 1063 and the requirements indicated below; coordinate depth of accessories with thicknesses and number of plaster coats required.

1. Plastic Components: ASTM D 4216, high-impact polyvinyl chloride (PVC) for building products.

B. Cornerbeads: Small nose cornerbeads fabricated from the following metal, with expanded flanges of large-mesh diamond-metal lath allowing full plaster encasement.

1. PVC Plastic: Minimum 0.035 inch (0.89 mm) thick.

C. Casing Beads: Square-edged style, with expanded flanges of the following material:

1. PVC Plastic: Minimum 0.035 inch (0.89 mm) thick.

D. Control Joints: Prefabricated, of material and type indicated below:

1. PVC Plastic: Minimum 0.035 inch (0.89 mm) thick.
2. One-Piece Type: Folded pair of nonperforated screeds in M-shaped configuration, with expanded or perforated flanges.

   a. Provide removable protective tape on plaster face of control joints.

E. Foundation Sill (Weep) Screed: Manufacturer's standard profile designed for use at sill plate line to form plaster stop and prevent plaster from contacting damp earth, fabricated from PVC plastic.

F. Lath Attachment Devices: Material and type required by ASTM C 1063 for installations indicated.

## 2.4 PLASTER MATERIALS

A. Base-Coat Cements: Type as indicated below:

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

B. Ready-Mixed Finish-Coat Plaster: Mill-mixed portland cement, aggregates, coloring agents, and proprietary ingredients.

1. Products:
   a. ChemRex; Thoro Stucco.
   b. Florida Stucco Corp
   c. Highland Stucco & Lime Products, Inc.;
   d. United States Gypsum Co.; Oriental Exterior Finish Stucco.
      1) Color: Grey

C. Lime: Special hydrated lime for finishing purposes, ASTM C 206, Type S; or special hydrated lime for masonry purposes, ASTM C 207, Type S.

D. Sand Aggregate for Base and Finish Coats: ASTM C 897.

1. Manufactured or natural sand.

2.5 MISCELLANEOUS MATERIALS

A. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch (13 mm) long, free of contaminates, manufactured for use in portland cement plaster.

B. Water for Mixing and Finishing Plaster: Potable.

2.6 PLASTER MIXES AND COMPOSITIONS

A. General: Comply with ASTM C 926 for base- and finish-coat mixes as applicable to plaster bases, materials, and other requirements indicated.

B. Base-Coat Mixes and Compositions: Proportion materials for respective base coats in parts by volume per sum of cementitious materials for aggregates to comply with the following requirements for each method of application and plaster base indicated. Adjust mix proportions below within limits specified to attain workability.

C. Fiber Content: Add fiber to following mixes after ingredients have mixed at least 2 minutes. Comply with fiber manufacturer's written instructions but do not exceed 1 lb/cu. ft. (16 kg/cu. m) of cementitious materials. Reduce aggregate quantities accordingly to maintain workability.

D. Three-Coat Work over Metal Lath: Base-coat proportions as indicated below:

1. Scratch Coat: 1 part portland cement, 0 to 3/4 parts lime, 2-1/2 to 4 parts aggregate.
2. Brown Coat: 1 part portland cement, 0 to 3/4 parts lime, 3 to 5 parts aggregate.

E. Portland Cement Job-Mixed Finish-Coat Mixes: For cementitious materials, mix 1 part portland cement and 1-1/2 to 2 parts lime. Use 1-1/2 to 3 parts aggregate per part of cementitious material (sum of separate volumes of each component material)..

2.7 MIXING

A. Mechanically mix cementitious and aggregate materials for plasters to comply with applicable referenced application standard and with recommendations of plaster manufacturer.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF LATH AND FURRING, GENERAL

A. Standards: Comply with ML/SFA 920, "Guide Specifications for Metal Lathing and Furring," and with requirements of ASTM C 1063.

### 3.2 LATHING

A. Install metal lath for the following applications where plaster base coats are required. Provide appropriate type, configuration, and weight of metal lath selected from materials indicated that comply with referenced ML/SFA specifications and ASTM lathing installation standards.

1. Monolithic surfaces using 3.4-lb/sq. yd. (1.8-kg/sq. m) minimum weight, self-furring, diamond-mesh lath.

### 3.3 PREPARATIONS FOR PLASTERING

A. Clean plaster bases and substrates for direct application of plaster, removing loose material and substances that may impair the Work.

B. Install temporary grounds and screeds to ensure accurate rodding of plaster to true surfaces; coordinate with scratch-coat work.

### 3.4 INSTALLATION OF PLASTERING ACCESSORIES

A. General: Comply with referenced lathing and furring installation standards for provision and location of plaster accessories of type indicated. Miter or cope accessories at corners; install with tight joints and in alignment. Attach accessories securely to plaster bases to hold accessories in place and in alignment during plastering. Install accessories of type indicated at following locations:

1. External Corners: Install corner reinforcement at external corners.
2. Terminations of Plaster: Install casing beads, unless otherwise indicated.
3. Control Joints: Install at locations indicated.

### 3.5 PLASTER APPLICATION

A. Plaster Application Standard: Apply plaster materials, composition, and mixes to comply with ASTM C 926.

B. Do not use materials that are frozen, caked, lumpy, dirty, or contaminated by foreign materials.

C. Do not use excessive water in mixing and applying plaster materials.

D. Flat Surface Tolerances: Do not deviate more than plus or minus 1/8 inch in 10 feet (3 mm in 3 m) from a true plane in finished plaster surfaces, as measured by a 10-foot (3-m) straightedge placed at any location on surface.

E. Grout hollow-metal frames, bases, and similar work occurring in plastered areas, with base-coat plaster material, and before lathing where necessary. Except where full grouting is indicated or required for fire-resistance rating, grout at least 6 inches (152 mm) at each jamb anchor.

F. Sequence plaster application with installation and protection of other work so that neither will be damaged by installation of other.

G. Plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground, unless otherwise indicated. Where plaster is not terminated at metal frame by casing beads cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.

H. Corners: Make internal corners and angles square; finish external corners flush with cornerbeads on interior work, square and true with plaster faces on exterior work.

I. Number of Coats: Apply plaster of composition indicated, to comply with the following requirements:

1. Three Coats: Over the following plaster base:

a. Metal lath.

J. Finish Coats: Apply finish coats to comply with the following requirements:

1. Trowel-Textured Finish: Apply finish coat with hand-trowelled-textured finish matching Architect's approved sample.

K. Moist-cure plaster base and finish coats to comply with ASTM C 926, including written instructions for time between coats and curing in "Annex A2 Design Considerations."

## 3.6 CUTTING AND PATCHING

A. Cut, patch, replace, repair, and point up plaster as necessary to accommodate other work. Repair cracks and indented surfaces. Point-up finish plaster surfaces around items that are built into or penetrate plaster surfaces. Repair or replace work to eliminate blisters, buckles, check cracking, dry outs, efflorescence, excessive pinholes, and similar defects. Repair or replace work as necessary to comply with required visual effects.

## 3.7 CLEANING AND PROTECTING

A. Remove temporary covering and other provisions made to minimize spattering of plaster on other work. Promptly remove plaster from door frames, windows, and other surfaces not to be plastered. Repair surfaces stained, marred or otherwise damaged during plastering work. When plastering work is completed, remove unused materials, containers, equipment, and plaster debris.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure plaster work is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 09220

# SECTION 09310 - CERAMIC TILE

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Ceramic mosaic tile.
2. Glazed wall tile.
3. Stone thresholds installed as part of tile installations.

### 1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples:

1. Each type, composition, color, and finish of tile and grout.
2. Stone thresholds in 6-inch (150-mm) lengths.

### 1.3 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

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

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

### 2.2 TILE PRODUCTS

A. Available Manufacturers:

1. American Olean; Div. of Dal-Tile International Corp.
2. Daltile; Div. of Dal-Tile International Inc.
3. Florida Tile Industries, Inc.
4. Monarch Tile, Inc.

B. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

C. Unglazed Ceramic Mosaic Tile Floors: Factory-mounted flat tile as follows:

1. Composition: Porcelain.
2. Surface: Smooth, without abrasive admixture.
3. Module Size: 2 by 2 inches (50.8 by 50.8 mm).
4. Nominal Thickness: 1/4 inch (6.35 mm).
5. Face: Plain with cushion edges.
6. Color: As selected by Architect from manufacture's full, American Olean Price Group III as basis of design.

D. Glazed Wall Tile Walls: Flat tile as follows:

1. Module Size: 6 by 6 inches (152 by 152 mm).
2. Thickness: 5/16 inch (8 mm).
3. Face: Plain with modified square edges or cushion edges.
4. Finish: Mat, opaque glaze.
5. Mounting: Factory back-mounted.
6. Color: As selected by Architect from manufacture's full, American Olean Price Group III as basis of design.

E. Glazed Wall Tile Trim Units: Matching characteristics of adjoining flat tile and coordinated with sizes and coursing where applicable.

1. Base: Coved based rounded top, module size 6 by 6 inches (152 by 152 mm).

## 2.3 ACCESSORY MATERIALS

A. Thresholds: Fabricate to provide transition between adjacent floor finishes. Bevel edges at 1:2 slope, limit height of bevel to 1/2 inch (12.7 mm) or less, and finish bevel to match face of threshold.

1. Marble Thresholds: ASTM C 503 with a minimum abrasion resistance of 10 per ASTM C 1353 or ASTM C 241 and with honed finish.

a. Description: Uniform, fine- to medium-grained white stone with gray veining.

## 2.4 SETTING AND GROUTING MATERIALS

A. Manufacturers:

1. Atlas Minerals & Chemicals, Inc.
2. Boiardi Products Corporation.

3. Bonsal, W. R., Company.
4. Bostik.
5. C-Cure.
6. Custom Building Products.
7. DAP, Inc.
8. Jamo Inc.
9. LATICRETE International Inc.
10. MAPEI Corporation.
11. Southern Grouts & Mortars, Inc.
12. Summitville Tiles, Inc.
13. TEC Specialty Products Inc.

B. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

1. Prepackaged dry-mortar mix containing dry additive to which only water must be added.
2. Prepackaged dry-mortar mix combined with liquid-latex additive.
3. For wall applications, provide nonsagging mortar.

C. Standard Unsanded Cement Grout: ANSI A118.6, color as selected.

D. Polymer-Modified Tile Grout: ANSI A118.7, color as selected from manufacturers full range.

1. Polymer Type: Dry, redispersible form, prepackaged with other dry ingredients.
2. Polymer Type: Liquid-latex form for addition to prepackaged dry-grout mix.

## 2.5 MISCELLANEOUS MATERIALS

A. Elastomeric Sealants: Elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 7 Section "Joint Sealants."

1. One-Part, Mildew-Resistant Silicone: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for in-service exposures of high humidity and extreme temperatures.

a. Available Products:

1) Dow Corning Corporation; Dow Corning 786.
2) GE Silicones; Sanitary 1700.
3) Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
4) Tremco, Inc.; Tremsil 600 White.

# PART 3 - EXECUTION

## 3.1 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions.

C. Remove protrusions, bumps, and ridges by sanding or grinding.

D. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing.

## 3.2 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.

C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Grind cut edges of tile abutting trim, finish, or built-in items. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.

F. Grout tile to comply with requirements of ANSI A108.10, unless otherwise indicated.

G. Install tile on floors with the following joint widths:

1. Ceramic Mosaic Tile: 1/16 inch (1.6 mm).

H. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile, unless otherwise indicated.

1. Set thresholds in latex-portland cement mortar for locations where mortar bed would otherwise be exposed above adjacent nontile floor finish.

I. Install tile on walls with the following joint widths:

1. Glazed Wall Tile: 1/16 inch (1.6 mm).

## 3.3 FLOOR TILE INSTALLATION SCHEDULE

A. Interior floor installation on concrete; thin-set mortar; TCA F113.

1. Thin-Set Mortar: Latex portland cement mortar.
2. Grout: Polymer-modified unsanded grout.

## 3.4 WALL TILE INSTALLATION SCHEDULE

A. Interior wall installation; thin-set mortar; over concrete masonry.

1. Thin-Set Mortar: Latex portland cement mortar.
2. Grout: Polymer-modified unsanded grout.

END OF SECTION 09310

# SECTION 09311 – PORCELAIN FLOOR TILE

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Porcelain tiles.
2. Crack-suppression membrane for thin-set tile installations.
3. Metal edge strips installed as part of tile installations.

B. Related Sections include the following:

1. Division 3 Section "Cast-in-Place Concrete" for monolithic slab finishes specified for tile substrates.
2. Division 7 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

### 1.2 DEFINITIONS

A. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.

B. Facial Dimension: Actual tile size (minor facial dimension as measured per ASTM C 499).

C. Facial Dimension: Nominal tile size as defined in ANSI A137.1.

### 1.3 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:

1. Level Surfaces: Minimum 0.6.

### 1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

D. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Sample of grout of type and in color or colors.
3. Metal edge strips in 6-inch (150-mm) lengths.

E. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

F. Product Certificates: For each type of product, signed by product manufacturer.

G. Qualification Data: For Installer.

H. Material Test Reports: For each tile-setting and -grouting product.

## 1.5 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain all tile of same color or finish from one source or producer.

1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:
1. Joint sealants.
2. Metal edge strips.
3. Expansion Joints

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Store emulsion adhesives in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.7 PROJECT CONDITIONS

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

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Basis-of-Design Product: The design for each tile type is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements, unless otherwise indicated.
2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting and Grouting Materials" Article.

C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the indicated requirements. Otherwise colors / patterns will be as selected from full range of manufacturer's products complying with stated requirements.

D. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

E. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by pre-coating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

## 2.3 TILE PRODUCTS

A. Manufacturers:

1. American Olean; Div. of Dal-Tile International Corp.
2. Crossville Ceramics Company, L.P.
3. Daltile; Div. of Dal-Tile International Inc.
4. Florida Tile Industries, Inc.

B. Unglazed Paver Tile; Flat tile as follows:

1. Composition: Porcelain.
2. Facial Dimensions: 11-13/16 by 11-13/16 inches (300 by 300 mm).
3. Thickness: 5/16 inch (8 mm).
4. Face: Plain with square edges
5. For latex-portland cement-mortared and -grouted paver tile, precoat with temporary protective coating.

## 2.4 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, aligning lower edge of bevel with adjacent floor finish. Limit height of bevel to 1/2 inch (12.7 mm) or less, and finish bevel to match face of threshold.

B. Granite Thresholds: ASTM C 615, with polished finish.

1. Description: Uniform, fine grained, black stone without veining.

## 2.5 CRACK-SUPPRESSION MEMBRANE FOR THIN-SET TILE INSTALLATIONS

A. General: Manufacturer's standard product that complies with ANSI A118.10.

B. Corrugated-Polyethylene Product: Corrugated polyethylene with dovetail-shaped corrugations for adhering to latex-portland cement mortar and with anchoring webbing on the underside; 39 inches (1000 mm) wide by 3/16-inch (4-mm) nominal thickness.

1. Product: Schluter Systems L.P.; DITRA.

## 2.6 SETTING AND GROUTING MATERIALS

A. Manufacturers:

1. Bonsal, W. R., Company.
2. C-Cure.
3. LATICRETE International Inc.
4. MAPEI Corporation.

B. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4, consisting of the following:

1. Prepackaged dry-mortar mix combined with acrylic resin liquid-latex additive.

a. For wall applications, provide nonsagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.

C. Polymer-Modified Tile Grout: ANSI A118.7, color as indicated.

1. Polymer Type: Either ethylene vinyl acetate, in dry, redispersible form, prepackaged with other dry ingredients, or acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.

a. Unsanded grout mixture for joints 1/8 inch (3.2 mm) and narrower.

## 2.7 ELASTOMERIC SEALANTS

A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 7 Section "Joint Sealants."

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.

C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

1. Products:

a. Dow Corning Corporation; Dow Corning 786.
b. GE Silicones; Sanitary 1700.
c. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
d. Tremco, Inc.; Tremsil 600 White.

D. Chemical-Resistant Sealants: For chemical-resistant floors, provide chemical-resistant elastomeric sealant of type recommended and produced by chemical-resistant mortar and grout manufacturer for type of application indicated, with proven service record and compatibility with tile and other setting materials, and with chemical resistance equivalent to mortar/grout. Include primer and backer rod recommended by manufacturer.

## 2.8 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness; metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications, anodized aluminum, and stainless steel; ASTM A 666, 300 Series exposed-edge material with satin finish.

1. Edge protecting profile for straight application

   a. Schluter: RENO TK

   b. Schluter: DILEX-BWS

2. Edge protecting profile for curved designs.

   a. Schluter: Schiene - R/E 100 for use with 5/16-inch thick natural stone.

C. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.

1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F (49 to 60 deg C) per ASTM D 87.
2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.

D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

E. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints that does not change color or appearance of grout.

1. Products:

   a. Bonsal, W. R., Company; Grout Sealer.
   b. C-Cure; Penetrating Sealer 978.
   c. Custom Building Products; Grout Sealer.
   d. MAPEI Corporation; KER 003, Silicone Spray Sealer for Cementitious Tile Grout.

## 2.9 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

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

### 3.2 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. Provide concrete substrates for tile floors installed with adhesives or thin-set mortar that comply with flatness tolerances specified in referenced ANSI A108 Series of tile installation standards.

1. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions. Use product specifically recommended by tile-setting material manufacturer.
2. Remove protrusions, bumps, and ridges by sanding or grinding.

C. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

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

## 3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.

C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.

F. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

   1. Locate joints in tile surfaces directly above joints in concrete substrates.
   2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

G. Grout tile to comply with requirements of the following tile installation standards:

   1. For ceramic tile grouts (sand-portland cement; dry-set, commercial portland cement; and latex-portland cement grouts), comply with ANSI A108.10.

## 3.4 CRACK-SUPPRESSION MEMBRANE INSTALLATION

A. Install waterproofing to comply with ANSI A108.13 and waterproofing manufacturer's written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate.

B. Install crack-suppression membrane to comply with manufacturer's written instructions to produce membrane of uniform thickness bonded securely to substrate.

## 3.5 FLOOR TILE INSTALLATION

A. General: Install tile to comply with requirements in the Floor Tile Installation Schedule, including those referencing TCA installation methods and ANSI A108 Series of tile installation standards.

1. For installations indicated below, follow procedures in ANSI A108 Series tile installation standards for providing 95 percent mortar coverage.

   a. Tile floors composed of tiles 8 by 8 inches (200 by 200 mm) or larger.

B. Joint Widths: Install tile on floors with the following joint widths:

   1. Porcelain Paver Tile: 3/8 inch (10 mm)

C. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile, unless otherwise indicated.

   1. Set thresholds in latex-portland cement mortar for locations where mortar bed would otherwise be exposed above adjacent nontile floor finish.

D. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

E. Grout Sealer: Apply grout sealer to cementitious grout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer that has gotten on tile faces by wiping with soft cloth.

## 3.6 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

   1. Remove latex-portland cement grout residue from tile as soon as possible.
   2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
   3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

B. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

## 3.7 FLOOR TILE INSTALLATION SCHEDULE

A. Tile Installation: Interior floor installation on crack-suppression membrane over concrete; thin-set mortar; TCA F122 and ANSI A108.5.

1. Tile Type: Porcelain Paver Tile.
2. Thin-Set Mortar: Latex-portland cement mortar.
3. Grout: Polymer-modified unsanded grout.

END OF SECTION 09311

# SECTION 09402 - RESINOUS MATRIX TERRAZZO FLOORING

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Thin-set epoxy-resin terrazzo flooring and base.
2. Divider and control joint strips.

B. Related Sections:

1. Division 1 Section "LEED Requirements" for additional LEED requirements.
2. Division 7 Section "Joint Sealants" for sealants installed with terrazzo.

### 1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include terrazzo installation requirements. Include plans, elevations, sections, component details, and attachments to other work. Show layout of the following:

1. Divider strips.
2. Control-joint strips.
3. Accessory strips.
4. Abrasive strips.
5. Stair treads, risers, and landings.
6. Precast terrazzo jointing and edge configurations.
7. Terrazzo patterns.

C. Samples for Initial Selection: NTMA color plates showing the full range of colors and patterns available for each terrazzo type indicated.

D. Samples for Verification: For each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Label each terrazzo sample to identify manufacturer's matrix color and aggregate types, sizes, and proportions. Prepare samples of same thickness and from same material to be used for the Work in size indicated below:

1. Terrazzo: 6-inch- (150-mm-) square Samples.
2. Accessories: 6-inch- (150-mm-) long Samples of each exposed strip item required.

E. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.

F. Qualification Data: For qualified Installer.

G. Material Certificates: For each type of terrazzo material or product, from manufacturer.

H. Maintenance Data: For terrazzo to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer (applicator) who is acceptable to terrazzo manufacturer to install manufacturer's products.

1. Engage an installer who is certified in writing by terrazzo manufacturer as qualified to install manufacturer's products.
2. Engage an installer who is a contractor member of NTMA.

B. Source Limitations: Obtain primary terrazzo materials from one source from a single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.

C. Source Limitations for Aggregates: Obtain each color, grade, type, and variety of from one source with resources to provide materials of consistent quality in appearance and physical properties.

D. NTMA Standards: Comply with NTMA's "Terrazzo Specifications and Design Guide" and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.

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

1. Build mockups for terrazzo including accessories.

a. Size: Minimum 100 sq. ft. (9 sq. m) of typical poured-in-place flooring and base condition for each color and pattern in locations directed by Architect on 4' by 8' exterior grade of plywood.

2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

F. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to terrazzo including, but not limited to, the following:

a. Inspect and discuss condition of substrate and other preparatory work performed by other trades.

b. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
c. Review special terrazzo designs and patterns.
d. Review dust-control procedures.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting terrazzo installation.

B. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.

C. Close spaces to traffic during epoxy terrazzo application and for not less than 24 hours after application unless manufacturer recommends a longer period.

D. Control and collect dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.

1. Provide dustproof partitions and temporary enclosures to limit dust migration and to isolate areas from noise.

PART 2 - PRODUCTS

2.1 EPOXY-RESIN TERRAZZO

A. Products: Subject to compliance with requirements, products that may be incorporated into the Work include the following:

1. Crossfield Products Corp., Dex-O-Tex Division; Terrazzo.
2. General Polymers Corporation; Terrazzo .
3. Key Resin Company; Key Epoxy Terrazzo.
4. Terrazzo Technologies LLC; Morricite.
5. Polymerica Incorporated; MasterPiece ETS.
6. Terrazzo & Marble Supply Companies; Terroxy Resin Systems.

B. Thickness: 3/8 inch (9.5 mm).

C. Materials:

1. Flexible Reinforcing Membrane: Manufacturer's resinous membrane for substrate crack preparation and reflective crack reduction.

a. Reinforcement: Fiberglass scrim.

2. Primer: Manufacturer's product recommended for substrate and use indicated.

3. Epoxy-Resin Matrix: Manufacturer's standard recommended for use indicated and in color required for mix indicated.

   a. Physical Properties without Aggregates:

      1) Hardness: 60 to 85 per ASTM D 2240, Shore D.
      2) Minimum Tensile Strength: 3000 psi (20.7 MPa) per ASTM D 638 for a 2-inch (51-mm) specimen made using a "C" die per ASTM D 412.
      3) Minimum Compressive Strength: 10,000 psi (6.9 MPa) per ASTM D 695, Specimen B cylinder.
      4) Chemical Resistance: No deleterious effects by contaminants listed below after seven-day immersion at room temperature per ASTM D 1308.

         a) Distilled water.
         b) Mineral water.
         c) Isopropanol.
         d) Ethanol.
         e) 0.025 percent detergent solution.
         f) 1.0 percent soap solution.
         g) 10 percent sodium hydroxide.
         h) 10 percent hydrochloric acid.
         i) 30 percent sulfuric acid.
         j) 5 percent acetic acid.

   b. Physical Properties with Aggregates: For resin blended with Georgia white marble, ground, grouted, and cured per requirements in NTMA's "Terrazzo Specifications and Design Guide," comply with the following:

      1) Flammability: Self-extinguishing, maximum extent of burning 0.25 inch (6.35 mm) per ASTM D 635.
      2) Thermal Coefficient of Linear Expansion: 0.0025 inch/inch per deg F (0.0025 mm/mm per 0.5556 deg C) for temperature range of minus 12 to plus 140 deg F (minus 24 to plus 60 deg C) per ASTM D 696.

4. Marble Chips: Complying with NTMA gradation standards for mix indicated and containing no deleterious or foreign matter.

   a. Hardness: HA-10 minimum per ASTM C24.
   b. 24-Hour Absorption Rate: Less than 0.75 percent.
   c. Dust Content: Less than 1.0 percent by weight.

5. Finishing Grout: Resin based.
6. Division-Strip Adhesives: Epoxy resin adhesive recommended by adhesive manufacturer for this use.

D. Terrazzo: Comply with NTMA's "Terrazzo Specifications and Design Guide" and manufacturer's written instructions for matrix and marble-chip proportions and mixing.

   1. Formulated Mix Color and Pattern: As selected by Architect from manufacturer's full range.

E. Terrazzo: Comply with NTMA's "Terrazzo Specifications and Design Guide" and manufacturer's written instructions for matrix and aggregate proportions and mixing.

## 2.2 STRIP MATERIALS

A. Thin-Set Divider Strips: L-type angle or T-type, 3/84 inch (9.5 mm) deep.

1. Material: White-zinc alloy.
2. Top Width: 1/8 inch (3.2 mm).

B. Heavy-Top Divider Strips: L-type angle in depth required for topping thickness indicated.

1. Bottom-Section Material: Matching top-section material.
2. Top-Section Material: White-zinc alloy.
3. Top-Section Width: 1/8 inch (3.2 mm) See Architectural Drawings.

C. Control-Joint Strips: Separate, double L-type angles, positioned back to back, that match material, thickness, and color of divider strips and in depth required for topping thickness indicated.

D. Accessory Strips: Match divider strip width, material, and color unless otherwise indicated. Use the following types of accessory strips as required to provide a complete installation:

1. Edge-beads for exposed edges of terrazzo.

## 2.3 MISCELLANEOUS ACCESSORIES

A. Patching and Fill Material: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.

B. Joint Compound: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.

C. Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, and recommended by sealer manufacturer for use on terrazzo type indicated.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Examine substrates and areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions, including levelness tolerances, have been corrected.

E. Research/Evaluation Reports: For each acoustical panel ceiling and components and anchor type.

F. Maintenance Data: For finishes to include in maintenance manuals.

## 1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:

1. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:

   a. Smoke-Developed Index: 450 or less.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

## 1.6 PROJECT CONDITIONS

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

## 1.7 COORDINATION

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

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.
2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

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

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 reflectance, unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface per ASTM E 795.

B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

C. Panel-Based Antimicrobial Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial solution that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria.

2.4 GLASS-FIBER-BASE, ACOUSTICAL PANELS WITH MEMBRANE-FACED OVERLAY FOR ACOUSTICAL PANEL CEILING

A. Product:

1. Armstrong Metalworks, Tartan, 24" wide panel grid.

2. Optima, Open Plan & Radial, Non Standard Sizes.

See Architectural drawings for acoustical panel layout. Products listed are based on a specific manufacturer's product using them as the basis of design. Other manufacturer's matching the exact specifications will be considered.

B. Classification: Provide fire-resistance-rated panels complying with ASTM E 1264 for type, form, and pattern as follows:

1. Type and Form: Type XII, Form 1.
2. Pattern: Fine texture

C. Color: White.

D. LR: Not less than 0.90.

E. NRC: Not less than 1.00.

F. Edge Detail: 9/16" Square Tegular.

G. Thickness: 1-1/2 inch.

H. Size: Non-standard size. (See Reflected Ceiling Plan)

## 2.5 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance".

C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1.Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

D. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

## 2.6 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING.

A. Product:

1. Armstrong Metalworks, Tartan, 24" wide panel grid.

2. Armstrong Interlude XL, 9/16", Non Standard Sizes.

3. Armstrong Axiom, Classic – 8" Curved Perimeter Trim

See Architectural drawings for acoustical panel layout. Products listed are based on a specific manufacturer's product using them as the basis of design. Other manufacturer's matching the exact specifications will be considered.

B. Wide-Faced, Capped, Double-Web, Hot-Dip Galvanized, Steel Suspension System: Main and cross runners formed from cold-rolled steel sheet, hot-dip galvanized according to ASTM A 653/A 653M coating designation, with prefinished, cold rolled, 9/16" wide aluminum caps on flanges.

1. Structural Classification: Intermediate-duty system.
2. Face Design: 24" wide, Tartan Custom Panel grid System.
   9/16" wide, Interlude XL Dimensional Tee grid. (Optima acoustical Panels)
3. Finish: Painted white.
4. Reveal Finish: Painted white.

## 2.7 METAL EDGE MOLDINGS AND TRIM

A. Manufacturers:

1. Armstrong World Industries, Inc.
2. Chicago Metallic Corporation.
3. Fry Reglet Corporation.
4. USG Interiors, Inc.

B. Roll-Formed Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish, and color 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.

## 2.8 ACCENT CANOPIES

A. Manufacturer:

1. Armstrong World Industries, Inc.

B. Channeled Polycarbonate, Infusion – Accent Canopies, 2' x 5', "Indigo Surf".

1. Suspend panels per manufacturer's recommendations. All panels are to be linked to each other with a 6" Linking Kit "E". Contractor to provide Escutcheon Kit "D" at all acoustical ceiling panel penetrations.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

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

### 3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

### 3.3 INSTALLATION, GENERAL

A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
4. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
5. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
6. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and

appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.

7. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
10. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches (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 (3.2 mm in 3.66 m). Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. Arrange directionally patterned acoustical panels as follows:

   a. As indicated on reflected ceiling plans.
   b. Install panels with pattern running in one direction parallel to long axis of space.

2. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
3. For reveal-edged panels on suspension system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension system surfaces and panel faces flush with bottom face of runners.
4. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
5. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated.

6. Install clean-room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.
7. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

## 3.4 CLEANING

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

END OF SECTION 09511

# SECTION 09651 - RESILIENT FLOOR TILE

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Solid vinyl floor tile.

B. Related Sections include the following:

1. Division 9 Section "Resilient Wall Base and Accessories" for resilient wall base, reducer strips, and other accessories installed with resilient floor tile.

### 1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of product indicated.

C. Samples for Verification: Full-size units of each color and pattern of resilient floor tile required.

D. Maintenance Data: For resilient products to include in maintenance manuals.

### 1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide products identical to those tested for fire-exposure behavior per test method indicated by a testing and inspecting agency acceptable to authorities having jurisdiction.

### 1.4 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store tiles on flat surfaces.

### 1.5 PROJECT CONDITIONS

A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After post installation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Close spaces to traffic during floor covering installation.

D. Close spaces to traffic for 48 hours after floor covering installation.

E. Install resilient products after other finishing operations, including painting, have been completed.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed or not less than 5%.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 COLORS AND PATTERNS

A. Colors and Patterns: As selected by Owner / Architect from manufacturer's complete range for specified product.

2.3 SOLID VINYL FLOOR TILE

A. Solid Vinyl Floor Tile: ASTM F 1700.

1. Mannington Commercial Flooring;
2. Armstrong World Industries, Inc.;
3. Azrock Commercial Flooring, DOMCO;
4. Marley Flexco (USA), Inc.;
5. Roppe Corporation.

B. Reference Specification: Meets or exceeds ASTM F 1303-97, Type KK, Grade I.

C. Type: B, Embossed Surface Homogeneous-wear layer containing suspended microscopic aluminum oxide particles.

D. Thickness: 0.080 inch (2.0 mm).

E. Size: 18 by 18 inches (457 by 457 mm).

F. Fire-Test-Response Characteristics:

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm per ASTM E 648.
2. NBS Smoke Density ASTM E 662: 450 or less.

G. Slip Retardant Performance: ASTM D 2047 James Test exceeds the ADA recommended static coefficient of friction for accessible routes.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
3. Moisture Testing:

a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 5 lb of water/1000 sq. ft. in 24 hours.

C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

D. Use trowelable non-shrinking water resistant Portland cement leveling and patching compound to fill cracks, holes, and depressions in substrates.

E. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

1. Do not install resilient products until they are same temperature as space where they are to be installed.

F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.3 TILE INSTALLATION

A. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles square with room axis.

B. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain running in one direction.

C. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.

D. Extend tiles into toe spaces, door reveals, closets, and similar openings.

E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

F. Install tiles on covers for telephone and electrical ducts and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of tile installed on covers. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

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

## 3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

    a. Do not wash surfaces until after time period recommended by manufacturer.

B. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

1. Apply protective floor polish to horizontal surfaces that are free from soil, visible adhesive, and surface blemishes if recommended in writing by manufacturer.

    a. Use commercially available product acceptable to manufacturer.
    b. Coordinate selection of floor polish with Owner's maintenance service.

2. Cover products installed on horizontal surfaces with undyed, untreated building paper until Substantial Completion.
3. Do not move heavy and sharp objects directly over surfaces. Place hardboard or plywood panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION 09651

# SECTION 09653 - RESILIENT WALL BASE AND ACCESSORIES

## PART 1 - GENERAL

1.1 Submittals: In addition to product data submit the following:

A. Samples in manufacturer's standard sizes of each different color and pattern of product specified.

B. Maintenance data for products specified in this Section, to include in Operating and Maintenance Manuals.

1.2 Extra Materials: Deliver to Owner not less than 10 linear feet (3 meters) for each 500 linear feet (150 meters) or fraction thereof, in roll form of each different material, style and color of resilient wall base installed.

## PART 2 - PRODUCTS

2.1 Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to:

A. Armstrong World Industries, Inc.;
B. Azrock Commercial Flooring, DOMCO;
C. Burke Mercer Flooring Products;
D. Johnsonite;
E. Marley Flexco (USA), Inc.; and
F. Roppe Corporation.

2.2 Rubber Wall Base: Products complying with ASTM F1861, Type TP, Group I, and requirements specified in the Rubber Wall Base Product Data at end of this Section.

2.3 Concrete Slab Primer: Nonstaining type as recommended by flooring manufacturer.

2.4 Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.

2.5 Adhesives: Water-resistant type recommended by manufacturer to suit resilient flooring product and substrate conditions indicated.

## PART 3 - EXECUTION

3.1 Examine areas where installation of products specified in this Section will occur, with Installer present, to verify that substrates and conditions are satisfactory for installation and comply with manufacturer's requirements.

A. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 before beginning installation.

3.2 Preparation: Comply with manufacturer's installation specifications to prepare substrates indicated to receive products specified in this Section.

3.3 Installation: Install products specified in this Section using methods indicated according to manufacturer's installation directions.

A. Apply resilient wall base to walls, columns, pilasters, casework, and other permanent fixtures in rooms or areas where base is required. Install wall base in lengths as long as practicable.

B. Tightly adhere wall base to substrate throughout length of each piece, with continuous contact of base with horizontal and vertical substrates.

C. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

D. Place resilient accessories so they are butted to adjacent materials of type indicated and secure with adhesive. Install reducer strips at edges of flooring that otherwise would be exposed.

3.4 Cleaning: Clean products specified in this Section after installation and 4 days prior to date scheduled for inspections intended to establish date of Substantial Completion. Apply protective polish according to resilient accessory manufacturer's directions.

A. Rubber Wall Base Product Data
Style: Cove with top-set toe
Minimum Thickness: 1/8"
Height: 4"
Lengths: Coils in lengths standard with manufacturer but not less than 100 feet
Exterior Corners: Premolded
Interior Corners: Field Cut
Color: As selected by Architect from manufacturers full range of colors.

END OF SECTION 09653

# SECTION 09900 - PAINTING

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes surface preparation and field painting of the following:

1. Exposed exterior items and surfaces.
2. Exposed interior items and surfaces.
3. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.

1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and ironwork, and primed metal surfaces of mechanical and electrical equipment.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Prefinished items include the following factory-finished components:

a. Architectural woodwork and casework.
b. Acoustical wall panels.
c. Metal toilet enclosures.
d. Metal lockers.
e. Unit kitchens.
f. Finished mechanical and electrical equipment.
g. Light fixtures.
h. Distribution cabinets.

2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:

a. Foundation spaces.
b. Furred areas.
c. Ceiling plenums.
d. Utility tunnels.
e. Pipe spaces.
f. Duct shafts.
g. Elevator shafts.

3. Finished metal surfaces include the following:

   a. Anodized aluminum.
   b. Stainless steel.
   c. Chromium plate.
   d. Copper.
   e. Bronze and brass.

4. Operating parts include moving parts of operating equipment and the following:

   a. Valve and damper operators.
   b. Linkages.
   c. Sensing devices.
   d. Motor and fan shafts.

5. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

## 1.2 SUBMITTALS

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

   1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
   2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.

B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.

   1. After color selection, the Architect will furnish color chips for surfaces to be coated.

C. 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 addresses of architects and owners, and other information specified.

## 1.3 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.

B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

C. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample of each type of coating and substrate required on the Project. Comply with procedures specified in PDCA P5. Duplicate finish of approved prepared samples.

1. The Architect will select one room or surface to represent surfaces and conditions for each type of coating and substrate to be painted.

   a. Wall Surfaces: Provide samples on at least 100 sq. ft. (9 sq. m) of wall surface.

2. Final approval of colors will be from job-applied samples.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (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.

1.5 PROJECT CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F (10 and 32 deg C).

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F (7.2 and 35 deg C).

C. Do not apply paint in rain, fog, or mist; or when the relative humidity exceeds 85 percent; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

## 1.6 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to the Owner.

1. Quantity: Furnish the Owner with an additional 5 percent, but not less than 1 gal. (3.785 L) or 1 case, as appropriate, of each material and color applied.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in the paint schedules.

B. Manufacturers Names: The following manufacturers are referred to in the paint schedules by use of shortened versions of their names, which are shown in parentheses:

1. Devoe & Raynolds Co. (Devoe).
2. Fuller-O'Brien Paints (Fuller).
3. Glidden Co. (The) (Glidden).
4. Benjamin Moore & Co. (Moore).
5. PPG Industries, Inc. (PPG).
6. Pratt & Lambert, Inc. (P & L).
7. Sherwin-Williams Co. (S-W).

## 2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: Provide color selections made by the Architect.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.

1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
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.

### 3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.
2. Cementitious Materials: Prepare concrete, 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.

   a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
   b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and

burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.

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.

3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.

   a. Blast steel surfaces clean as recommended by paint system manufacturer and according to requirements of 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 paint manufacturer, and touch up with the same primer as the shop coat.

4. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

## 3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the schedules.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, 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.

5. 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.
6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
9. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
10. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
2. Omit primer on metal surfaces that have been shop primed and touchup painted.
3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, 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.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
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.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.

F. Mechanical items to be painted include, but are not limited to, the following:

1. Piping, pipe hangers, and supports.
2. Heat exchangers.

3. Tanks.
4. Ductwork.
5. Insulation.
6. Motors and mechanical equipment.
7. Accessory items.

G. Electrical items to be painted include, but are not limited to, the following:

1. Conduit and fittings.
2. Switchgear.
3. Panelboards.

H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

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 surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

K. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

## 3.4 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from 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.

## 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 approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

## 3.6 EXTERIOR PAINT SCHEDULE

A. Plywood: Provide the following finish systems over exterior plywood:

B. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.

1. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a rust-inhibitive primer.

a. Primer: Rust-inhibitive metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils (0.033 mm).

1) Devoe: 13101 Mirrolac Rust Penetrating Metal Primer.
2) Fuller: 621-04 Blox-Rust Alkyd Metal Primer.
3) Glidden: 5205 Glid-Guard Tank & Structural Primer, Red.
4) Moore: IronClad Retardo Rust-Inhibitive Paint #163.
5) PPG: 6-208 Speedhide Interior/Exterior Rust Inhibitive Steel Primer.
6) P & L: S/D 1009 Suprime "9" Interior/Exterior Alkyd Metal Primer.

b. First and Second Coats: Semigloss, exterior, acrylic-latex enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils (0.066 mm).

1) Devoe: 17XX Wonder-Shield Semi-Gloss Exterior Acrylic Latex House and Trim Paint.
2) Fuller: 664-XX Weather King II Semi-Gloss House & Trim Paint.
3) Glidden: 6600 Series Spred Ultra Exterior Gloss Latex House & Trim Paint.
4) Moore: MoorGlo Latex House & Trim Paint #096.
5) PPG: 78 Line Sun-Proof Semi-Gloss Acrylic Latex House and Trim Paint.
6) P & L: Z/F 3100 Series Aqua Royal Latex House & Trim Finish.

C. Zinc-Coated Metal: Provide the following finish systems over exterior zinc-coated (galvanized) metal surfaces:

1. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a galvanized metal primer.

a. Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils (0.031 mm).

1) Devoe: 8502/8520 Mirrolac-WB Interior/Exterior Waterborne Flat DTM Primer and Finish.
2) Fuller: 621-05 Blox-Rust Latex Metal Primer.
3) Glidden: 5205 Glid-Guard Tank & Structural Primer, Red.
4) Moore: IronClad Galvanized Metal Latex Primer #155.
5) PPG: 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel.
6) P & L: Z/F 1003 Suprime "3" Interior/Exterior Latex Metal Primer.

b. First and Second Coats: Semigloss, exterior, acrylic-latex enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils (0.066 mm).

1) Devoe: 17XX Wonder-Shield Semi-Gloss Exterior Acrylic Latex House and Trim Paint.
2) Fuller: 664-XX Weather King II Semi-Gloss House & Trim Paint.
3) Glidden: 6600 Series Spred Ultra Exterior Gloss Latex House & Trim Paint.
4) Moore: MoorGlo Latex House & Trim Paint #096.
5) PPG: 78 Line Sun-Proof Semi-Gloss Acrylic Latex House and Trim Paint.
6) P & L: Z/F 3100 Series Aqua Royal Latex House & Trim Finish.

## 3.7 INTERIOR PAINT SCHEDULE

A. Concrete Masonry Units: Provide the following finish systems over interior concrete masonry block units:

1. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a block filler.

a. Block Filler: High-performance, latex-based, block filler applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 5.0 mils (0.13 mm).

1) Devoe: 52902 Bloxfil 200 Interior/Exterior Latex Block Filler.
2) Fuller: 280-00 Interior/Exterior Latex Block Filler.
3) Glidden: 5317 Ultra-Hide Block Filler, Latex Interior-Exterior.
4) Moore: Moorcraft Interior & Exterior Block Filler #173.
5) PPG: 6-7 Speedhide Interior/Exterior Masonry Latex Block Filler.
6) P & L: Z 98 Pro-Hide Plus Latex Block Filler.

b. First and Second Coats: Semigloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils (0.066 mm).

1) Devoe: 39XX Wonder-Tones Semi-Gloss Interior Latex Enamel.
2) Fuller: 214-XX AA Enamel Interior Acrylic Latex Semi-Gloss Enamel.
3) Glidden: 8200 Series Spred Ultra Latex Semi-Gloss Enamel.
4) Moore: Moore's Regal AquaGlo Vinyl-Acrylic Latex Enamel #333.
5) PPG: 88-110 Satinhide Interior Enamel Wall & Trim Lo-Lustre Semi-Gloss Latex.
6) P & L: Z/F 4100 Series Accolade Interior Semi-Gloss.

B. Plaster: Provide the following finish systems over new, interior plaster surfaces:

1. Low-Luster, Acrylic-Enamel Finish: 2 finish coats over a primer.

a. Primer: Alkali-resistant, alkyd- or latex-based, interior primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by

the manufacturer to achieve a total dry film thickness of not less than 1.2 mils (0.031 mm).

1) Devoe: 51701 Wonder-Prime Interior All-Purpose Latex Primer Sealer & Vapor Barrier.
2) Fuller: 220-06 Interior Alkyd Wall Primer Sealer.
3) Glidden: 5111 Spred Ultra Latex Primer-Sealer.
4) Moore: Regal First Coat Interior Latex Primer & Underbody #216.
5) PPG: 6-603 Speedhide Interior/Exterior Acrylic Latex Alkali Resistant Primer.
6) P & L: Z/F 1001 Suprime "1" 100 Percent Acrylic Multi-Purpose Primer.

b. First and Second Coats: Low-luster (eggshell or satin), acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.8 mils (0.071 mm).

1) Devoe: 34XX Wonder-Tones Interior Latex Eggshell Enamel.
2) Fuller: 212-XX AA Enamel Interior Acrylic Latex Eggshell Enamel.
3) Glidden: 4100 Series Spred Ultra Eggshell Latex Wall & Trim Paint.
4) Moore: Moore's Regal AquaVelvet #319.
5) PPG: 89 Line Manor Hall Eggshell Latex Wall and Trim Enamel.
6) P & L: Z/F 4000 Series Accolade Interior Velvet.
7) Acoustical Plaster: Provide the following finish system over interior, acoustical plaster
8) PPG: 89 Line Manor Hall Interior Eggshell Latex Wall and Trim Enamel.
9) P & L: Z/F 4000 Series Accolade Interior Velvet.
10) PPG: 88-110 Satinhide Interior Enamel Wall & Trim Lo-Lustre Semi-Gloss Latex.
11) P & L: Z/F 4100 Series Accolade Interior Semi-Gloss.

C. Ferrous Metal: Provide the following finish systems over ferrous metal:

1. Semigloss, Acrylic-Enamel Finish: One finish coat over an enamel undercoater and a primer.

a. Primer: Quick-drying, rust-inhibitive, alkyd-based or epoxy-metal primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils (0.038 mm).

1) Devoe: 13101 Mirrolac Rust Penetrating Metal Primer.
2) Fuller: 621-04 Blox-Rust Alkyd & Structural Metal Primer.
3) Glidden: 5207 Glid-Guard Tank & Structural Primer, White.
4) Moore: IronClad Retardo Rust-Inhibitive Paint #163.
5) PPG: 6-208 Speedhide Interior/Exterior Rust Inhibitive Steel Primer.
6) P & L: S 4551 Tech-Gard High Performance Rust Inhibitor Primer.

b. Undercoat: Alkyd, interior enamel undercoat or semigloss, acrylic-latex, interior enamel, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils (0.033 mm).

1) Devoe: 39XX Wonder-Tones Semi-Gloss Interior Latex Enamel.
2) Fuller: 220-07 Interior Alkyd Enamel Undercoat.
3) Glidden: 8200 Series Spred Ultra Latex Semi-Gloss Enamel.
4) Moore: Moore's Alkyd Enamel Underbody #217.
5) PPG: 6-6 Speedhide Interior Quick-Drying Enamel Undercoater.
6) P & L: Z/F 4100 Series Accolade Interior Semi-Gloss.

c. Finish Coat: Semigloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils (0.033 mm).

1) Devoe: 39XX Wonder-Tones Semi-Gloss Interior Latex Enamel.
2) Fuller: 214-XX AA Enamel Interior Acrylic Latex Semi-Gloss Enamel.
3) Glidden: 8200 Series Spred Ultra Latex Semi-Gloss Enamel.
4) Moore: Moore's Regal AquaGlo Vinyl-Acrylic Latex Enamel #333.
5) PPG: 88-110 Satinhide Interior Enamel Wall & Trim Lo-Lustre Semi-Gloss Latex.
6) P & L: Z/F 4100 Series Accolade Interior Semi-Gloss.

D. Zinc-Coated Metal: Provide the following finish systems over zinc-coated metal:

1. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a primer.

a. Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils (0.031 mm).

1) Devoe: 13201 Mirrolac Galvanized Metal Primer.
2) Fuller: 621-05 Blox-Rust Latex Metal Primer.
3) Glidden: 5207 Glid-Guard Tank & Structural Primer, White.
4) Moore: IronClad Galvanized Metal Latex Primer #155.
5) PPG: 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel.
6) P & L: Z/F 1003 Suprime "3" Interior/Exterior Latex Metal Primer.

b. First and Second Coats: Semigloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils (0.066 mm).

1) Devoe: 39XX Wonder-Tones Semi-Gloss Interior Latex Enamel.
2) Fuller: 214-XX AA Enamel Interior Acrylic Latex Semi-Gloss Enamel.
3) Glidden: 8200 Series Spred Ultra Latex Semi-Gloss Enamel.
4) Moore: Moore's Regal AquaGlo Vinyl-Acrylic Latex Enamel #333.
5) PPG: 88-110 Satinhide Interior Enamel Wall & Trim Lo-Lustre Semi-Gloss Latex.
6) P & L: Z/F 4100 Series Accolade Interior Semi-Gloss.

E. Cotton or Canvas Covering over Insulation: Provide the following finish system on cotton or canvas insulation covering:

1. Flat Acrylic Finish: 2 finish coats. Add fungicidal agent to render fabric mildewproof.

a. First and Second Coats: Flat, latex-based, interior paint applied at spreading rate recommended by the manufacturer.

1) Devoe: 36XX Wonder-Tones Interior Latex Flat Wall Paint.
2) Fuller: 202-XX Acrylic Latex Wall Paint.
3) Glidden: 4000 Series Spred Ultra Flat Latex Wall and Trim Paint.
4) Moore: Regal Wall Satin #215.
5) PPG: 6-700 Series Speedhide Ultra Interior Wall Flat Latex 100 Percent Acrylic.
6) P & L: Z/F 1005 Suprime "5" Latex Pre-Wallcovering Primer.
7) S-W: Classic 99 Wall and Trim Paint A27W10.

END OF SECTION 09900

# SECTION 09963 - ELASTOMERIC COATINGS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes surface preparation and application of elastomeric coatings to all exterior stucco and scheduled interior exposed concrete masonry surfaces.

### 1.2 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

B. Stucco: A portland cement-based plaster used on exterior surfaces.

### 1.3 PERFORMANCE REQUIREMENTS

A. Provide elastomeric coating systems with the following properties as determined by test methods indicated:

1. Elongation: Not less than 100 percent with a tensile strength of 200 psi (1379 kPa) and not less than 88 percent recovery after 1 hour and 90 percent recovery after 24 hours when tested according to ASTM D 2370 using parameters established by MPI 113.
2. Accelerated Weathering: No cracking, peeling, blistering, chalking, or visual deterioration after 1000 hours when tested according to procedures in ASTM G 155.
3. Low-Temperature Flexibility: No crack formation when tested according to ASTM D 1737.
4. Moisture-Vapor Transmission: Not less than 2.0 perms (115 ng/Pa x s x sq. m) according to ASTM D 1653.
5. Wind-Driven Rain Resistance: No water penetration according to procedures in FS TT-C-555.
6. Minimum Solids Content by Volume: Not less than 45 percent.

### 1.4 SUBMITTALS

A. Product Data: For each elastomeric coating system specified. Include crack fillers, block fillers, and primers.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference the specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Technical information including label analysis and instructions for handling, storing, and applying each coating material.

B. Samples for Initial Selection: For each type of finish-coat material indicated.

1. After color selection, Architect will furnish color chips indicating colors selected.

C. Material Certificates: For each elastomeric coating material, signed by manufacturers.

## 1.5 QUALITY ASSURANCE

A. Applicator Qualifications: A firm or individual experienced in applying elastomeric coating systems similar in material and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Source Limitations: Obtain crack fillers, block fillers and primers from same manufacturer as finish coats.

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Product name or title of material.
2. Manufacturer's stock number and date of manufacture.
3. Contents by volume, for pigment and vehicle constituents.
4. Thinning instructions (if permitted).
5. Application instructions.
6. Color name and number.
7. Handling instructions and precautions.
8. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain storage containers in a clean condition, free of foreign materials and residue.

1. Protect elastomeric coating materials from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

## 1.7 PROJECT CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 90 deg F (10 and 32 deg C), unless otherwise permitted by manufacturer's written instructions.

B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent or to damp or wet surfaces.

1. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before starting or continuing coating operation.

## 1.8 WARRANTY

A. Elastomeric Coating Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace elastomeric coatings that fail within specified warranty period. Failures include, but are not limited to, water penetration through the coating.

B. Warranty Period for Elastomeric Coatings: One year from date of Substantial Completion.

## 1.9 EXTRA MATERIALS

A. Furnish extra elastomeric coating materials from same production run as materials applied and in quantities described below. Package materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to Owner.

1. Quantity: Furnish Owner with an additional 3 percent, but not less than 1 gal. (3.8 L) of each color applied.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

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

B. Manufacturers Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Benjamin Moore & Co. (Benjamin Moore).
2. ICI Dulux Paint Centers, Inc. (ICI Dulux Paint).
3. Modac Products Company (Modac).
4. PPG Industries, Inc.; Pittsburgh Paints (Pittsburgh Paints).
5. Sonneborn, Div. of ChemRex, Inc. (Sonneborn).
6. Sto Concrete Restoration; Sto Finish Systems Division (Sto).
7. Tamms Industries, Inc. (Tamms).
8. Tnemec Company, Inc. (Tnemec).

## 2.2 ELASTOMERIC COATING MATERIALS, GENERAL

A. Material Compatibility: Provide crack fillers, block fillers, primers, elastomeric finish-coat materials, and related materials that are compatible with one another and substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality elastomeric coating materials that are factory formulated, comply with requirements in FS TT-C-555, and are recommended by manufacturer for the application indicated. Material containers not displaying manufacturer's product identification are not acceptable.

C. Colors and Textures: As selected by Architect from manufacturer's full range.

## 2.3 CRACK FILLERS

A. Crack Fillers: Factory-formulated acrylic emulsion crack fillers compatible with substrate and finish-coat materials indicated.

1. Crack Filler for Cracks up to 1/16 Inch (1.5 mm):

   a. ICI Dulux Paint; Decra-Flex Smooth Brush Grade Elastomeric Patching Compound.
   b. Modac; Acra Lastic Brush Grade 115-004.
   c. Pittsburgh Paints; Buttering Grade Vinyl Sealant 236-2414.
   d. Sonneborn; Hydrocide 750 Brush Grade or Knife Grade Patching Compound.
   e. Sto; Flexible Crack Filler.

## 2.4 CONCRETE MASONRY BLOCK FILLERS

A. Concrete Unit Masonry Block Filler: Factory-formulated, high-performance latex block fillers.

1. Benjamin Moore; Moorcraft Super Craft Latex Block Filler #285: Applied at a dry film thickness of not less than 8.1 mils (0.206 mm).
2. ICI Dulux Paint; Bloxfil 4000-1000 Interior/Exterior Heavy Duty Acrylic Block Filler: Applied at a dry film thickness of not less than 7.0 to 14.5 mils (0.178 to 0.368 mm).
3. Modac; 100% Acrylic Block Filler 019-146: Applied at a dry film thickness of not less than 4.0 mils (0.104 mm).
4. Pittsburgh Paints; 16-90 High-Performance Acrylic Block Filler: Applied at a dry film thickness of not less than 6.0 mils (0.152 mm).
5. Sonneborn; Colorflex Block Filler #749: Applied at a dry film thickness of not less than 1.3 mils (0.033 mm).
6. Sto; Flexible Coating CR212 Thinned 1:5 with 1 Gal. (3.8 L) of Water per Each 5 Gal. (19 L) of CR212: Applied at a dry film thickness of not less than 10 mils (0.254 mm).
7. Tamms; H/P Primer: Applied at a dry film thickness of not less than 1.3 mils (0.033 mm).

## 2.5 PRIMERS

A. Stucco Primer: Factory-formulated stucco primer.

1. Benjamin Moore; Moore's Acrylic Masonry Sealer #066: Applied at a dry film thickness of not less than 0.7 mil (0.018 mm).
2. ICI Dulux Paint; Aquacrylic GRIPPER 3210 Acrylic Primer: Applied at a dry film thickness of not less than 1.3 mils (0.033 mm).
3. Modac; Acrylic Latex Surface Conditioner 019-156: Applied at a dry film thickness of not less than 4.0 mils (0.104 mm).
4. Pittsburgh Paints; primer not required.
5. Sonneborn; primer not required.

6. Sto; Flexible Coating CR212 Thinned 1:5 with 1 Gal. (3.8 L) of Water per Each 5 Gal. (19 L) of CR212: Applied at a dry film thickness of not less than 10 mils (0.254 mm).
7. Tamms; H/P Primer: Applied at a dry film thickness of not less than 1.3 mils (0.033 mm).
8. Tnemec; Elasto-Grip Series 151: Applied at a dry film thickness of not less than 3.5 mils (0.090 mm).

## 2.6 ELASTOMERIC FINISH-COAT MATERIALS

A. Smooth Elastomeric Finish: Smooth, factory-formulated, 100 percent acrylic elastomeric coating.

1. Benjamin Moore; Moorlastic Elastomeric Waterproof Coating #055: Applied at a dry film thickness of not less than 10 mils (0.254 mm).
2. ICI Dulux Paint; Decra-Flex 2260-XXXX Smooth Elastomeric Coating System: Applied at a dry film thickness of not less than 6.0 mils (0.15 mm).
3. Modac; Elastomeric Acrylic Coating--Smooth Texture 019-146: Applied at a dry film thickness of not less than 7.0 mils (0.18 mm).
4. Pittsburgh Paints; Pitt-Flex Exterior Masonry Coating 100 Percent Acrylic Elastomeric 4-110: Applied at a dry film thickness of not less than 5.5 mils (0.140 mm).
5. Sonneborn; Sonocoat Colorflex Waterproof Elastomeric Coating: Applied at a dry film thickness of not less than 8.0 mils (0.020 mm).
6. Sto; Flexible Coating CR212: Applied at a dry film thickness of not less than 10 mils (0.254 mm).
7. Tamms; Tammolastic Smooth Elastomeric Decorative and Protective Coating: Applied at a dry film thickness of not less than 10 mils (0.254 mm).
8. Tnemec; Enviro-Crete Series 156 Smooth: Applied at a dry film thickness of not less than 8.0 mils (0.021 mm).

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for coating application. Comply with procedures specified in PDCA P4.

1. Proceed with coating application only after unsatisfactory conditions have been corrected and surfaces are thoroughly dry.
2. Start of coating application will be construed as Applicator's acceptance of surface conditions.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

## 3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, light fixtures, and similar items already installed that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.

1. After completing coating operations, reinstall items removed, using workers skilled in trades involved.

B. Cleaning: Before applying coatings or other surface treatments, clean substrates of substances that could impair bond of coating systems. Remove oil and grease before cleaning.

1. Schedule cleaning and coating application so dust and other contaminants from cleaning process will not fall on wet, newly coated surfaces.

C. Surface Preparation: Clean and prepare surfaces to be coated according to manufacturer's written instructions for particular substrate conditions and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.
2. Cementitious Surfaces: Prepare concrete unit masonry and stucco surfaces to receive elastomeric coatings. Remove efflorescence, chalk, dust, dirt, release agents, grease, oils, and similar impediments to good adhesion by water blasting followed by a clear water rinse.

   a. Remove mildew and neutralize surfaces according to manufacturer's written instructions before patching materials are applied.
   b. Determine alkalinity and moisture content of surfaces to be coated by performing appropriate tests. If surfaces are sufficiently alkaline to cause finish paint to blister and burn, correct this condition before application. Do not apply coatings over surfaces where moisture content exceeds that permitted in manufacturer's written instructions.

3. Crack Repair: Fill cracks according to manufacturer's written instructions before coating surfaces.
4. Deep Hairline Cracks: Remove dust and dirt from around cracks. Remove mildew by sterilizing before filling. Apply manufacturer's recommended primer to cracks before patching. If shrinkage occurs after applying crack filler, apply additional filler material to cracks before initial application of elastomeric coatings.

   a. Cracks up to 1/16 Inch (1.5 mm): Clean surface around cracks. Apply crack filler primer penetrating cracks as deeply as possible, overflowing crack 2 inches (50 mm) on each side. When crack filler primer is dry, apply manufacturer's recommended sealant, forced well into cracks using a brush, putty knife, or trowel. Smooth edges of primed area around cracks. Allow for sealant shrinkage when applying.

D. Material Preparation: Mix and prepare materials according to coating manufacturer's written instructions.

1. Maintain containers used in mixing and applying elastomeric coatings in a clean condition, free of foreign materials and residue.
2. Stir materials before application to produce a mixture of uniform density. Stir as required during application. If surface film forms, do not stir film into material. If necessary, remove film and strain coating material before using.
3. If manufacturer permits thinning, use only thinners recommended by manufacturer, and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match color of finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

## 3.3 APPLICATION

A. General: Apply elastomeric coatings according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Colors, surface treatments, and finishes are indicated in coating schedule.
2. Do not paint over conditions detrimental to formation of a durable coating film, such as dirt, rust, scale, grease, moisture, and scuffed surfaces.
3. Provide finish coats compatible with primers used.

B. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

C. Scheduling Coating: 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. Number of coats and film thickness required are same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.
2. If undercoats or other conditions show through final coat, apply additional coats until coating film is of uniform finish, color, and appearance. Ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.
3. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until coating has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat does not cause undercoat to lift or lose adhesion.

D. Application Procedures: Apply elastomeric coatings by brush, roller, or spray according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for material being applied.
2. Rollers: Use professional-quality quick-release rollers of carpet, velvet back, or high-pile sheep's wool covers with a 1- to 1-1/4-inch (25.4- to 31.8-mm) nap as recommended by manufacturer for material and texture required.

E. Minimum Coating Thickness: Apply each material no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness as recommended by manufacturer.

F. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

G. Prime Coats: If recommended by manufacturer, apply a primer to material being coated before applying finish coats.

H. Brush Application: Brush out and work brush coats into surfaces in an even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Neatly draw glass lines and color breaks.

I. Roller Application: Keep cover wet at all times; do not dry roll. Work in sections. Lay on required amount of material, working material into grooves and rough areas; then level material, working it into surface.

J. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or recoat work not complying with specified requirements.

## 3.4 CLEANING

A. Cleanup: At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. After completing coating work, clean glass and spattered surfaces. Remove spattered coatings by washing, scraping, or other methods, being careful not to scratch or damage adjacent finished surfaces.

## 3.5 PROTECTION

A. Protect work of other trades from damage whether being coated or not. Correct damage by cleaning, repairing, replacing, and recoating as approved by Architect. Leave in an undamaged condition.

B. Provide "Wet Paint" signs to protect newly coated finishes. Remove temporary protective wrappings provided by others to protect their work after completing coating operations.

## 3.6 COATING SCHEDULE

A. Concrete Unit Masonry: Provide the following elastomeric coating systems over interior concrete unit masonry surfaces:

1. Smooth Elastomeric Finish: Two finish coat(s) over a concrete unit masonry block filler if required by manufacturer.

   a. Block Filler: Concrete unit masonry block filler.
   b. Primer: Concrete and masonry primer.
   c. Finish Coats: Smooth elastomeric finish.

B. Stucco (Portland Cement Plaster): Provide the following elastomeric coating systems over exterior stucco surfaces:

1. Smooth Elastomeric Finish: Two finish coat(s) over a primer if required by manufacturer.

   a. Primer: Stucco primer.
   b. Finish Coats: Smooth elastomeric finish.

END OF SECTION 09963

# SECTION 10155 - TOILET COMPARTMENTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes toilet compartments and screens as follows:

1. Type: Solid-plastic, polymer resin.
2. Compartment Style: Overhead braced and floor anchored.
3. Screen Style: Wall hung.

B. Related Sections include the following:

1. Division 10 "Toilet and Bath Accessories" for toilet paper holders, grab bars, purse shelves, and similar accessories.

### 1.2 SUBMITTALS

A. Product Data: For each type and style of toilet compartment and screen specified. Include details of construction relative to materials, fabrication, and installation. Include details of anchors, hardware, and fastenings.

B. Shop Drawings: For fabrication and installation of toilet compartment and screen assemblies. Include plans, elevations, sections, details, and attachments to other work.

1. Show locations of reinforcement and cutouts for compartment-mounted toilet accessories.

C. Samples for Verification: Of each compartment or screen color and finish required, prepared on 6-inch- (150-mm-) square Samples of same thickness and material indicated for Work.

### 1.3 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ampco Products, Inc.
2. Capitol Partitions, Inc.
3. General Partitions Mfg. Corp.
4. Global Steel Products Corp.
5. Santana Products, Inc.

### 2.2 MATERIALS

A. General: Provide materials that have been selected for surface flatness and smoothness. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are unacceptable.

B. Solid-Plastic, Polymer Resin: High-density polyethylene (HDPE) with homogenous color throughout. Provide material not less than 1 inch (25 mm) thick with seamless construction and eased edges in color and pattern as follows:

1. Colors and Patterns: Two colors and patterns in each room as selected by Architect from manufacturer's full range of colors and patterns.

C. Pilaster Shoes and Sleeves (Caps): ASTM A 666, Type 302 or 304 stainless steel, not less than 0.0312 inch (0.8 mm) thick and 3 inches (75 mm) high, finished to match hardware.

D. Stirrup Brackets: Manufacturer's standard ear or U-brackets for attaching panels and screens to walls and pilasters of the following material:

1. Material: Stainless steel.

E. Full-Height (Continuous) Brackets: Manufacturer's standard design for attaching panels and screens to walls and pilasters of the following material:

1. Material: Stainless steel.

F. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories of the following material:

1. Material: Stainless steel.

G. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with anti-grip profile in manufacturer's standard finish.

H. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip in manufacturer's standard finish.

I. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized, protective-coated steel.

## 2.3 FABRICATION

A. General: Provide standard doors, panels, screens, and pilasters fabricated for compartment system. Provide units with cutouts and drilled holes to receive compartment-mounted hardware, accessories, and grab bars, as indicated.

B. Solid-Plastic, Polymer-Resin Compartments and Screens: Provide aluminum heat-sink strips at exposed bottom edges of HDPE units to prevent burning.

C. Overhead-Braced-and-Floor-Anchored Compartments: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.

D. Wall-Hung Screens: Provide units in sizes indicated of same construction and finish as compartment panels, unless otherwise indicated.

E. Doors: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide in-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments indicated to be handicapped accessible.

1. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold door open at any angle up to 90 degrees.
2. Latch and Keeper: Manufacturer's standard surface-mounted latch unit with combination rubber-faced door strike and keeper designed for emergency access. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be handicapped accessible.
3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
4. Door Pull: Manufacturer's standard unit that complies with accessibility requirements of authorities having jurisdiction at out-swinging doors. Provide units on both sides of doors at compartments indicated to be handicapped accessible.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, plumb, and level. Provide clearances of not more than 1/2 inch (13 mm) between pilasters and panels and not more than 1 inch (25 mm) between panels and walls. Secure units in position with manufacturer's recommended anchoring devices.

B. Overhead-Braced-and-Floor-Anchored Compartments: Secure pilasters to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster with not less than 2 fasteners. Hang doors and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Screens: Attach with anchoring devices (continuous) according to manufacturer's written instructions and to suit supporting structure. Set units level and plumb and to resist lateral impact.

## 3.2 ADJUSTING AND CLEANING

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

B. Provide final protection and maintain conditions that ensure toilet compartments and screens are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 10155

# SECTION 10200 - LOUVERS AND VENTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes fixed, extruded-aluminum louvers.

B. Coordinate Louvers specified under this section with framing, wall panels and trim specified in Division 13 Section "Metal Building Systems".

### 1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide louvers capable of withstanding the effects of gravity loads and wind loads based on a uniform pressure of 30.5 lbf/sq. ft. (1436 Pa), acting inward or outward, without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors.

B. Seismic Performance: Provide louvers capable of withstanding the effects of earthquake motions determined according to International Building Code, 2003 Edition.

C. Thermal Movements: Provide louvers that allow for thermal movements resulting from a temperature change (range) of 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces, by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

D. Air-Performance, Water-Penetration, and Wind-Driven Rain Ratings: As demonstrated by testing manufacturer's stock units according to AMCA 500-L.

### 1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.

1. Verify louver openings by field measurements before fabrication and indicate measurements on Shop Drawings.
2. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples: For each type of finish.

B. Exposed Height: 30 feet (9.1 m) for two flanking poles, 35 feet (10.7 m) for one center pole.

C. Aluminum Flagpoles: Provide cone-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/ (B 241M), Alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 mm). Heat treat after fabrication to comply with ASTM B 597, Temper T6.

D. Foundation Tube: Galvanized corrugated-steel foundation tube, 0.064-inch- (1.6-mm-) minimum nominal wall thickness. Provide with 3/16-inch (4.8-mm) steel bottom plate and support plate; 3/4-inch- (19-mm-) diameter, steel ground spike; and steel centering wedges all welded together. Galvanize steel parts, including foundation tube, after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole. Provide flashing collar of same material and finish as flagpole.

## 2.3 FITTINGS

A. Finial Ball: Manufacturer's standard flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter; finished to match flagpole.

B. Internal Halyard, Winch System: Manually operated winch with control stop device and removable handle, stainless-steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door secured with cylinder lock. Finish truck assembly to match flagpole.

C. Halyard Flag Snaps: Provide two swivel snap hooks per halyard.

D. Elastomeric Joint Sealant: Single-component urethane or single-component neutral-curing silicone joint sealant complying with requirements in Division 7 Section "Joint Sealants" for Use NT (nontraffic) and for Use M, G, A, and, as applicable to joint substrates indicated, O joint substrates.

## 2.4 FINISHES

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

1. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

# PART 3 - EXECUTION

## 3.1 FLAGPOLE INSTALLATION

A. General: Install flagpoles where shown and according to manufacturer's written instructions.

B. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.

C. Foundation-Tube Installation: Install flagpole in foundation tube, seated on bottom plate between steel centering wedges. Plumb flagpole and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch (50-mm) layer of elastomeric joint sealant and cover with flashing collar.

D. Baseplate Installation: Install baseplate on washers placed over leveling nuts on anchor bolts and adjust until flagpole is plumb. After flagpole is plumb, tighten retaining nuts and fill space under baseplate solidly with nonshrink, nonmetallic grout. Finish exposed grout surfaces smooth and slope 45 degrees away from edges of baseplate.

END OF SECTION 10350

2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified (see Product Cuts at end of Section).

## 2.2 FABRICATION

A. Preassemble specialties in shop to greatest extent possible to minimize field assembly. Form postal specialties to required shapes and sizes, with true lines and angles, square, rigid, and without warp, with metal faces flat and free of dents or distortion. Make exposed metal edges and corners free of sharp edges and burrs, and safe to touch.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. Install products based on approved shop drawings and manufacturer's instructions

END OF SECTION 10425

# SECTION 10505 - METAL LOCKERS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Knocked-down, standard quiet metal lockers. Initial estimate quantity is a total of 150 compartments in a double tier configuration

### 1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:. Include plans, elevations, sections, details, and attachments to other work.

1. Show base, sloping tops, filler panels, recess trim and other accessories.
2. Include locker identification system.

C. Samples: For each exposed finish.

D. Maintenance data.

### 1.3 QUALITY ASSURANCE

A. Accessibility Requirements:

1. Provide not less than 1 shelf located no higher than 54 inches (1372 mm) above the floor for side reach.
2. Provide 1 shelf located at bottom of locker no lower than 15 inches (381 mm) above the floor for forward reach.
3. Provide hardware that does not require tight grasping, pinching, or twisting of the wrist, and that operates with a force of not more than 5 lbf (22.2 N).

### 1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.
b. Faulty operation of latches and other door hardware.

2. Damage from deliberate destruction and vandalism is excluded.
3. Warranty Period for Knocked-Down Metal Lockers: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

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

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

### 2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS) Type B, suitable for exposed applications.

B. Fasteners: Zinc- or nickel-plated steel, slot less-type exposed bolt heads, and self-locking nuts or lock washers for nuts on moving parts.

C. Anchors: Select material, type, size, and finish required for secure anchorage to each substrate.

1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance.
2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

### 2.3 KNOCKED-DOWN, STANDARD QUIET METAL LOCKERS

A. Available Products:

1. Art Metal Products, Div. of Fort Knox Storage Co.;
2. DeBourgh Mfg. Co.; Worley Lockers.
3. General Storage Systems, Div. of North American Steel; Decor Tri-Lok
4. Hadrian Inc.; Emperor Lockers.
5. List Industries Inc.; Lockers.
6. Lyon Workspace Products; Standard Lockers.
7. Penco Products, Inc., Subsidiary of Vesper Corporation; Lockers.
8. Republic Storage Systems Company; Lockers.
9. Shanahan's Ltd.; Deluxe Series Lockers.
10. Tennsco Corp.; Tennsco Lockers.

B. Locker Arrangement: Double tier.

C. Body and Shelves: Assembled by riveting or bolting body components together. Fabricate from 0.0209-inch- (0.55-mm-) thick, unperforated, cold-rolled steel sheet.

D. Frames: Channel formed; fabricated from 0.0528-inch- (1.35-mm-) thick, cold-rolled steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames.

E. Doors: One-piece; fabricated from 0.0528-inch- (1.35-mm-) thick, cold-rolled steel sheet; formed into channel shape with double bend at vertical edges, and with right-angle single bend at horizontal edges.

1. Doors less than 12 inches (305 mm) wide may be fabricated from 0.0428-inch- (1.1-mm-) thick, cold-rolled steel sheet.
2. Box lockers less than 15 inches (381 mm) wide may be fabricated from 0.0428-inch- (1.1-mm-) thick, cold-rolled steel sheet.
3. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches (381 mm) wide; welded to inner face of doors.
4. Stiffeners: Manufacturer's standard full-height stiffener fabricated from 0.0428-inch- (1.1-mm-) thick, cold-rolled steel sheet; welded to inner face of doors.
5. Sound-Dampening Panels: Manufacturer's standard, designed to stiffen doors and reduce sound levels when doors are closed, of die-formed metal with full perimeter flange and sound-dampening material; welded to inner face of doors.
6. Door Style: Louvered vents at top and bottom of face of door.

F. Hinges: Self-closing; welded to door and attached to door frame with not less than 2 factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.

1. Hinges: Manufacturer's standard, steel continuous or knuckle type.

G. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond face of door; pry resistant.

1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in key locks, or padlocks; positive automatic and prelocking.

   a. Latch Hooks: Equip doors less than 48 inches (1219 mm) high with 2 latch hooks; fabricated from minimum 0.0966-inch- (2.5-mm-) thick steel; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.
   b. Latching Mechanism: Manufacturer's standard rattle-free latching mechanism and moving components isolated with vinyl or nylon to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.

H. Equipment: Equip each metal locker with identification plate and the following, unless otherwise indicated:

1. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
2. Coat Rods: For each compartment of double-tier metal lockers.

I. Accessories:

1. Legs: Fabricated from 0.0528-inch- (1.35-mm-) thick, cold-rolled steel sheet.

   a. Closed Front and End Bases: Fabricated from 0.0329-inch- (0.85-mm-) thick, cold-rolled steel sheet.
2. Continuous Sloping Tops: Fabricated from cold-rolled steel sheet, manufacturer's standard thickness, but not less than 0.0329 inch (0.85 mm) thick.
3. Recess Trim: Fabricated from 0.0428-inch- (1.1-mm-) thick, cold-rolled steel sheet.
4. Filler Panels: Fabricated from cold-rolled steel sheet, manufacturer's standard thickness, but not less than 0.0329 inch (0.85 mm) thick.
5. Boxed End Panels: Fabricated from 0.0528-inch- (1.35-mm-) thick, cold-rolled steel sheet.
6. Finished End Panels: Fabricated from 0.0209-inch- (0.55-mm-) thick, cold-rolled steel sheet.

J. Finish: Baked enamel.

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

## 2.4 FABRICATION

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

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

B. Unit Principle: Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments.

C. Knocked-Down Construction: Fabricate metal lockers for nominal assembly at Project site using nuts, bolts, screws, or rivets. Factory weld frame members together to form a rigid, one-piece assembly.

D. Hooks: Manufacturer's standard ball-pointed type, aluminum or steel; zinc plated.

E. Coat Rods: Fabricated from 1-inch- (25-mm-) diameter steel; chrome finished.

F. Identification Plates: Manufacturer's standard etched, embossed, or stamped aluminum plates; with numbers and letters at least 3/8 inch (9 mm) high.

G. Legs: Formed by extending vertical frame members or by attaching gusset-type legs to locker body; with provision for fastening to floor; finished to match lockers.

1. Closed Front and End bases: Fabricate bases without overlap or exposed fasteners; finished to match lockers.

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

I. Continuous Sloping Tops: Fabricated in lengths as long as practicable, without visible fasteners at splice locations; finished to match lockers.

J. Recess Trim: Fabricated with minimum 2-1/2-inch (64-mm) face width and in lengths as long as practicable; finished to match lockers.

K. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip joint filler angle formed to receive filler panel.

L. Boxed End Panels: Fabricated with 1-inch- (25-mm-) wide edge dimension, and designed for concealing fasteners and holes at exposed ends of nonrecessed metal lockers; finished to match lockers.

M. Finished End Panels: Designed for concealing unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.

## 2.5 STEEL SHEET FINISHES

A. Baked-Enamel Finish: Immediately after cleaning, pretreating, and phosphatizing, apply manufacturer's standard thermosetting baked-enamel finish. Comply with paint manufacturer's written instructions for application, baking, and minimum dry film thickness.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. General: Install level, plumb, and true; shim as required, using concealed shims.

1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches (910 mm) o.c. Install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion, using concealed fasteners.
2. Anchor single rows of metal lockers to walls near top of lockers and to floor.

B. Knocked-Down Metal Lockers: Assemble knocked-down metal lockers with standard fasteners, with no exposed fasteners on door faces or face frames.

C. Equipment and Accessories: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.

1. Attach hooks with at least two fasteners.
2. Identification Plates: Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
3. Attach recess trim to recessed metal lockers with concealed clips.
4. Attach filler panels with concealed fasteners.
5. Attach sloping top units to metal lockers, with closures at exposed ends.

6. Attach boxed end panels with concealed fasteners to conceal exposed ends of nonrecessed metal lockers.
7. Attach finished end panels with fasteners only at perimeter to conceal exposed ends of nonrecessed metal lockers.

D. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding.

END OF SECTION 10505

# SECTION 10520 - FIRE-PROTECTION SPECIALTIES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Portable fire extinguishers.
2. Fire-protection cabinets. (located in MRO office / support area and ARFF kitchen).
3. Mounting brackets for fire extinguishers (located in Hangar floor, shops, and ARFF bay areas).

### 1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Fire Extinguishers: Include rating and classification.
2. Fire-Protection Cabinets: Include door hardware, cabinet type, trim style, panel style, and details of installation.

### 1.3 QUALITY ASSURANCE

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

C. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements of ASTM E 814 for fire-resistance rating of walls where they are installed.

### 1.4 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

### 1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of portable fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:

   1. Sheet: ASTM B 209 (ASTM B 209M).
   2. Extruded Shapes: ASTM B 221 (ASTM B 221M).

C. Stainless-Steel Sheet: ASTM A 666, Type 304.

D. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), 6 mm thick, with Finish 1 (smooth or polished).

2.3 PORTABLE FIRE EXTINGUISHERS

A. Manufacturers:

   1. Fire End & Croker Corporation.
   2. General Fire Extinguisher Corporation.
   3. JL Industries, Inc.
   4. Larsen's Manufacturing Company.
   5. Potter Roemer; Div. of Smith Industries, Inc.

B. General: Provide fire extinguishers of type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

   1. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

C. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:10-B:C, 5-lb (2.3-kg) for all office locations; 6-A:60-B:C, 10-lb (4.5-kg) for general Terminal locations; nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

## 2.4 FIRE-PROTECTION CABINET

A. Manufacturers:

1. Fire End & Croker Corporation.
2. General Accessory Mfg. Co.
3. JL Industries, Inc.
4. Larsen's Manufacturing Company.
5. Potter Roemer; Div. of Smith Industries, Inc.

B. Cabinet Type: Suitable for fire extinguisher.

C. Cabinet Construction: Non-rated.

D. Cabinet Material and Shelf: Enameled-steel sheet.

E. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted on wall; with no trim.

F. Door Material: Stainless-steel sheet.

G. Door Style: Vertical duo panel with frame.

H. Door Glazing: Acrylic sheet.

1. Acrylic Sheet Color: Clear transparent acrylic sheet.

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide projecting door pull and friction latch.
2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

J. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, with plated or baked-enamel finish.
2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

   a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."

      1) Location: Applied to cabinet door.
      2) Application Process: Silk-screened pressure-sensitive vinyl letters.
      3) Lettering Color: Red.
      4) Orientation: Vertical.

K. Finishes:

1. Stainless Steel: Satin, directional polish, No. 6.

## 2.5 MOUNTING BRACKETS

A. Manufacturers:

1. Fire End & Croker Corporation.
2. JL Industries, Inc.
3. Larsen's Manufacturing Company.
4. Potter Roemer; Div. of Smith Industries, Inc.

B. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.

1. Color: Black.

C. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red-letter decals applied to mounting surface.

a. Orientation: Horizontal.

## 2.6 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
2. Miter and weld perimeter door frames.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. Examine fire extinguishers for proper charging and tagging. Remove and replace damaged, defective, or undercharged units.

B. Install fire-protection specialties in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

C. Fire-Protection Cabinets: Fasten fire-protection cabinets to structure, square and plumb.

D. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated or directed.

E. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

F. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair.

END OF SECTION 10520

# SECTION 10671 - METAL STORAGE SHELVING

## 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. Post-and-beam metal storage shelving.

B. Related Sections include the following:

   1. Division 1 Section "Unit Prices" for a list of unit prices.

### 1.3 UNIT PRICES

A. Basis for Bids: Base bids on number and dimensions of metal storage shelving units as follows:
   1. Post-and-Beam Metal Storage Shelving: <Insert number> shelving units.

B. Measurement and Payment:

   1. Post-and-Shelf Metal Storage Shelving: Based on add-on metal storage shelving unit, 36 inches (914 mm) wide by 18 INCHES (455 MM) deep by 84 inches (2135 mm) high, with 4 intermediate shelves.
   2. No payment will be made for rejected metal storage shelving units, including defective units or units damaged during handling or installation.

### 1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance for Post-and-Shelf Metal Storage Shelving: Provide metal storage shelving capable of withstanding the loads indicated when tested according to MH 28.1, "Specification for the Design, Testing, Utilization and Application of Industrial Grade Steel Shelving."

B. Structural Performance for Post-and-Beam Metal Storage Shelving: Provide metal storage shelving capable of withstanding the loads indicated when tested according to MH 28.2, "Specification for the Design and Testing of Metal--Wood Shelving."

C. Seismic Performance: Provide metal storage shelving capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

## 1.5 SUBMITTALS

A. Product Data: Include rated capacities, construction details, material descriptions, dimensions of individual components and profiles, and finishes for metal storage shelving.

B. Shop Drawings: Show fabrication and installation details for metal storage shelving, including upright-to-shelf/arm connections, lateral bracing, and attachments to other work. Include plans, elevations, sections, details, and relationship to other work.

1. Calculations: Include structural analysis data for shelving units, including capacities of shelving sections, compression members (posts), and shelf connectors; signed and sealed by the qualified professional engineer responsible for their preparation.

C. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which metal storage shelving will be attached.
3. Items penetrating finished ceiling, including the following:

   a. Lighting fixtures.
   b. Air outlets and inlets.
   c. Speakers.
   d. Sprinklers.
   e. Access panels.

D. Samples for Initial Selection: For units with factory-applied color finishes. Include similar Samples of accessories involving color selection.

E. Samples for Verification: For the following components, of size indicated below.

1. Posts: 12 inches (305 mm) long.
2. Shelves: Full size, but not more than 24 inches (610 mm) wide by 12 inches (305 mm) deep.
3. Shelf-to-Post Connectors: Full size.
4. Shelf Labels: Full size.

F. Product Schedule: For metal storage shelving. Use same designations indicated on Drawings.

G. Qualification Data: For Installer.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for each type of metal storage shelving.

I. Maintenance Data: For metal storage shelving to include in maintenance manuals.

## 1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

C. Source Limitations: Obtain metal storage shelving through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of metal storage shelving and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

1. Do not modify intended structural performance and aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code--Sheet Steel."

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver metal storage shelving palleted, wrapped, or crated to provide protection during transit and Project-site storage.

## 1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install metal storage shelving until spaces are enclosed and weatherproof, wet work in spaces is completed and dry, and ambient temperature is being maintained at the levels indicated for Project when occupied for its intended use.

## 1.9 COORDINATION

A. Coordinate sizes and locations of blocking and backing required for installation of metal storage shelving attached to [partition] [wall] [and] [ceiling] assemblies.

B. Coordinate locations and installation of metal storage shelving that may interfere with ceiling systems including lighting, HVAC, and sprinklers.

## 1.10 EXTRA MATERIALS

A. Furnish extra materials 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. Shelves: Full-size units equal to 5 percent of amount installed for each type indicated, but no fewer than 10 shelves.

2. Shelf-to-Post Connectors: Full-size units equal to 5 percent of amount installed for each type indicated, but no fewer than 10 connectors.
3. Shelf Labels: Full-size units equal to 5 percent of amount installed for each type indicated, but no fewer than 10 labels.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

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

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
3. Basis-of-Design Product: The design for each type of metal storage shelving is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

### 2.2 MATERIALS

A. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with G60 (Z180) zinc (galvanized) or A60 (ZF180) zinc-iron-alloy (galvannealed) coating.

D. Steel Tubing: ASTM A 513, Type 2.

E. Steel Wire: ASTM A 899.

F. Postinstalled Expansion Anchors in Concrete: With capability to sustain, without failure, a load equal to 4 times the load imposed, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition (mild).
2. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Alloy Group 1 or 4) for nuts and bolts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.
3. Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B 164 for UNS No. N04400 alloy.

G. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for

attaching foot plates for shelving units, and with capability to sustain, without failure, a load equal to [10] <Insert number> times that imposed by shelving systems, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

2.3 POST-AND-BEAM METAL STORAGE SHELVING <Insert drawing designation>

A. General: Factory-formed, field-assembled, freestanding, post-and-beam metal storage shelving system; designed for shelves to be supported by beams that span between and are supported by corner posts, with shelves adjustable over the entire height of shelving unit. Fabricate initial shelving unit with a post at each corner. Fabricate additional shelving units as add-on units, designed to share two corner posts with initial shelving unit. Provide fixed top and bottom shelves, adjustable intermediate shelves, and accessories indicated.

1. Manufacturers:

   a. Borroughs Corporation.
   b. Frick-Gallagher Manufacturing Company (The).
   c. Lyon Metal Products, Inc.
   d. Penco Products, Inc.
   e. Rousseau Metal Inc.
   f. Schaefer Systems International, Inc.
   g. Tennsco Corp.
   h. Western Pacific Storage Systems.

B. Posts: Fabricated from 0.0677-inch- (1.70-mm-) thick, cold-rolled steel; in manufacturer's standard angle or open box shape; with perforations at 1-1/2 inches (38 mm) o.c. to receive shelf-to-post connectors.

1. Add-On Shelf Posts: 0.0677-inch- (1.70-mm-) thick, cold-rolled steel, T-shaped; perforated to match main posts.
2. Post Base: 0.0677-inch- (1.70-mm-) thick, cold-rolled steel foot plate, and drilled for mechanical attachment to floor.

C. Beams: Fabricated from 0.0677-inch- (1.70-mm-) thick, cold-rolled steel; in channel, flanged channel or flanged shape; with projecting tabs at each end designed to engage posts. Provide beam at each side of each shelf, with center supports as required for load-carrying capacity.

1. Provide top, bottom, and intermediate shelf beams with [single] [double] rivets.
2. Provide top and bottom shelf beams with double rivets and intermediate shelf beams with single rivets.

D. Shelves: None required. Provide beams for four (4) shelves.

E. Flat Metal Shelves: Fabricated from 0.0329-inch- (0.85-mm-) thick, steel sheet.

1. Fabricate fronts, backs, and sides of shelves with box-formed edges, with corners lapped and welded.

F. Ribbed Metal Decking Shelves: Fabricated from 0.0329-inch- (0.85-mm-) thick steel..

G. Shelf Capacity: 600 lb (272 kg).

# SECTION 12484 - FLOOR MATS AND FRAMES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:
   1. Cocoa mats.

B. Related Sections include the following:

   1. Division 3 Section "Cast-in-Place Concrete" for concrete work, including forming, placing, and finishing concrete floor slabs, and for concrete materials for grouting and filling around and under recessed mats and frames.

### 1.2 SUBMITTALS

A. Product Data: Include manufacturer's specifications and installation instructions, construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of floor mat and frame specified.

B. Shop Drawings: For floor mats and frames. Show assembly, joint locations, installation details, layout, plans, elevations, sections, details of patterns or designs, accessories, anchors, and attachments to other Work.

   1. Coordinate Shop Drawings showing oversized recess for deferred installation of frames with concrete work.

C. Samples for Initial Selection: For each type of floor mat and frame indicated.

D. Maintenance Data: For cleaning and maintaining floor mats to include in maintenance manuals.

### 1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain floor mats and frames through one source from a single manufacturer.

B. Accessibility Requirements: In addition to requirements of authorities having jurisdiction, provide installed floor mats that comply with Sections 302 and 303 in ICC A117.1.

### 1.4 PROJECT CONDITIONS

A. Field Measurements: Verify blocked-out openings in floors by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating floor mats and frames without field measurements. Coordinate floor construction to ensure that actual opening dimensions correspond to established dimensions.

## 1.5 COORDINATION

A. Coordinate size and location of oversized recesses in concrete work to receive floor mats and frames. Defer frame installations until building enclosure is completed and related interior finish work is in progress. Concrete, reinforcement, and formwork requirements are specified in Division 3.

B. Coordinate integral installation of recessed frames and anchors with placing of concrete slab so frames are positioned accurately.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cocoa Mats:

   a. AFCO-USA.
   b. Mats Incorporated.
   c. Musson, R. C. Rubber Co. (The).
   d. Tennessee Mat Company, Inc.

## 2.2 METAL FRAME MATERIALS

A. Extruded Aluminum: ASTM B 221 (ASTM B 221M), alloy 6061-T6 or alloy 6063-T5, T6, or T52 as standard with manufacturer.

## 2.3 CONCRETE FILL AND GROUT MATERIALS

A. Provide concrete materials complying with Division 3 for grout and fill around and under recessed mats and frames that produce concrete equivalent in strength to cast-in-place concrete slabs. For concrete fill, adjust aggregate size to not exceed one-third fill thickness.

## 2.4 FLOOR MATS

A. General: Provide colors, patterns, and profiles of materials, including metals and metal finishes indicated or specified. If not indicated, provide colors, patterns, and profiles selected by Architect from manufacturer's standards.

B. Cocoa Mats: Constructed from cocoa fiber yarn permanently bonded to PVC backing for dimensional stability and resistance to shedding; 1-inch (25-mm) overall thickness; 2.0-lb/sq. ft (10-kg/sq. m) weight.

## 2.5 FABRICATION

A. General: Where possible, verify sizes by field measurement before shop fabrication.

B. Floor Mats: Shop fabricate units to greatest extent possible in sizes as indicated. If not otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.

C. Recessed Metal Mat Frames: Extruded aluminum, of size and style to fit floor mat type specified, for permanent recessed installation, complete with corner pins or reinforcement and anchorage devices.

1. Fabricate edge-frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.

D. With manufacturer's standard protective coating, coat surfaces of aluminum frames that will contact cementitious material.

## 2.6 FINISHES, GENERAL

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

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

## 2.7 ALUMINUM FINISHES

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

B. Mill Finish: AA-M10 (Mechanical Finish: as fabricated; no other applied finish unless buffing is required to remove scratches, welding, or grinding produced in fabrication process).

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, floor conditions, and floor recesses for compliance with requirements for location, sizes, minimum recess depth, and other conditions affecting installation of floor mats and frames.

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

### 3.2 INSTALLATION

A. Install recessed mat frames to comply with manufacturer's written instructions. Set mat tops at height recommended by manufacturer for most effective cleaning action; coordinate top of mat surfaces with bottom of doors that swing across mats to provide clearance between door and mat.

1. Install necessary shims, spacers, and anchorages for proper location and secure attachment of frames.
2. Install grout and fill around frames and, if required to set mat tops at proper elevations, in recesses under mats. Finish grout and fill smooth and level.

### 3.3 PROTECTION

A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

B. Defer installation of floor mats until Project is near Substantial Completion.

END OF SECTION 12484

# SECTION 12491 - HORIZONTAL LOUVER BLINDS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following blinds with aluminum louver slats:
   1. Miniblinds.

### 1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, details of installation, operational clearances, and relationship to adjoining Work.

   1. Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings.

C. Samples: For each exposed finish and for each color and texture required.

D. Window Treatment Schedule: Use same room designations indicated on Drawings.

E. Maintenance data.

### 1.3 QUALITY ASSURANCE

A. Horizontal Louver Blinds Fire-Test-Response Characteristics: Provide products passing flame-resistance testing according to NFPA 701 by a testing agency acceptable to authorities having jurisdiction.

B. Corded Window Covering Product Standard: Unless otherwise indicated, comply with WCMA A 100.1.

C. Mockups: Install mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.

   1. Install mockups.
   2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

2. Blind Units Installed Outside Jambs: Width and length as indicated, with terminations between blinds of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

D. Installation Brackets: Designed for easy removal and reinstallation of blind, for supporting headrail[, valance,] and operating hardware, and for hardware position and blind mounting method indicated.

E. Installation Fasteners: Not fewer than two fasteners per bracket, fabricated from metal noncorrosive to blind hardware and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Install blinds level and plumb and aligned with adjacent units according to manufacturer's written instructions. Install intermediate support as required to prevent deflection in headrail. Allow clearances between adjacent blinds and for operating glazed opening's operation hardware, if any.

1. Location: Exterior louver edges in any position are not closer than **1 inch (25 mm)** to interior face of glass.

B. Flush Mounted: Install blinds with louver edges flush with finish face of opening if slats are tilted open.

C. Jamb Mounted: Install headrail flush with face of opening jamb and head.

D. Head Mounted: Install headrail on face of opening head.

E. Recessed: Install headrail concealed within blind pocket.

F. Adjusting: Adjust horizontal louver blinds to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

G. Cleaning: Clean blind surfaces after installation, according to manufacturer's written instructions.

END OF SECTION 12491

# SECTION 12615 - PUBLIC SEATING

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes public seating for airport terminals.

B. See Division Section "allowances" for allowances regarding furnishings.

### 1.2 SUBMITTALS

A. Product Data: For each type of seating and accessory indicated.

B. Installation Drawings: Layout plans, and system details showing seating layout, chair widths, accessories, including locations of tables.

C. Samples: Show the full range of color, texture, and pattern variations expected. Prepare Samples from same material to be used for the Work.

1. Upholstery Material: 12-inch- (300-mm-) square section of fabric from dye lot to be used for the Work, with specified treatments applied. Show complete pattern repeat. Mark top and face of material. Provide testing data to include Weizenbeck, fabric content and backing.

D. Maintenance data.

### 1.3 EXTRA MATERIALS

A. Furnish extra materials described below, before installation, along with accessory attachment screws, nut, etc. that match products installed and that are packaged with protective coating for storage and identified with labels describing content.

1. Chair Seats and Backs: Provide five (5) complete full size seats and backs.
2. Seat Arms: Provide six (6) complete full size seat arms and connection material in the amount of 6 arms.
3. Tables: Provide two (2) complete full size tables.

### 1.4 QUALITY ASSURANCE

A. Upholstery Fabric Source Limitations: Obtain fabric of a single dye lot for each color and pattern of fabric required.

## 1.5 WARRANTY

A. General Warranty: Provide manufacturers standard warranty against defects in materials and workmanship for a period as specified below. Any defects or failure, excepting ordinary wear and tear, shall be repaired or replaced by the Manufacturer promptly upon receipt of written notice from the Owner. Warranty shall cover all shipping, taxes, materials, and labor.

1. Warranty Period:

   a. Upholstery: Three (3) years from date of Final Payment.
   b. Frame: Ten (10) years from date of Final Payment.

# PART 2 - PRODUCTS

## 2.1 PUBLIC SEATING

A. Performance requirements:

1. Mounting: Beam.
2. Chairs: Separate, removable vinyl seats and backs.
3. Accessories: Seat arms and tables.

B. Quantities:
1. 18 – 4 seat bank w/ 1 table at end.
2. 20 – 3 seat bank w/ 1 table at end.

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

1. KI; Gate One Series Seating.
2. Herman Miller; Eames Tandem Sling Seating.
3. Airport Seating Alliance, ALA Series
4. Chromcraft Contract; Guardsman Lounge Series Seating

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. Install seats and tables level and plumb.

B. Repair minor abrasions and imperfections in finishes with coating that matches factory-applied finish.

C. Replace seat and back upholstery fabric damaged during installation. Do not use Owner's extra materials, stock for replacement of damaged fabric during installation.

D. See furnishing installation location plan attached at end of section.

E. Remove all trash, shipping containers, etc. from project site and dispose of property.

F. Vacuum floor, and wipe clean the rooms with seating after installation. Repair floor, wall, or ceiling finishes, if damaged during installation.

END OF SECTION 12615

# SECTION 14540 – INBOUND AND OUTBOUND BAGGAGE CONVEYORS

## PART 1 - GENERAL

### 1.1 SECTION SUMMARY

Furnish all design, materials, labor, equipment, transportation and all other services needed to construct, install and make completely operable baggage handling conveyors as indicated in the Construction Documents. Included are new roll-up security and fire doors, and complete electrical wiring and control systems. See Drawing Q 1.0.

### 1.2 PERFORMANCE AND DEPENDABILITY

A. The system must be capable of continuous operations, 18 hours per day, 7 days per week, with provisions for routine preventive maintenance as specified in the maintenance manual. It must operate reliably and be reasonably free of breakdowns. The system may be shut down for routine or preventative maintenance, when necessary, during off-peak periods (2300 to 0500 hours). Major components of the system shall be pre-tested so that life expectancy under the design operating conditions is known prior to installation. Design of the components and comprising the system shall provide for ease of maintenance and replacement accessibility and service.

### 1.3 COMPATIBILITY AND VERSATILITY

A. All vendors must fully recognize that maintainability and equipment standardization influence the total cost of equipment ownership. The following items shall be taken into consideration in the equipment design.

B. Drive packages, as well as other components, shall be standardized as much as possible to provide maximum interchangeability of components, and to reduce the number of spares that must be carried by the station.

C. The design, construction, and installation of the equipment shall provide maximum accessibility and convenience for all maintenance and operating requirements.

D. The equipment shall provide maximum accessibility for the repair or replacement of parts, or assemblies in lieu of parts, or other removable and replaceable equipment items without having to move, remove, or dismantle associated equipment, other equipment, or structural items in the area.

E. Lubrication fittings and electrical controls shall be located wherever possible with maximum access as a prime objective. In areas where there are catwalks: drives disconnect switches, controls switch, jam detectors, etc., shall be mounted so that they are accessible.

F. Guards, covers, etc., shall be equipped with quick removal ¼ turn fasteners such as or hinges with pull pins in areas where jams may occur or maintenance access is limited.

## 1.4 SAFETY

A. Current Standards

All equipment and installation shall conform to the current standards and interpretations of the Williams-Steiger Occupational Safety and Health Act of 1970, Public Law 91-596, and ANSI Standards Number B20.1-1990.

B. Codes and Regulations: All materials and methods used in the construction and installation of the baggage conveyor system shall meet or exceed the requirements of the following:

1. NFPA National Fire Code.
2. National Electrical Manufacturer's Association (NEMA).
3. National Electrical Code (NEC).
4. Conveyor Equipment Manufacturers Association (CEMA).

C. Switches

In addition, all motors shall be provided with safety disconnect switches to permit shutting off the motor power circuits. Switches shall be equipped with a "locking out" feature in the off position.

D. Additional Features

The following additional safety features shall be incorporated into the system:

1. All control methods, circuitry, mechanical equipment, and operating procedures shall consider the safety of the public in addition to that of operation and maintenance personnel. System design shall also minimize possible damage to equipment and baggage being handled. If a conflict should arise between safety to people or equipment, safety to people shall take precedence.

2. Whenever an unsafe condition could develop from an equipment failure or a procedural error, fail-safe techniques shall be used to prevent the occurrence of the unsafe conditions.

3. Protect unattended control stations in public areas to prevent operation.

4. Systems operations controls shall be convenient, clearly identified simple and safe to use. Possible errors shall be minimized. Emergency stops shall be provided.

## 1.5 DESIGN CRITERIA

### A. Luggage Size

The system is designed to handle baggage sizes as follows:

1. Normal Items, which can be processed by the equipment without special handling.
2. Oversize Items such as animal cages, map cases, golf bags, duffel bags, etc., which cannot be handled by the equipment and must be manually transported. (golf bags and duffle bags with maximum dimensions of 54 inches in length x 18 inches in height and 70 pounds can also be handled as normal baggage.)

3. Fragile/Odd Size

   Items such as garment bags, hat boxes, bowling balls, shopping bags, etc., which when in tote trays can be processed as normal baggage.
   The following defines the physical characteristics of normal baggage to be used in the design of the new system:

| | Maximum | Minimum |
|---|---|---|
| Length | 54 inches | 6 inches |
| Width | 33 inches | 03 inches |
| Height | 36 inches | 03 inches |
| Weight | 120 pounds | 01 pound |

*Note:* For the purposes of rate testing, the average bag length shall be considered to be 30 inches.

### B. Conveyor Loads

Design the conveyors and their supports using the following loading criteria:

1. The live load imposed on the building comprised of the conveyor components, supports and baggage used for designing structural elements, rollers and pulleys shall be 100 pounds per linear foot/150kg per meter, except for merges and conveyors designated as oversize conveyors, in which case it shall be 150 pounds per linear foot/225kg per meter. All conveyor equipment shall be capable of supporting a single concentrated load of 250 pounds/113kg.

2. The live load to be used for sizing drives, belts, bearings, etc., shall be 60 pounds per linear foot/90kg per meter, for load, accumulating conveyors and make-up units, and 40 pounds per linear foot/60kg per meter, at a conveyor speed of 90' per minute (0.46m/sec.) adjusted proportional to speed for all other conveyors.

   a. Size conveyor drives and components for a minimum duty design factor of 1.25 so that starting and stopping may be accomplished under full load conditions.

b. A design factor of 1.25 combined with a friction factor of 0.35 shall be used for determining minimum drive horsepower requirements. A minimum of one horsepower (.75kw) shall be maintained, except where motorized pulleys are used. All motors shall have a minimum nameplate service factor of 1.15.

C. Environment

All components are designed to operate satisfactorily within a temperature range of 20 degree F to 140 degrees F with a relative humidity of 0 to 95%, noncondensing.

D. Noise Levels

1. The Contractor shall design, fabricate and install the baggage handling system to limit combined equipment and controlled ambient noise levels to the following maximum requirements:

   a. 65dB(A) in, or in the ceiling space above, public areas (measured at a number of positions normally occupied by passengers, public and staff).
   b. 75dB(A) in bag room and all other associated non-public areas or unoccupied areas.

2. The ambient noise level shall be determined both before and after the measurement of the components. The ambient noise level shall be determined as follows:

   a. The baggage handling system equipment shall be turned off.
   b. All other equipment (i.e., air-conditioning and heating equipment) shall be on, and outside noise sources (from aircraft and mobile ground equipment) shall be as normal.
   c. Noise level readings shall be taken throughout a zone 3' (1 meter) vertically and 3' (1 meter) horizontally from the BHS equipment using an integrated sound level meter set to the A-weighted network.
   d. After the ambient noise level has been determined, the BHS equipment shall be turned on and the total noise level shall be measured at the same points throughout the zone that the ambient levels were measured. In no case will the conveyor equipment increase the overall noise levels by more than 15 dB(A).

E. Clearances

1. Minimum clearance on all conveyors between the conveyor tops of belts to underside of obstructions shall be 36" (1 meter) unless otherwise noted on the contract drawings. If it should be discovered that these specified clearances cannot be maintained, Contractor shall notify Owner as soon as possible Contractor will conduct a field survey of all conveyor paths prior to the submission of installation drawings.

F. Accessibility

1. Equipment components requiring inspection and servicing shall be readily accessible. Suitable doors or removable enclosures shall be provided for this purpose. Access holes in frames or guards are acceptable but shall be held to a minimum number and size, and shall not create protrusions or discontinuities detrimental to the baggage being conveyed.

G. Periodic Maintenance

1. The systems shall be so designed that no scheduled PM task requires more than two hours of full-system shutdown, or four hours of reduced operation, or any combination of both in excess of four hours. All components and subsystems shall be designed for replacement within this period. All components and assemblies shall be easily disconnected and removed from the equipment without necessity for extensive disassembly.

H. Radio Frequency Interference

1. The equipment provided shall not cause interference with communications within the airport or between the airport and aircraft or ground vehicles. All electrical and electronic equipment, including interconnecting wires and cables, shall be designed to operate without malfunction in the presence of normal electromagnetic emissions generated by other equipment installed or used at the airport. The normal airport environment includes the aircraft communications bands and high-power radar systems. Various electrical motors and controls, power tools (including welders), automotive vehicles, etc., are also considered elements of the airport environment.

I. Vibration Control

1. The Contractor and the Architect shall jointly review any areas of the system design which either believes to be potential sources of unsafe or otherwise severe levels of vibration. The Contractor and the Architect shall mutually determine the need for, and design of, vibration isolation devices. Should such a requirement occur, the addition of such devices shall be by change order.

## 1.6 SUBMITTALS

A. Shop Drawings

1. The Contractor shall submit shop drawings in accordance with Division 1 of the specifications. Such shop drawings shall consist of Contractor's mechanical and electrical installation drawings and shall include the following:

   a. Mechanical: general arrangement and dimensions of all equipment (plan, elevation, and sections); clearances, both horizontal and vertical, as related to the building structure and interferences; dimensions and details of any required building preparations or modifications; location and dimensions of conveyor drives; location and detail of attaching conveyor supports to floors and overhead structures.
   b. Electrical: schematics showing motor control panel and field control wiring; interior and front panel layout of motor control panels; pushbutton station layout, conduit diagrams showing location of all controls, conduit sizes, and wire sizes and numbers.

B. As-Built Drawings

1. Within thirty days following Substantial Completion, Contractor shall provide Owner with one set of full-size, mechanical and electrical drawings showing the 'as-built' condition of the systems. One set of electrical drawings for each MCP cabinet to be placed in the respective MCP door pocket.

## 1.7 OPERATION AND MAINTENANCE MANUALS

A. Operation and Maintenance Manuals

Three Operations and Maintenance Manuals shall be provided per Division 1. Manuals shall be presented to the Owner on the date of the start of the pre-acceptance testing period. The manual shall be updated by supplement to reflect any field changes, equipment changes due to warranty, etc., that are made during the warranty period of the system so that the manuals shall reflect "as-built" information.

The Operations section of the manuals shall include the following:

1. Complete listing of electrical graphic symbols and reference designations per ANSI/IEEE standards for all electrical equipment components contained in the system.

2. Push-button, photo eye, limit switch, etc., summary; location; units controlled; and function.

3. Normal system start-up and shutdown procedures.

4. Detailed description of operation and troubleshooting of the system.

The operation and Maintenance manuals shall fully cover appropriate safety measures, precautions, and instructions to be followed before, during, and after making repairs, adjustments, clearing jams, or performing routine maintenance.

## 1.8 PERFORMANCE TEST

After installation of the compete system, its operating capability shall be demonstrated. All "debugging" shall be completed prior to the start of the system's testing. The Contractor shall provide personnel, baggage, totes, boxes, etc., for testing. The performance test shall be conducted in the presence of the Owner's representative for a minimum of eight (8) hours. The performance test shall include:

A. Performance Test Parameters

1. Checkout of the operational and safety devices of the system using bags, totes, or boxes.

2. Demonstrate the capability to handle the required sizes and weights of baggage through the system without jamming or excessive toppling of baggage.

3. Demonstrate the capability of all conveyors being able to start under full load.

4. Measure all conveyor speeds using a standard device. These measurements shall be taken with the system in a "no-load" condition, i.e., all conveyors running, but without product. Any component not operating within five (5) percent of design speed shall be reworked to bring it to proper speed.

B. Correction of Unsatisfactory Operation

During the test period, any deficiencies or variations in the design, fabrication, or operation causing unsatisfactory performance shall be corrected to provide satisfactory performance. Manufacturer shall have appropriate service personnel on site during the test period to service or adjust the system's equipment as required.

C. Test Program

A test program for compliance with the above demonstration requirements shall be submitted to the Owner's representative for review and approval prior to operations start-up date for the system.

D. Failure Defined

A failure during any test period shall be defined as any design characteristic or malfunction of the furnished equipment or materials that damage baggage or reduce any operating rate below those specified. Conditions resulting from improper loading of baggage or loading baggage of sizes not included in the specification requirements shall not be considered as failures.

## 1.9 ACCEPTANCE

A. After completion of the system performance tests, the Owner's representative and a representative of the manufacturer shall make an acceptance inspection. The purpose of this inspection shall be to determine that the conveyor system has been furnished and installed as specified. If the system is non-acceptable for reasons of noncompliance to the drawings and specifications, the Owner shall receive immediate corrective action within the construction schedule. A final acceptance inspection shall be done to determine all corrections have been made.

B. Even though the equipment shall be inspected and accepted for warranty purposes, the acceptance date shall not occur before all contractual obligations are completed, including delivery of all "as-built" drawings, maintenance, operations and spare parts manuals, and all punch list items have been completed.

C. The Owner and Contractor at conclusion of this acceptance will execute a system acceptance form.

## 1.10 OPERATION AND MAINTENANCE TRAINING

A. It is understood that the times and durations of the classes may involve irregular hours in order to provide training of operation and maintenance personnel on different shifts.

B. The training classes shall be provided prior to the operations start-up of the system.

C. Operations training sessions shall cover the operational functions of the system and all related sections of the operations manual.

D. Maintenance training sessions shall include "classroom" and "hands-on" type programs. "Hands-on" type training shall include actual troubleshooting adjustments of equipment, component removal, etc.

E. The duration of the above training sessions may vary with the proficiency of the personnel being trained, but the prime objective of all classes shall be to thoroughly acquaint the necessary personnel with the operation and maintenance of the equipment.

## 1.11 WARRANTY

A. Special Project Warranty: Provide written warranty signed by the manufacturer, the Contractor, and the installer, guaranteeing to correct failures in materials and workmanship which occur within the warranty period, including those attributable to abnormal aging, without reducing or otherwise limiting any other rights to correction which the Owner may have under the contract documents.

1. The warranty shall include responsibility for removing and replacing other work as necessary to accomplish repairs or replacement of materials covered by the warranty.

Warranty period: 1 year after date of Substantial Completion.

## 1.12 MAINTENANCE

A. Spare Parts: The Conveyor Contractor shall provide, to the Owner, a recommended spare parts list along with an item-by-item price list based upon the conveyor equipment provided under this contract. This spare parts list, if implemented, is not intended to be a subsidy to be used by the Conveyor Contractor for warranty parts replacement. If the Owner approves, spare parts may be used during the warranty period to save equipment downtime only if the Conveyor Contractor replaces the spare parts with duplicates without additional cost to the Owner.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

Provide products complying with requirements of the contract documents and made by one of the following:

| | | |
|---|---|---|
| BAE Automated Systems Inc. | Carrollton, Texas | 972-389-9411 |
| G&S Mechanical USA, Inc. | Wichita, Kansas | 403-230-1140 |
| G&T Conveyor Co., Inc. | Tavares, Florida | 352-343-1500 |
| Jervis B. Webb Co. of Georgia | Marietta, Georgia | 770-426-3900 |
| Rapistan Systems | Grand Rapids, Michigan | 877-725-7500 |
| FKI Logistex | Grand Prairie, Texas | 800-433-2911 |

## 2.2 GENERAL

A. Structural plates shall conform to ASTM A-36. Hot rolled sheets and coils shall conform to ASTM A-569. Structural steel shapes shall conform to ASTM A-36.

B. All welding electrodes shall conform to AWS A-5.18-69. The standard code for arc and gas welding in building construction will be used as a guide to general procedure and qualification of welders.

C. Fasteners will conform to ASTM A-307 Class 2A thread fit for bolts, and Class 2B thread for nuts. All fasteners are to be zinc plated or equivalent. All fasteners will be locked with lock nuts or lockwashers.

D. Steel used in the fabrication of the equipment will be clean and free from rust, rust pits, kinks, and sharp bends. The forming of material will be accomplished by methods that will not fracture or otherwise damage the metal. Burrs, sharp edges, and sharp corners will be removed. All parts will be formed and cut properly to assure uniformity. All joints will be smooth and all corners rounded. Holes for photocell beams will be punched, not burned, in metal side guards and will be free of any sharp edges or burrs.

E. Unguarded, exposed sharp corners and edges of items; such as, but not limited to, support legs, braces, and trim; shall be well rounded, or removed to prevent injury to employees or damage to their clothing.

## 2.3 CRESCENT-PLATE DEVICES (INBOUND SYSTEMS)

Crescent-plate devices shall be constructed of articulating, crescent-shaped flights forming a continuous, rotating, flat surface. They shall be arranged to receive baggage by manual loading. These conveyor units shall meet or exceed the following design data and standards:

| | |
|---|---|
| Overall Conveyor Width . . . . . | 38" minimum to 42" maximum |
| Usable Width . . . . . | 32" minimum to 36" maximum |
| Centerline Radius . . . . . | 36" minimum to 44" maximum |
| Standard Conveyor Operational Velocity . . | 90 feet per minute (adjustable) |
| Static Load Capacity of Frame . . . . . | 200 lbs. per linear foot |
| Electrical Service . . . . . | 3 Phase, 480 VAC, 60 Hz. |
| Pallet Material . . . . . | 1/4" steel (or equivalent strength composite core) |
| Pallet Surface . . . . . | Black molded polyurethane or urethane |
| Conveyor Height . . . . . | 12" (+/- 1") |
| Center Infill Height . . . . . | 30" height (+/- 3") |

| | |
|---|---|
| Overall Conveyor Width . . . . . | 38" minimum to 42" maximum |
| Rolling Doors and Draft Curtains . . . . . | Wall openings for conveyors shall be protected by steel roll-up doors. Provide a strip-type draft curtain on public side of each opening |
| Motors . . . . . | 4 pole, 3-phase, motors sized to meet design criteria, totally enclosed units located on non-public side of conveyor assembly to minimize noise in public areas |
| Controls . . . . . | Controls as specified, control panel shall interconnect with roll-up security and fire doors at conveyor openings in walls |

Frame and Track: The frame shall consist of standard modular assemblies bolted together to form a support structure and guide for the carrier assemblies. The track shall be assembled to form an integral part of the support structure. Leveling of the assembled structure shall be accomplished by leveling screws at the base of each module.

Drive: The drive shall consist of a heavy-duty roller chain driven by a motor through a gear reducer. The roller chain shall engage at least two carrier assemblies at all times. The drive assembly shall be equipped with an appropriately sized electrical, electronic, or mechanical soft-start control unit. The drive shall be designed for operation from a 480 VAC, 3 phase, 60 Hz power source. The drive shall be sized to permit start-up under full-load conditions.

## 2.4 BELTING

A. Belting for all level conveyors in public view shall meet the following specifications:

| | | |
|---|---|---|
| 1. | Overall thickness | 5/32-inch |
| 2. | Covers | 1/32-inch x bare surface |
| 3. | Color | Black |
| 4. | Carcass | Polyester |
| 5. | Recommended workload | 150 pounds per inch of width |
| 6. | Breaking point | 1500 pounds per inch of width |

B. Belting for all level conveyors not in the public view shall meet the following specifications:

| | | |
|---|---|---|
| 1. | Overall thickness | 9/64-inch |
| 2. | Covers | Bare x bare |
| 3. | Color | Tan or black |
| 4. | Carcass | Polyester |
| 5. | Recommended workload | 120 pounds per inch of width |
| 6. | Breaking point | 1200 pounds per inch of width |

C. Belt lacing shall be of appropriate size for the application and as manufactured by Clipper or Anchor.

## 2.5 SLIDER BED SECTIONS

A. Conveyor bed sections shall be a minimum of 12-gauge (2.7mm) hot-rolled steel, formed in one piece and reinforced to be strong and well-braced with 1-1/4" x 1-1/4" x 3/16" (or equivalent metric) angle stiffeners on a maximum of 3'-4" (1016mm) centers on transport conveyors and 2'-6" (762mm) centers on load conveyors. Butt coupling joints shall be provided. Return belt shall be routed and supported so that it does not contact any stiffening members. Conveyor beds shall be provided with the following between-guard width dimensions:

| | | |
|---|---|---|
| 1. | Ticket counter load | 33"/762mm |
| 2. | Curbside load | 33"/762mm |
| 3. | Transfer load | 33"/762mm |
| 4. | Transport | 33"/914mm |

## 2.6 SIDE GUARDS

A. Vertical side guards for conveyors not in public view shall be 12-gauge HRS extending 21 inches above the bed and extending 8 inches below the slider bed with upright bracing (1-1/4-inches x 1-1/4-inches x 3/16-inch vertical angle stiffeners) on a maximum of 2 foot, 6 inch centers. Guards for conveyors in public view shall be formed, 21 inches high x 12-gauge type 304 stainless steel with a horizontal number 4 brushed finish. Guards are to be supported directly by the conveyor frame and braced with 10 gauge formed channels at 5'-0" on center typical. Unless otherwise noted, guards will be required on both sides except where baggage is being loaded or unloaded in non-public areas at which point only one guard shall be required.

B. Distance between side guards will be 3 inches greater than the belt width. Side guard joints will be bolted.

C. Guards adjacent to power turns shall be in alignment with the effective inside side guard of the turn to prevent interference with baggage movement. The side guards of power turns shall not be welded to adjacent straight conveyor side guards. No mechanical or electrical equipment will be mounted on the outside radius side guard of power turns. Side guards will provide a continuous uninterrupted surface the entire length and height of the joints.

## 2.7 SHROUDING

A. Shrouding shall be provided for outbound conveyor equipment located in public areas (ATO ticket counters) where the conveyors are exposed for loading. The shrouding shall be formed stainless steel, minimum 12-gauge (2.7mm), Type 304 with #4 brushed finish. All connections shall be smooth and flush without openings or projections on which bags or tags may catch. Fasteners shall be hidden from public view wherever practical to do so.

B. The visible side of the ticket counter conveyor shall be equipped with 12-gauge (2.7mm), Type 304 removable stainless steel kick plate and back guard. These parts shall also have a #4 finish as previously outlined and shall be provided for the overall length of the conveyor with removable sections for maintenance and repair of components. Removable sections on all conveyors shaft not exceed 10' (3048mm) in length. These sections are to be designed to be removed for maintenance and repair of conveyor components and electrical controls.

2.8 SUPPORTS

A. All floor supports for transportation conveyors shall be located on a maximum of 10'-0" (3048mm) centers. Load conveyors shall be supported on 5'-0" (1524mm) centers. All floor supports shall be of a standard "H" type design with vertical adjustment. Floor support vertical members shall be constructed of 10-gauge (3.4mm) hot-rolled formed-steel channel with 10-gauge (3.4mm), hot-rolled galvanized universal foot and head plates.

2.9 CONVEYOR GUARDRAILS

A. Provide guardrails at inbound and outbound conveyors at locations shown on the drawings. Guardrails shall be 4" diameter schedule 40 steel pipe on steel posts at 4'-0" on center anchored to the floor slab with 3/8" steel base plate and (4) ¾" x 6" anchor bolts at each plate.

2.10 GENERAL DRIVE REQUIREMENTS

A. All drive units shall be equipped with a suitable guard of "clamshell" design with quick-release fasteners, and fabricated from a minimum of 16-gauge (1.6mm) steel. All guards shall comply with applicable OSHA standards and have an expanded or slotted metal viewing port to allow belt inspection without removal of the guard.

B. All drive sprockets and/or V-belt sheaves shall have a taper-lock type hub construction, with keyways. Sprockets shall be steel with a minimum of thirteen Type B form teeth.

C. Driving and driven sheaves shall be minimum two-groove A-section pulleys with taper-lock type hubs.

D. Roller chain, if used, shall be compatible with the torque and horsepower requirements of the application but not less than RC-60 in size. The roller chain ends shall be connected with a removable connecting link.

2.11 CONVEYOR DRIVES

A. The conveyors shall be driven by motors that conform to AIEE and NEMA standards. These drives should be shaft-mounted, single reduction speed reducers or an approved equal. Reducers shall be sized for AGMA Class II application minimum. Motors shall be sized for maximum load and belt speed requirements under continuous operations (minimum 1 horsepower) and capable of withstanding shock caused by frequent starting and stopping under load where applicable. Motors shall be of the constant speed (1725 revolutions per minute), continuous service, ball bearing type with Class "B" insulation. All motors will be NEMA "B", TEFC, "C-Face" and provided with thermal overload protection. All motors shall be Bald or, Reliance, or

equal, and of the high-efficiency, low-energy type. Service factor on all motor/reducers shall be a minimum of 1.0.

B. For low profile application where shaft-mounted reducers are not practical (i.e., ticket counter conveyors and load conveyors) right angle or parallel C-face may be substituted for the above mentioned motor and reducers.

C. Electric brakes shall be provided on all incline and decline conveyors to prevent coasting. (Electric brakes shall not be required on decline conveyors feeding an inclined plate device.) On all belts with frequent Start/Stop operation, such as indexing belts, motors shall be continuous-running NEMA "B" design, coupled with a Electro-magnetic clutch and/or clutch/brake arrangement.

D. Drip pans shall be provided on all drives. Drip pans shall be constructed out of minimum 14-gauge steel, and appropriately mounted for the actual application. Such mounting shall not impact maintenance access.

## 2.12 PULLEYS/SHAFTS

A. The maximum shaft run-out of all assembled (non welded) pulleys, shafts, and bearings under a no-load condition, measured from the centerline of the bearing to the end of the shaft farthest from the conveyor shall not exceed .0075 inch per inch. Maximum pulley shell run-out shall not exceed .060 inch.

B. All pulleys/shafts shall meet CEMA Standard No. B105.1-1990.

## 2.13 STATUS BALANCE

A. All pulleys are statically balanced when operating speeds exceed 200 rpm, and dynamically balanced when speeds exceed 500 rpm. Rollers of eccentric material such as standard pipe, are statically balanced when operating speeds exceed 200 rpm, and dynamically balanced when speeds exceed 400 rpm. Rollers made of seamless tubing are balanced when speeds exceed 600 rpm. Rollers made of welded steel tubing may be used without balancing at speeds up to 1000 rpm, if straightness is held to close limits and excessive welding flash is not present; for speeds in excess of 1000 rpm, dynamic balancing is provided.

## 2.14 POWER PULLEYS

A. All power pulleys for intermediate-type drives shall be lagged with a minimum 3/8" (9.5mm) thick vulcanized lagging of 55-70 durometer and be crown-faced and equipped with taper-lock hubs and 1-7/16" (36mm) minimum diameter AISI 1018 C.R.S. shafts mounted in precision-and-ground flange-type ball bearing units. Pulleys and shaft sizes are determined by maximum belt pull as follows:

1. Light-duty (300 pounds (136 kg) maximum belt pull) consists of a 63/4"(171mm)minimum diameter drive pulley with a 1-7/16" (36mm) minimum diameter shaft. Where used, roller chain shall be RC-60.

2. Normal-duty (500 pounds (227 kg) maximum belt pull) consists of an 8-3/4" (222mm) minimum diameter drive pulley with a 1-11/16" (43mm) minimum diameter shaft. Where used, roller chain shall be RC-60 or larger.
3. Intermediate-duty (1,000 pounds (455 kg) maximum belt pull) consists of a 10-3/4" (273mm) minimum diameter drive pulley with a 1-15/16" (49mm) minimum diameter shaft. Where used, roller chain shall be RC-80 or larger.

4. Heavy-duty (1,500 pounds (682 kg) maximum belt pull) consists of a 12-3/4" (324mm) minimum diameter drive pulley with a 2-3/16" (56mm) minimum diameter shaft. Where used, roller chain shall be RC-80 or larger.

B. Power pulleys for end-type drives or power take-offs shall be lagged with a minimum 3/8" thick (9.5mm) vulcanized lagging of 55-70 durometer, and shall be 6" (152mm} in diameter (minimum) crown-faced and equipped with taper-lock type hubs and 1-7/16" (36mm) minimum diameter AISI 1018 C.R.S. shafts mounted in precision-and-ground flange-type ball-bearing units. End-type drive units may be used for conveyors 25' (7.6 m) or less in length.

## 2.15 HEAD AND TAIL PULLEYS

A. Head and tail pulleys shall be steel, crown faced, equipped with compression type hubs and l-7/16-inch minimum diameter AISI 1018 C.R.S. shafts mounted in eccentric locking type precision ground flange type ball bearing units. All head and tail pulleys will be 6-inch diameter minimum x 10-gauge wall. Pulleys shall be of a single piece electric weld steel construction and have steel end discs attached to the rim by continuous welding. Slider beds shall be arranged to keep the gap between the end section and the end pulley to a minimum. Gap between adjacent end pulleys will not exceed 1 inch, with 1/2-inch as the design objective. All head and tail pulleys used for belt tracking will be equipped with jacking bolts to provide a total combined adjustment of l-1/2-inches per conveyor. Jacking bolts shall be equipped with jam nuts to prevent loosening.

## 2.16 TAKE-UPS

A. All take-up pulleys shall be a minimum of 4" (102mm) in diameter, steel, crown-faced and equipped with taper-lock type hubs and 1-7/16" (36mm) minimum diameter AISI 1018 C.R.S. shafts mounted in precision-and-ground flange-type ball bearing units. Pulleys shall be mounted on threaded take-up devices with steel guides. All conveyors shall be provided with take-ups for field adjustment of at least 4" (102mm) or 2% of the conveyor bed length, which ever is greater. Take-ups shall be an integral part of the drive frames on all intermediate-drive conveyors.

B. The Contractor shall adjust the position of all take-up pulley devices after system testing prior to substantial completion of the system so that no more than 50% of the take-up device adjustment has been used.

## 2.17 SNUB PULLEYS

A. All snub pulleys shall be a minimum of 4" (102mm) in diameter equipped with taper-lock type hubs and 1-7/16" (36mm) minimum diameter AISI 1018 C.R.S. shafts mounted in precision-and-ground flange-type ball bearing units. All snub pulleys used for belt tracking shall be equipped with jacking bolts to facilitate adjustment.

## 2.18 RETURN IDLER ROLLERS

A. The return idler rollers shall be a minimum of 2-1/2" (63.5mm) diameter, 12-gauge (2.7mm) steel equipped with an 11/16" (17.5mm) hex axle for belt speeds up to 150 fpm (0.76 m/sec) and a minimum of 3-1/2" (89mm} diameter with an 11/16" (17.5mm) hex axle for belt speeds from 150 to 300 fpm (0.76 to 1.52 m/sec).

B. All hex shaft return idler rollers shall be equipped with sealed, permanently lubricated, caged, semi-precision type ball bearings. Return idler rollers shall be located on centers not to exceed 10' (3048mm), with spacing being reduced in areas where belting may drag against the floor or conveyor structure. The shafts shall be mounted to the conveyor bed with adjustable retainers for proper belt tracking.

## 2.19 BEARINGS

A. All bearings shall be greaseable, self-aligning, anti-friction, ball bearing type, pre-lubricated and sealed with synthetic lip seals, and equipped with eccentric locking collars. Bearings shall be mounted on the outside of the conveyor frames unless clearance restrictions prohibit. All bearings will be provided with alemite lubrication fittings.

B. Bearings shall have a minimum B-10 life of 30,000 hours based on service and loading of conveyors, and on the manufacturer's published data showing the load rating of each bearing.

## 2.20 REDUCERS

A. Reducers shall be shaft-mounted Dodge "TXT" Series or Morse XM, equipped with tapered bushings. The reducer input shafts shall be equipped with two-groove minimum, taper-lock type hubs, V-belt sheaves for "A" section cogged belts.

B. In applications such as ticket counter conveyors or queue conveyors where physical space is limited, Dodge APG or Morse Powerline right-angle worm gear reducers with C-faced motors or JOKI (Interroll) or equal motorized pulleys may be used.

C. All reducers shall be sized for Class II application.

D. Reducers used on inclines or declines where roll-back would be critical shall be equipped with brake motors.

## 2.21 FINISHES

A. Painting

1. All surfaces to be painted shall be thoroughly cleaned of rust, scale, oil, grease, grit, welding flash and other forms of dirt. All structural parts, except those surfaces coated with a galvanized coating, and those that would normally be unpainted (such as rollers, shafts, sprockets, bearings, chains, nameplates, etc.), will be painted with one shop coat of standard machinery rust-inhibitive paint, including all floor support structures. Structural steel required for ceiling hangers above drop points to be painted with rust-inhibitive primer.

B. Stainless Steel

1. All flat head screws used to attach the stainless steel shrouding, such as the horizontal portions attached to the conveyor bed, will be completely countersunk so that no portion of the screw head is above the adjacent surface. Grinding or filing of the screw heads shall not be done.

2. Field welding of any stainless steel trim element shall not be done. Blemishes of the stainless steel trim elements shall not be accepted. This includes those caused by poor manufacturing practices, as well as those caused in the field, plus those caused by field attempts to remove any blemish.

## 2.22 CONVEYOR IDENTIFICATION

A. Each conveyor section shall be permanently and indelibly marked with its respective number. Each conveyor number shall be carefully and neatly painted or stenciled in a contrasting color, nominally 4" (100mm) high, in a conspicuous location adjacent to the conveyor drive. In public areas, such identification shall be 2" (50mm) high numbers in a conspicuous location on the conveyor drive. Temporary markings on the conveyors or other equipment shall be made with a medium which is readily removable with water or a readily available commercial solvent, such that they may be removed without requiring *any* refinishing of the surface on which they appear.

## 2.23 POWER TURNS

A. All powered turns shall be as manufactured by Transnorm Systems or Portec. Unless otherwise noted, "B" radius curves will be used at ticket counters, and "C" radius elsewhere. The belt speed as measured on the centerline of the belt width shall match the speeds of the adjacent conveyors within 10%, except in certain cases where conveyor speeds must be progressively in creased to meet bag travel time requirements. Side guards for turns shall be in alignment with the adjacent straight conveyor side guards. The angle iron frame supporting the outside guard shall be fabricated in two sections on turns greater than 90 degrees for quick removal for repairs and maintenance. Belting and drive components for power turns will be as supplied by Transnorm System or Portec.

## 2.24 FIRE AND/OR SECURITY DOORS

A. Where fire and/or security doors are shown on the drawings, they shall be provided and in stalled by the Contractor. Fire doors shall be rolling shutter, slat-type, interior-face, mounted doors with electric operators, UL labeled for three-hour rating with Class A firewalls. Fire doors shall be Atlas Door Corp. Part No. L41 (ST) (stainless steel) or equal products of Overhead Door Corp., Cookson, or Raynor.

## 2.25 DRAFT CURTAINS

A. Draft curtains shall be provided at all conveyor wall penetrations and shall be flexible strip doors with two staggered layers of 8 inch x 1/16-inch strips-color "black"-as manufactured by the Necor Corporation, or type DBD flexible strip door-color "black"-as manufactured by Metalglas Products.

## 2.27 ELECTRICAL SPECIFICATIONS

A. Related Standards & Codes

1. All components and materials shall conform to applicable NEMA (National Electrical Manufacturer's Association) and JIC (Joint Industrial Council) standards. The requirements of the NEC (National Electrical Code), NPFA-70 and the American National Standards Institute Safety Code B20.1 shall be met as well as those of any other government or local authorities having jurisdiction. All components shall be designed for continuous duty service.

B. System Power Provisions

1. 480/220 VAC, 3-phase, 60 Hz power shall be furnished to a disconnect located within 10' (3050mm) of each Motor Control Panel (MCP) disconnect. Contractor shall be required to supply each BHS system from this point. The Contractor shall furnish all 110 VAC, single-phase control power required for his installation. Contractor shall show on his shop drawings the electrical power requirements (amperage) of each MCP. Beyond each service disconnect, the Contractor shall furnish and install all services, feeder, and fused disconnects for branch circuits to each MCP as specified and shall provide and install all panel boxes, wireways, conduits, conductors, transformers, fuses, equipment and materials required to complete the electrical power distribution for the operation of the system.

C. Electrical Power Conditioning

1. The Contractor shall provide and install, as required, the appropriate number and size of power regulation to ensure that the power for the respective programmable controllers, computers, baggage tag readers, etc., is properly conditioned. Power regulators, if required, are to be of the type manufactured by the Sola Corporation or approved equal.

D. Standardization of Equipment

1. Where there is more than one item of equipment required under this contract, the Contractor should furnish equipment of the same type and from the same manufacturer as much as possible. All components shall be Allen Bradley, Cutler Hammer, or equivalent.

E. Color Coding and Wire Marketing

1. All electric wire and cable shall be color-coded and shall have the wire numbers as shown on the electrical drawing affixed to both ends of each wire. Coding shall be as follows:

(a) Power Wiring – Line Side:

This code applies to all power wiring from source to line side of fuses in control cabinets. The neutral, if applicable, shall terminate at the terminal board.

| **Phase** | **120/208** | **277/408** |
|---|---|---|
| A | Black | Brown |
| B | Red | Orange |
| C | Blue | Yellow |
| Neutral | White | Gray |
| Mechanical Ground | Green | Green |

(b) Power Wiring - Load Side:

The code for power and control wiring from the load side of fuses in control cabinets to all other devices shall be as follows:

| | |
|---|---|
| Power | Black |
| A/C Control | Red |
| D/C Control | Blue |
| Neutral | White |
| Mechanical Ground | Green |

F. Controls

1. Controls shall operate on a maximum of 120 volts. Control components shall not be subjected to operation under loads exceeding the manufacturer's recommended rating.

G. Equipment

1. Enclosures

All electrical enclosures shall be NEMA type 12, except those, which may be, exposed to the elements, which shall be NEMA type 3 or 4 weatherproof.

2. Motor Starters

Magnetic motor starters with manual reset thermal overloads shall be used. Minimum starter size shall be NEMA size "0". Pulleys and shaft sizes shall be determined by maximum belt pull.

3. Push Button Starters

Push-button stations shall be equivalent to Allen Bradley 800T. All push-button stations in the public view shall be flush mounted with a stainless steel cover plate. Emergency stop push-buttons shall be of the maintained contact, push to stop, pull to reset, illuminated mushroom head type, equivalent to Allen Bradley 800T.

4. Switches

Limit switches shall be of the precision, oil-tight Allen Bradley "C" or approved equal. Contacts shall have a minimum rating of 10 amperes, 120 volts for continuous duty. Selector switches shall be of the multiple, rotary, heavy-duty, industrial type generally known as instrument, control auxiliary or transfer switches, Allen Bradley 800T or approved equal.

5. Pilot Lights

Pilot lights shall be equivalent to Allen Bradley 800T, push-to-test, transformer type. Lens colors as required for the application.

6. Photo Electric Controls

The sensors shall be mounted on structural members attached to the machinery structure so that a minimum of vibration is transmitted to these units. No more than one penetration per sensor, a maximum of 1-1/2 inch (38.1 mm) in diameter, shall be permitted in metal parts (conveyor guards). Sensors for tall bag detection, if required, shall be mounted 32 inches (81.3 cm) above the conveyor surface. All other sensors shall be mounted to detect an object 1-1/2 inch (38.1-mm) above the conveyor surface. Photo controls shall be LED type, Photo Switch 42MRU, series 5000, or equal.

7. Relays and Timers

Wherever practical to do so, programmable controllers shall be used in preference to discreet relays and timers. Where relays are used, they shall be Allen Bradley 700 Type NP or approved equal. All relays shall be rated at the required voltage for the application. Where the time-delay feature is required, relays shall be furnished with time-delay range as required for each application. All timers shall be Allen Bradley 700 PT or 849 Series, Eagle Cycl-Flex Series, or approved equal.

8. Programmable Controllers

Programmable logic controllers shall be Allen Bradley series or approved equal.

9. Interlocks

Provide and install all equipment required to interlock the motor control units of the systems operated in series.

H. Panels and Control Stations

1. Control Panel

a. The main control panel shall be designed to provide the following described functions at a minimum:

(i) System Start
(ii) Emergency Stop
(iii) Hold in Circuit
(iv) Jam Detection

2. System Status Panel

A. A system status panel shall be furnished and installed in the control panel door when required by system complexity. A graphic representation of the system shall be portrayed on the face of the panel. Indicator lights shall be appropriately located on the map to identify sensing devices and emergency stop devices. Emergency stop indicator lights shall be red; jam indicator lights shall be amber; and a green run light shall be provided for each individual sub-system.

B. An audible alarm shall be mounted on the panel along with a silence button. This audible alarm shall operate whenever a jam or emergency stop condition exists.

C. If a make-up sortation loop is used, a start button shall be provided on the panel door. This button will not start the related feed conveyors.

3. Control Stations

A. Control Stations shall contain the following:

1. Ticket Counters and Baggage Claim

(i) System start button (to start respective system only)
(ii) Emergency stop button (to stop respective system only)
(iii) Key operated "ON-OFF" selector switch (one station only)

2. Make-up Area

(i) Emergency stop button (to stop the entire system)
(ii) Start station

3. Jam Control

(i) Jam reset button (to reset the jam control circuitry and restart the conveyors that have been shut down)

I. Control Functions - Outbound Conveyor Systems

1. System Start

A. Control stations incorporating a green momentary START pushbutton and a red illuminated mushroom-head maintained-contact E-STOP pushbutton shall be provided at 25 foot (7600mm) intervals along each load belt. One of these control stations shall incorporate a two-position maintained-contact keylock selector switch which will enable/disable all START pushbuttons associated with the load belt. The keylock switch shall use the Allen Bradley D-18 key (unless otherwise specified by Owner) with key removable in both "Enable" and "Disable" positions. Activation of any START button shall activate an alarm in the baggage make-up room and, after a predetermined time delay, the system shall automatically start, causing the alarm to deactivate.

2. System Stop (Auto)

A. Automatic stopping of each conveyor subsystem shall be accomplished through circuitry utilizing a photosensor located at the discharge end of each load conveyor. Interruption of the photosensor beam shall reset the related circuit timing function. If, after an adjustable time period sufficient for the last bag to completely traverse the system, the photosensor has not sensed a bag, the timing function will automatically shut down the related subsystem conveyors.

B. The auto-stop circuitry shall be so designed that any activation of a related emergency-stop switch, motor overload, or a jam condition as detected by the subsystem jam-detection circuitry, will inhibit the auto-stop timing function until the noted condition has been corrected and the subsystem conveyors ere restarted.

3. System Stop (Emergency)

A. The system may be stopped anytime during the normal operation by depressing any one of the red illuminated mushroom-head maintained-contact emergency-stop (E-STOP) buttons which shall be located adjacent to the following belts:

a. Ticket counter, curbside, and transfer loading belts
b. Bag room sortation conveyors
c. Merge devices

B. When an E-STOP button is depressed, the entire associated system shall be stopped, including all upstream belts feeding the affected section. The E-STOP button which is depressed shall be illuminated. After clearing the emergency, the system may be restarted either by resetting the actuated emergency pushbutton at a bag room or merge station, or by resetting the E-STOP button and then depressing

the START button at loading belt stations. The system may only be restarted from the station that actuated the emergency-stop button.

D. At Owner option and where operationally desirable, multiple E-STOP locations may be replaced with one or more E-STOP lanyards. When E-STOP lanyards are used, they shall illuminate a red light at the location of the E-STOP lanyard switch. This switch shall be of the specified type and shall be manually resettable.

J. Control Functions - Inbound Control Systems

1. Start System: Depressing the "Start" push button (green inset) starts the conveyor device and associated equipment. An adjustable time delay (0.1-20 seconds) is incorporated into the circuitry such that if the "Start" push button is depressed, an audible alarm and warning light will be activated in the immediate vicinity of the claim device before the unit begins motion.

2. System Stop (Automatic): Automatic stopping the system is accomplished through a photoelectric sensor located at the discharge shutter. Each time the system is started and an interruption of the photoelectric sensor beam occurs, a timing device is reset. After a time interval (0-30 minutes adjustable) suitable to ensure the last bag of a load has time to complete a full revolution on the conveyor after detection by the photoelectric sensor, the timing device will time-out and the conveyor will stop.

3. System Stop (Manual): Depressing the "Stop" push button (red extended) stops the conveyor device and associated equipment. Security and/or fire doors will shut once the conveyor device is stopped.

4. System Stop Emergency (Illuminated Mushroom Head Push Button E-Stop): The system and associated equipment will stop any time an "E-Stop" push button is depressed. A minimum of three (3) "E-Stop" push buttons are required for the system: two (2) are located in the lobby near the claim device out of the reach of children (one at each wall penetration), and the third is located in the same unit as the system "Start" and "Stop" push buttons. Depressing the "E-Stop" push stops the claim device and associated equipment; however, the fire/security doors remain in the open position.

5. After clearing the emergency, with the exception of "E-Stop" push buttons in public areas, the system may only be restarted by resetting the actuated "E-Stop" push button and then depressing a system "Start" push button. "E-Stop" push buttons in public areas operate as herein described with the exception that if reset, the system will automatically restart after completing a normal system start (warning) sequence.

K. Security Door Controls

1. If a system is equipped with an automatic security door, expiration of the start-up warning shall cause the door to raise. After the door has reached the full open position, the conveyors shall automatically start.

2. If a system is equipped with a manually operated security door, an interlock feature shall be provided which will prevent operation of the system unless the security door is in the full open position.

3. Normal System Stop (Automatic): When the system stops automatically, the associated doors shall then close. If the safety edge switch located on the bottom of the door encounters an obstruction, the door shall automatically return to the open position and illuminate a white indicator lamp. After the obstruction is removed, an obstruction reset pushbutton must be depressed to lower the door. The white indicator lamp and reset pushbutton shall be located near the security door. The conveyors shall remain inoperative when a door obstruction occurs.

L. Additional Controls

1. Cascade Stop

A. Photocells shall be located at the discharge end of all conveyors to signal the operation of cascade stops. A conveyor will stop when the cascade photocells are interrupted and the conveyor immediately downstream is stopped. The cascade stopped conveyor will automatically restart if the photocells are unblocked or the downstream conveyor restarts.

2. Jam Detection

A. Photocells to signal a jam shall be located at the discharge end of all conveyor feeding onto power turns, tapered rollers, incline conveyors, merges, opposite pushers and diverts, and at any other potential jam areas.

B. When the photocells detect a jam, the conveyor detecting the jam and the conveyor immediately downstream are stopped. If the conveyor immediately downstream is a power turn, then the conveyor immediately downstream of the power turn is also stopped.

C. If the conveyor is stopped for any reason, the jam detection timer will be reset and held until the conveyor is restarted. The jam detection function will only operate when the conveyor is running; if the conveyor is stopped and the jam detection photocell is blocked, then a false jam will not be reported.

3. Overheight Detection

A. Photocells shall be located at every input to detect bags that are too high to clear the lowest downstream stream obstruction for all possible routes. The conveyor will stop when the overheight photocell is interrupted and the oversized indicator lamp at the control station will be lit. The operator must reposition or remove the overheight bag and press the rest/start pushbutton. The stopped conveyor will restart and the oversized indicator lamp at the control station will be turned off.

4. Overlength Detection

A. Photocells shall be located at every input to detect bags that are longer than a preset bag length. The conveyor will stop if the bag is too long and the oversized indicator lamp at the control station will be lit. The operator must remove the overlength bag and press the rest/start pushbutton. The stopped conveyor will restart and the oversized indicator lamp at the control station will be turned off.

5. Auto Stop

   A. Photocells shall be located upstream of sections of transport conveyors not specifically controlled by START/STOP switches. The conveyors will stop if the auto stop photocell does not sense a bag for an adjustable time period. If a conveyor stops for any reason, the auto stop timer is reset and held until the conveyor restarts.

5. Indexing Control

   A. Photocells shall be located at the discharge end of each conveyor feed and indexing conveyor. The conveyor will run when the photocell is blocked and stop when it is clear. A time delay will be included such that the conveyor will continue to run for a preset interval after a bag clears the photocell and is completely on the indexing conveyor.

   B. Advance control pushbuttons shall be located in public areas and advance control lanyards will be located in the bag room. The advance control will cause the conveyor to run as long as the control is activated, or until the respective sort pier full photocell is blocked.

M. Motor Overloads

1. If any subsystem motor draws excess current, motor overload indicators on the affected MCP panels shall be lit. The fault shall also be displayed on the status monitoring system. Following correction of the overload cause and resetting of the overload protection device, the system may be restarted with the start pushbutton, after which the motor overload indicator will be turned off and normal operation will resume. If an individual conveyor motor overloads, all upstream conveyors will cascade stop and all downstream conveyors will continue to run as normal.

N. Jam Indication/Reset

1. A jam indicator light, emergency stop pushbutton, and a reset/start pushbutton shall be located in a control station near each jam detection photocell. The jam indicator light will be lit when the jam detection photocell senses a jam condition.

2. To restart the conveyor and extinguish the lamp the operator shall perform the following; push the emergency stop pushbutton, clear the jam, reset emergency stop pushbutton, and press reset/start push-button, after which the jam indicator light will be turned off.

3. Where possible the control stations shall be located adjacent to the jam photocell and will only be accessible to the personnel clearing the jam. The control stations will be located on the catwalk side of conveyors equipped with catwalks.

O. Startup Warning

1. Before startup of the conveyor system, an alarm horn shall sound and a beacon shall be lit for a period of time (adjustable). Alarm horns shall be provided at the ticket counter, curbside, and rechecked baggage inputs.

P. Alarm Silence

1. An alarm silence pushbutton on the door of the MCP shall silence the alarm horn. Multiple faults shall sound the associated alarm horn multiple times. For example, if a jam condition has caused the alarm horn to sound and the alarm has been silenced by the alarm silence pushbutton but the jam has not been cleared, then a second fault occurring after the alarm has been silenced will again cause the alarm horn to sound. The alarm silence pushbutton will not turn off any fault indicator lamps.

Q. Field Wiring

1. Disconnects

a. The Contractor shall furnish and install a non-fusible, manual disconnect switch, with provision for padlocking, in the circuit of each motor in the conveyor sub-systems in compliance with ANSI B20.1.

2. Circuit Wiring

a. All connections shall be made with wire of current-carrying capacity consistent with the load and duty cycle. Wires shall be run continuously from one piece of apparatus to another without splices in conduit. Power wiring may be spliced in junction boxes as required. Control connections shall be made on terminals or with compression-type splices enclosed in junction boxes. Power and low-level (less than 90 volts) electronic control wiring shall be in separate conduits. All circuit wiring shall comply with the most current version of the National Electrical Code and all State and local codes.

3. Conduit

a. Unless otherwise specified, all electric wiring shall be enclosed in E.M.T. conduit. Except in public areas, conduit shall be installed exposed on walls, ceilings, beams, columns, and on the conveyor structure. Locations of exposed conduit shall be selected in order to minimize or prevent damage to conduit from vehicles or equipment. In public areas, conduit runs shall be inconspicuous by running under cover plates, behind conveyors concealed from public view.

b. Flexible conduit may be used for final connections to motors and all other devices requiring adjustments. All fittings for flexible conduit shall be of the liquid-tight type. Installation shall be in accordance with Article 351 of NEC-78.

c. Outlet, junction and pull boxes, and cover plates shall be suitable for use with E.M.T. conduit and shall conform to the National Electric Code for minimum wiring space requirements and material thickness. All boxes shall have screw-fastened covers.

4. Wireways

   a. Wireways may be used where protection is adequate in accordance with Article 362 of NEC-78. Any Wireways used shall have hinge type covers.

5. Wire and Cable Conductors

   a. All power conductors shall be a minimum of No. 12 AWG, 600 volt, type THWN/THHN or THHN insulated stranded copper wire. All external control wire shall be a minimum of No. 14 AWG, type THWN/THHN or THHN stranded copper conductor, rated at 600 volts. All wires inside the control panel shall be sized for current carrying capacity. Control wires to be a minimum of No. 16 AWG, MTW, rated at 600 volts.

R. Control Device Identification

1. MCP component identification shall be provided so that all relays, timers, starters, overloads, fuses, etc., can be readily identified when the MCP door is opened. In addition to all prime manufacturer's nameplates, all electrical and mechanical control items mounted in or on panels or pushbutton stations shall be further identified in the system by permanently attached corrosion-proof, etched, engraved, or stamped identification plates. Dymo-type labels are not acceptable.

S. Conveyor Identification

1. Each conveyor section is permanently and indelibly marked with its respective number as illustrated by the Equipment Description list. Each conveyor number is carefully and neatly stenciled in a contrasting color 4" high, in a conspicuous location on the conveyor drive.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Inspect substrates and conditions under which the work of this section will be performed, and verify that installation properly may commence. Do not proceed with the work until unsatisfactory conditions have been resolved fully.

3.2 INSTALLATION

A. General: The conveyors shall be laid out as shown on the drawings and in no case shall interfere or encroach on adjacent space or functions. Required components of the system shall include but not be limited to straight sections and 90 degree turns. Installation and attachment of frame, trim, drive assembly, motor, controls, and other equipment may be based on manufacturer's standard methods.

B. Install baggage conveyors plumb and level. Coordinate location and layout with security doors.

C. Coordinate location of disconnect(s), alarms, lights, switches, access control devices etc. with other trades.

D. Mechanical Installation

1. Mechanical installation includes all necessary conveyor support steel and fire stops and fire doors supplied with the conveyor systems.

E. Electrical Installation

1. Electrical installation includes wiring and conduit for all conveyor power and control. All conveyor electrical equipment connections are included.

## 3.3 TESTING AND TRAINING

A. The Conveyor Contractor shall satisfy the Owner and the Architect that the equipment performs safely and in accordance with these specifications and manufacturer's published data as required by testing and training per Part 1 of this section.

## 3.4 ADJUSTING

A. Final Adjustments: Upon achieving substantial completion of the work, adjust all operable components to ensure that they are properly installed and functioning smoothly. Replace any component which cannot be adjusted for proper operation or within 10 percent of design requirements, at no additional cost.

## 3.5 CLEANING

A. During progress of the work, remove from the project site all discarded materials, rubbish, and debris resulting from the work.

B. Upon completion, clean all surfaces which have become soiled or coated as a result of work of this section, using proper methods which will not scratch or otherwise damage finished surfaces. All surfaces enclosed within the conveyor or center infill area shall be free from debris and broom clean for final acceptance.

1. For cleaning, use only products and techniques acceptable to manufacturer of products being cleaned.

## 3.6.1 PROTECTION

A. General: Institute protective procedures and install protective materials as required to ensure that work of this section will be without damage or deterioration at Substantial Completion and commissioning of the facility.

END OF SECTION 14540

# SECTION 16708 – ACCESS CONTROL SYSTEM

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Documents affecting work of the Contract, including General and Supplementary Conditions and Division 1 Specification section, apply to this section.

### 1.2 SUMMARY

A. Scope: Work of this section includes all labor, materials, and software required for systems operation, detailed technical design, installation, data entry and importation, graphic entry and importation, testing, and documentation of a complete and operating Integrated Access Control and Badging System (ACS) as shown on the drawings and specified herein.

### 1.3 RELATED SECTIONS

1. Division 16 Electrical Specifications"

### 1.4 RELATED WORK

### 1.5 SYSTEM DESCRIPTION

A. General: The Access Control System (ACS) shall consist of redundant real-time servers, alarm and badging workstations, and a hierarchy of intelligent field panels and door interface boxes which interface with specified card readers, portal input devices, portal output devices, monitoring, and control devices. The system shall be capable of routing individual alarms to selected workstations.

B. The system architecture shall support multiple-site system connections using local area network or wide area network. The user interface shall be Windows compatible, operate within a standardized pull down menu shell, and provide complete mouse input device capabilities. The ACS software shall operate simultaneously with other Windows compatible applications and shall preempt system operations upon a change of alarm state. During an alarm condition, the alarm status and acknowledgment windows shall move to the screen foreground.

## 1.6 HARDWARE ARRANGEMENTS

A. Host CPU: A redundant, cold backup, Central Processing Unit (CPU) capable of supporting 32-bit architecture and providing LAN connectivity for system workstations and RS-485 or LAN data connectivity for the intelligent field panels.

B. Access Control Workstations: A LAN connected personal computer (PC) operating as the user interface to the ACS system.

C. Badging Workstations: A LAN connected personal computer (PC) operating as the user interface for photo I.D. badging, cardholder database, future biometric enrollment, smart card programming, card printing, and key database management functions.

D. Intelligent Field Panels: A distributed intelligence processor that stores the cardholder database to grant or deny access, monitors system activity, and provides data communications interface between Input/Output Panels and the ACS System Host CPUs.

E. Input/Output Panels: An interface panel that provides for input and output device connection to the ACS System.

F. Card Reader: A portal device to read encoded portable cards information for the purpose of determining access rights.

G. Electric Locks: A device to secure the portal and allow passage through the portal by means of remote control.

H. Door Position Switch: A Balance Magnetic Switch (BMS) or other device used to monitor the open/closed status of the portal.

I. Lock Status Switch: A device used to monitor secured/unsecured status of the portal.

J. Request to Exit Device: A device used to allow egress through a secured portal without creating an alarm condition.

K. Duress Alarm: A device used to manually generate an immediate alarm condition at the alarm monitoring workstation.

L. Audio/Visual Alarm: A device used to indicate a breached security condition locally at the portal.

M. Key Switch: A key controlled device used to arm, disarm or reset certain portions of the ACS system.

N. Card Printer: Ancillary device used to print photo ID and card holder information directly onto access cards.

## 1.7 SYSTEM ARCHITECTURE

A. General: The ACS's primary function shall be to regulate access through specific portals to secured areas and provide ID badge creation. The ACS must utilize a single seamlessly integrated database for both its access control and badging functionality. This integration shall be provided under one operating environment.

B. Integrated Access Control and Badging System shall provide the following system functions:

1. Access Control
2. Alarm Monitoring
3. Cardholder Management
4. Signature Capture
5. Badge Creation and Printing
6. System Administration
7. Badge Layout Creation
8. Screen/Forms Creation
9. Graphical Map Creation
10. Data Import
11. Database and Alarm Reporting

C. Access Control: The systems primary purpose shall be to provide access control. The system shall be able to make access granted or denied decisions, define access levels, and set time zones and holidays. An input/output linkage feature will allow linking of monitor zone points to output control points within Intelligent Field Panels (IFP). The system shall provide features such as area control (two-man control, hard, soft and time anti-passback) and time zone/holiday overrides.

D. Alarm Monitoring: The system shall be used for graphical alarm monitoring. Map Configuration software must allow a User to create and import customized maps of their facility and to attach icons to those maps. Alarms are to be prioritized The alarm monitoring screen shall provide information about the time and location of the alarm, along with its priority. The alarm monitoring screen must be able to sort pending and/or insert new alarms based on any of the following attributes: priority, date/time, IFP, card reader, or card holder. Date/time sorts must be user selectable to be either ascending or descending and must have the option of displaying the seconds of the minute in which the alarm arrived into the system.

E. Badge Creation: The ACS shall include a state-of-the-art, 32-bit, ID badge creation and production system integrated with the cardholder management system. This shall allow for the creation of different badge types based on a database field, the linking of that field to a badge type to automate the process of credential production, and the use of security colors to allow officers to quickly identify personnel access authority by the badge design.

## 1.8 REFERENCES

A. General: The publications listed below form a part of this specification.

1. NFPA 70 National Electrical Code (NEC)
2. INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)
3. International Building Code 2003

## 1.9 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division #1 Specifications Sections:
   1. Product Data
   2. Shop Drawings

B. Provide assembly drawings.

C. Provide wiring diagrams

D. Testing: Prepare and submit Test Plans, Test Procedures and Test Reports as indicated in Part 3, Execution.

E. Provide detailed transition plan for implementing new ACS system.

## 1.10 OPERATION AND MAINTENANCE MANUALS

## 1.11 WARRANTY

A. Period: The Contractor shall guarantee all labor, workmanship, and materials for a period of one year from the date of substantial completion at the end of the last phase of construction. Should a failure occur within the first year to the system, the Contractor shall provide all labor and materials necessary to restore the system to the condition required for the final test and acceptance for this contract, at no cost to the Owner. During this period, the Contractor shall provide, free of charge, all software upgrades and patches. The contractor shall provide all materials, labor and equipment necessary to correct any defects that may develop due to faulty materials, or workmanship. Contractor shall fix or replace defects within 8 hours of the initial call for services. Tie-ins: During the warranty period, additional card readers and components may be connected and their use entered in database. New devices will be connected in the same manner as shown on the drawings for this contract and the existence of te new connections shall not void this warranty.

## 1.12 INTEGRATION/INTERFACE WITH OTHER SYSTEMS

A. Interface with the Fire Alarm System

B. Interface with the CCTV

# PART 2 - PRODUCTS

## 2.1 GENERAL

A. Power: All ACS equipment shall operate on 120 VAC. Any special power treatment required, such as filtering or spike elimination that may be required for proper operation and protection of the ACS system shall be provided with the system.

B. Backup Power: Provide integral battery back-up for all ACS devices including, but not limited to, ACS field panels, and lock power supplies.

C. Hardware: Provide a distributed access control system as required for a complete operating system as described herein and shown on the drawings.

## 2.2 MANUFACTURERS

A. General: Subject to compliance with requirements provide the following products by one of the stated approved manufacturers.

B. Software, Intelligent field panels, reader modules, and other input/output/active ACS modules:

C. Servers and Personal Computers (workstations):

D. Smart Card Readers:

E. Smart Card Readers with internal keypad:

F. Door Position Switches:

G. Audible/visual Alarm units:

H. Duress Alarm Pushbutton:

I. Power Supplies:

J. Proximity Cards:

K. Card Printer:

## 2.3 PROCESSING DEVICES

A. Host Processor/Server: The host CPU shall support Ethernet LAN communication using TCP/IP protocol between clients and servers.

B. Redundant Processor/Server

C. Workstations:

Intelligent Field Panels: The intelligent field panel shall be a distributed intelligence processor with multi-door portal interface functionality.

## 2.4 BADGING SYSTEMS DEVICES

A. The system shall b ea complete personnel imaging and data management system.

## 2.5 DOOR DEVICES

1. Smart card reader:
2. Smart card reader with Keypad:
3. Door Position Switches
4. Audible/Visual Alarm Units:
5. Duress Alarm Pushbutton:
6. Power Supplies
7. ElectroMagnetic Locks
8. Electrified Panic Bars: Provided and installed by Division 8 supplier and wired by this Contractor. Reference Door Hardware Section 08710 for more information.
9. Power Supplies for magnetic locks: Provided by Division 8 supplies, installed and wired by this Contractor.
10. I.D. Badge Printer.

## 2.6 SMART CARDS

A. The smart card and ID badge shall be one card. The smart card shall be capable of being imprinted with photo identification and text.

## 2.7 CABLE AND CONDUCTORS

A. Provide per manufacturers' written instructions and as indicated on the drawings.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. The Contractor shall investigate the site and become thoroughly familiar with the existing badging system, Airport security and airport operations.

B. Install security system in accordance with equipment manufacturer's written instructions and complying with applicable portions of NEC and NECA's "Standard of Installation".

## 3.2 INSTALLATION OF CONDUCTORS

A. General: Installation of conductors shall comply with manufacturer's recommendations, local, provincial and national codes.

3.3 GROUNDING

A. Cable Shields: All twisted pair shields shall be grounded at one point only cables that originate from equipment in systems/electrical rooms and serve field devices shall be grounded to the signal ground terminal in the system/electrical room.

3.4 FINAL TESTING AND ACCEPTANCE

3.5 SYSTEM AVAILABILITY TEST

3.6 TRAINING

3.7 ACCEPTANCE

END OF SECTION 16708

# SECTION 16742 – STRUCTURED CABLING SYSTEM

## 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. All general Division 16 electrical specifications.

B. Specific reference in Specifications to codes, rules, regulations, standards, manufacturer's instructions or requirements of regulatory agencies shall mean the latest printed edition of each in effect at Date of contract unless the Document is shown dated.

C. Conflicts:
1. Between Referenced Requirements: Comply with the one (1) establishing the more stringent requirements.
2. Between Referenced Requirements and Contract Documents: Comply with the one (1) establishing the more stringent requirements.

D. References: Installation and testing shall comply with the following codes, standards, and design guidelines:
1. National Fire Protection Association (NFPA).
2. NFPA 70 (2002); National Electrical Code (NEC).
3. Telecommunications Distribution Methods Manual (TDMM).
4. Telecommunications Industry Association and Electronic Industry Alliance (TIA/EIA).
5. International Civil Aviation Organization Annex 9-Facilitation
6. International Air Transport Association Airport Development Reference Manual
7. International Building Code 2003
8. Local codes and ordinances, as applicable.

### 1.2 SUMMARY

A. Design Criteria: The structured cabling system provides a consolidated communications infrastructure to be used by network systems and is comprised of copper and fiber optic cables routed throughout the Facility. This system shall provide transmission media for all voice, data, and video signals. The Contractor shall provide structured cabling transmission media, components, and testing as specified herein or shown on the Drawings and in conformance with manufacturers' requirements and recommendations.

B. This Section includes the racks, patch panels, connectors, patch cords, outlets, terminal blocks, etc. as required to provide a complete structured system. This Section specifies the following types of control and signal transmission media:
   1. UTP Copper: AnSI/TIA/EIA-568B.2-1 Compliant, 4-Pair Category 6.
   2. UTP Copper: Category 3 Backbone Cable.
   3. Fiber Optic Cable: AnSI/TIA/EIA-568B.3 and ISO/IEC 11801 Compliant.
   4. Coaxial Cable.
   5. Multi Conductor and Paired Cable

C. Unless agreed to in writing, the system shall be documented as specified herein or shown on the Drawings.

## 1.3 SUBMITTALS

A. Shop Drawings:

1. Proposed Products Data Sheets: The Contractor shall submit catalogue cut-sheets for approval that include manufacturer, trade name, and complete model number for each product specified. Model number shall be hand written and/or hi-lighted to indicate exact selection. Identify applicable specification section reference for each product.

## 1.4 QUALITY ASSURANCE

## 1.5 WARRANTY

A. Period: The contractor shall guarantee all labor, workmanship, and materials for a period of one year from the date of substantial completion at the end of the last phase of construction. Should a failure occur within the first year to the system, the Contractor shall provide all labor and materials necessary to restore the system to the condition required for the final test and acceptance for this contract, at no cost to the Owner. During this period, the Contractor shall provide, free of charge, all software upgrades and patches. The contractor shall provide all materials, labor and equipment necessary to correct any defects that may develop due to faulty materials, or workmanship. Contractor shall fix or replace defects within 8 hours of the initial call for services.

# PART 2 - PRODUCTS

## 2.1 CABLE

A. Category 6 Cable
B. Category 3 Backbone Riser Cable
C. Fiber Optic Cable
   1. Multi mode cable
   2. Singe mode cable
D. Coaxial Cable.

## 2.2 CONNECTORS

A. Category 6 Connectors/Jacks/Outlets:
B. Fiber Optic Connectors:

## 2.3 PATCH PANELS

A. Category 6 patch panels
B. Riser & Voice Punchdown Blocks
C. Fiber Optic

## 2.4 PATCH CORDS

A. Patch Cords fiber optic or CAT 6 copper, shall meet all conventions and specifications conforming to the structured cabling arrangement described above and shall be factory manufactured.

## 2.5 RACKS AND CABINETS

A. Freestanding Cabinets

B. Freestanding Equipment Racks

C. Wallmount Equipment Racks

## 2.6 TELECOMMUNICATIONS ROOM CABLE TRAY.

## 2.7 UNINTERRUPTIBLE POWER SUPPLIES (UPS)

## 2.8 NONMETALLIC FLEXIBLE OPTICAL FIBER RACEWAY

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. General: The contractor shall ensure that all Work performed under these Specifications is in accordance with the requirements and standards defined and referenced in these Specifications. Any Work performed in deviation of these Specifications, any of the referenced material, or any applicable standards or requirements, shall immediately be corrected by the Contractor without additional charges, regardless of the stage of completion. The Contractor shall record all inspection observations. As a minimum, the record shall include the name(s) of personnel conducting the inspection, a brief description of the inspection and the observations. These records shall be available for the Owner to review at any time. Also, these records shall be delivered to the Owner before Final Acceptance.

## 3.2 INSTALLATION

A. Standards: All installation activities shall be performed in a neat and professional manner in accordance with all applicable local and national codes.

## 3.3 DOCUMENTATION

## 3.4 IDENTIFICATION

A. Cabling: All installed cables shall be labeled using a pre-printed stick-on self-adhering labeling system. The label must be applied on both ends of the cable, and shall remain clearly visible after completion of the installation.

## 3.5 FIELD QUALITY CONTROL

A. The test procedures shall contain at a minimum the following elements:

1. Statements of purpose identifying the goals of the test.

2. The methods used for testing.

3. Duration and schedule of tests.

4. Examples of all graphs, tables, and charts necessary for display of testing results.

5. Certifications and qualifications of all persons conducting the testing.

6. Calibration certificate of test equipment.

## 3.6 MAINTENANCE AND SUPPORT

A. General

1. The contractor shall provide maintenance and support of all components associated with this system at no additional charge during the Warranty period.

## 3.7 CLEANING

A. Upon completion of system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

## 3.8 ACCEPTANCE

A. Acceptance will be withheld until the following have been completed successfully:

1. Acceptance of all submittals
2. Delivery of final documentation
3. Successful testing
4. Successful demonstration, including operation of systems using the cables, training and manual review.

END OF SECTION 16742

# SECTION 16770 – PUBLIC ADDRESS SYSTEM

## 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 Paging Systems. It includes requirements for Paging System componenets including, but not limited to, the following:

1. Audio Distribution Amplifiers
2. Audio Mixer Amplifiers
3. Digital Signal Processors
4. Noise Leveling Computer
5. Racks and Accessories
6. Wiring
7. Microphone Paging Stations
8. Routing Controller
9. Paging Interface
10. Surge Suppression
11. Grounding
12. Recording and Playback Equipment
13. Speakers and Accessories

### 1.3 PUBLIC ADDRESS SYSTEM DESCRIPTION

A. General: Provide a complete Public Address System based on the Specifications given and the information shown on the Drawings. Contractor shall provide all labor, materials, tools, equipment, and documentation, and the performance of all operations necessary for engineering, detailing, fabricating, inspecting, documenting, delivering, installing, and testing for a complete functioning Public Address System.

### 1.4 SOFTWARE GENERAL

A. All software that the operators interact with shall be user friendly, menu or graphical user interface driven and have the characteristics of an application program. All operating features specified here shall be available without requiring knowledge of the underlying programming language. All features shall be available by answering prompts and responding to menus. All

menus shall be subdivided into logical groups. All operator input shall be checked to insure that no input error can render the system, or a portion thereof, inoperable.

B. System software required for the complete operation of this system shall be provided, installed on the system hard disk and tested, including software to build and maintain the required databases.

## 1.5 SUBMITTALS

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

B. Shop Drawings detailing public address system including, but not limited to the following:
   1. Product Data: Submit manufacturer's data on the Public Address System components, including, but not limited to electrical Specifications, mechanical Specifications, rough-in diagrams and instructions for installation, operation and maintenance, suitable for inclusion in maintenance manuals.

## 1.6 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who is a factory-authorized sales and service representative to perform the Work of this Section.

B. Electrical Component Standard: Provide work complying with applicable requirements of NFPA 70 "National Electrical Code."

C. EIA Compliance

## 1.7 WARRANTY

A. Guarantee all labor, workmanship, and materials for a period of one (1) year from the date of substantial completion of the last phase of construction. All system failures during this period shall be repaired at no cost to Owner.

# PART 2 - PRODUCTS

## 2.1 SYSTEM REQUIREMENTS

A. General: Provide complete and fully functional Paging Systems using materials and equipment of types, sizes, ratings, and performances as indicated. Use materials and equipment that comply with referenced standards and manufacturers' standard design and construction in accordance with published product information. Coordinate the features of materials and equipment so they form an integrated system with components and interconnections matched for optimum performance of specified functions.

## 2.2 EQUIPMENT AND MATERIALS

A. General: Provide equipment using all solid-state components fully rated for continuous duty at the ratings indicated or specified. Select equipment for normal operation on input power supplied at 108-132 V. 60 Hz. All amplification, routing control and signal processing equipment is to be configurable from the local paging controller or remote paging operator workstation.

B. Distribution Amplifier

C. Routing controller

D. DSP Equalization

E. Paging Material Distribution

F. Digital Interface and Monitor/Test System

G. Digital Recording Capabilities

H. Digital Audio Library

I. Power Amplifiers

J. Ambient Noise Microphone

K. Desktop Paging Station

L. Wall Mount Paging Stations

M. Volume Controller

N. Speakers

O. Speaker Mounting Hardware

P. Electronic Microphone Cable

Q. Speaker Cable: UL listed Article 725 (UL 444 for plenum applications)-min. 12 AWG, tinned copper, PVC insulated, with PVC riser rated jacket.

R. Ambient Noise Sensor Cable: One (1) shielded twisted pair 20 AWG tinned copper conductors; color coded, low loss polyethylene insulation; with 20 AWG stranded tinned copper drain wire shield.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. Examine conditions, with the Installer present, for compliance with requirements and other conditions affecting the performance of the Public Address system work.

## 3.2 INSTALLATION

A. General: Install system in accordance with NFPA 70 and other applicable codes. Install equipment in accordance with manufacturer's written instructions.
B. Wiring Methods: Install wiring in raceway except within consoles, desks, and counters. Conceal wiring within desks and counters. Use UL-listed plenum cable in environmental air spaces, including plenum ceilings.

## 3.3 GROUNDING

A. Ground equipment, conductor, and cable shields to eliminate shock hazard and to minimize to the greatest extent possible, ground loops, common mode returns, noise pickup, cross talk, and other impairments. Provide 5-ohm ground at main equipment location. Measure, record, and report ground resistance.

## 3.4 TESTING AND ACCEPTANCE

A. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.

B. Pretesting: Upon completing installation of the system, align, adjust, and balance the system and perform complete pretesting. Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new, and retest until materials satisfactory performance and conditions are achieved.

## 3.5 MAINTENANCE AND OPERATIONS MANUALS

## 3.6 CLEANING AND PROTECTION

A. Prior to final acceptance, clean system components and protect from damage deterioration.

## 3.7 TRAINING

A. Train maintenance and operation personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventative maintenance of the system Provide a minimum of sixteen (16) hours training.

END OF SECTION 16770

# SECTION 16780 – CLOSED CIRCUIT TELEVISION

## 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 Sections:
   1. All Division 16 Specification Sections.

### 1.2 SUMMARY

A. This Section includes all labor and materials including, but not limited to: Closed Circuit Television (CCTV) cameras, lenses, mounting hardware, power supplies, signal transmission equipment, CCTV monitors ad Digital Video Recording and Surveillance System (DVRS) required to forma fully functional CCTV surveillance system.

### 1.3 FUNCTIONAL DESCRIPTION

A. All user control of the system shall be through the DVERS keyboard and mouse.

B. The CCTV system shall support NTSC video signals from any source that provides a composite 1v p-p video signal.

C. The system shall provide for the sequencing for full screen video images on a CCTV monitor that can include selecting multiple pre-selected positions for PTZ cameras.

D. The system shall provide for four images to be simultaneously displayed on one CCTV monitor. The images in each quadrant shall be capable of sequencing through multiple inputs.

E. The system shall general user configurable on-screen displays for camera title, time and date.

### 1.4 INTEGRATION

A. The CCTV system shall be integrated with the Access Control System.

B. The CCTV system shall also interface with and the Digital Video Recording (DVR) System.

### 1.5 SUBMITTALS

A. Product Data
   1. Dimensions
   2. Product identification
   3. Fabrication and installation Drawings
   4. Rough-in diagrams
   5. Wiring diagrams showing field-installed wiring
   6. Schedules and Tables
   7. Design calculations and methods
   8. Compliance with specified standards
   9. If rack mounted equipment is used, provide an assembly Drawing of every equipment rack with locations, quantities, model numbers of individual components contained in the rack, and dimensions shown on the Drawing.

## 1.6 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of CCTV systems, components and accessories, of types, capacities and characteristics required, whose products have been in satisfactory use in similar service for not less than five (5) years.

## 1.7 INTELLECTUAL PROPERTY

## 1.8 WARRANTY

A. Period: The Contractor shall guarantee all labor, workmanship, and materials for a period of two (2) years from the date of final acceptance. Should a failure occur within the first two years to the system, the Contractor shall provide all labor and materials necessary to restore the system to the condition required for the final test and acceptance for this contract, at no cost to the Owner. During this warranty period, any maintenance required for keeping the warranty valid, including but not limited to periodic cleaning and adjusting of equipment, shall e provided by the contractor at no additional charge under this contract.

# PART 2 - PRODUCTS

## 2.1 FIELD DEVICES

A. General: Provide material of types, sizes, capacities and electrical characteristics indicated. Except as otherwise indicated, provide manufacturer's standard Closed Circuit Television system components as indicated by their published product information, designed and constructed as recommended by manufacturer.

B. Camera Equipment

1. Interior Fixed Position Type
2. Exterior Fixed Position Type Cameras
3. Interior PTZ Style Cameras
4. Exterior PTZ Style Cameras.

C. Fiber-Optic Video Transceiver

D. High Resolution Color Monitors

E. Rack Mount CCTV Camera Supply

PART 3 – EXECUTION

3.1 INSTALLATION

A. Manufacturer's Instructions: Install Closed Circuit Television systems and components where indicated, in accordance with equipment manufacturer's written instructions, in compliance with National Electrical Code, and with recognized industry practices, to ensure that television system complies with requirements and serves intended purposes.

3.2 OPERATION AND MAINTENANCE MANUAL

3.3 ACCEPTANCE

A. Acceptance will be withheld until the successful completion of the following:

1. Acceptance of all submittals
2. Delivery of manuals and training material
3. Delivery of as-built/installed drawings
4. Camera aiming
5. Successful testing
6. Successful demonstration, including camera operation, training and documentation review.

END OF SECTION 16780

# SECTION 16781 – DIGITAL VIDEO RECORDING SYSTEM

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes all materials and labor required for the installation, testing, commissioning, and documentation of a fully functional Digital Video Recording System (DVRS) and review stations as provided by the Contractor and shown on the drawings and specified herein.

### 1.3 RELATED SECTIONS

A. Division 16708 – "Access Control System"

B. Division 16742 – "Structured Cabling System"

C. Division 16780 – "CCTV System"

### 1.4 REFERENCED STANDARDS

A. The following standards and requirements shall apply to the signal processing anc communications features of the unit:
   1. NTSC standard documents
   2. EIA Recommended Standards RS-170 and RS-170A.
   3. NFPA 70 National Electrical Code
   4. International Building Code 2003

### 1.5 SUBMITTALS

A. Product Data: Submit manufacturer's data on digital video recording system components as follows:
   1. Electrical specifications
   2. Mechanical specifications
   3. Instructions for installation, operation
   4. Maintenance manuals

5. On data sheets that illustrate multiple models, the particular model proposed for the application shall be highlighted, encircled or otherwise identified. Individual copies shall be included for each proposed model number indicating areas of application.
6. Deviations from specifications shall be highlighted, encircled or identified on the documents and be marked as deviations.

1.6 OPERATION AND MAINTENANCE MANUALS

1.7 INTELLECTUAL PROPERTY

1.8 WARRANTY

A. Period: The contractor shall Warranty all labor, workmanship, and materials for a period of two (2) years from the date of Final Acceptance. Should a failure occur within the first two (2) years of the system, the Contractor shall provide all labor and materials necessary to restore the system to the condition required for the Final test and Acceptance for this Contract, at no cost to the Airport.

1.9 DELIVERY, STORAGE, AND HANDLING

1.10 SEQUENCING AND SCHEDULING

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide material of types, sizes, capacities and electrical characteristics indicated. Except as otherwise indicated, provide manufacturer's standard DVRS system components as indicated by published product information, designed and constructed as recommended by manufacturer.

B. Power Supply: All devices in the DVRS system shall operate on 120 VAC supply, except where noted. Any special power treatment required such as filtering or spike elimination that may be required for proper operation for the DVRS system shall be provided with the system.

2.2 DESCRIPTION

A. The digital video management system shall be a PC-based video processor and recorder. Video shall be displayed on LCD displays, and configuration shall be performed with a standard mouse and keyboard. The digital video management system shall have the ability to display full-frame, real-time video VGA and analog video monitors.

B. The digital video management system shall be configured using an interface application and shall record video continuously, only during alarm events, or only while video motion activity is detected.

C. Each camera shall be able to record in different modes and on different schedules or using the same schedule and configuration.

D. Local and remote interfaces shall allow easy search and retrieval of video. User-defined parameters shall allow searches based on the time and date the video was captured; whether alarm, motion, or scene loss events occurred; and which camera captured the video.

E. The interfaces shall also permit full video storage management, hardware control, alarm configuration, and export of video and individual frames.

F. Remote connections are available over standard TCP/IP network.

2.3 OPERATOR CONTROLS

A. The application interface shall function on a Windows operating system. It shall run automatically when the digital video management system is powered up.

2.4 DISPLAY OUTPUTS

A. Up to four analog video outputs shall be assigned in one of the following ways:
   1. Camera inputs assigned to each output
   2. A user-defined tour cycle of cameras assigned to each output
   3. Tour cycle of all camera inputs recording alarm or activity events

2.5 DIGITAL VIDEO RECORDER WORKSTATION

PART 3 – EXECUTION

3.1 GENERAL

A. The Contractor shall investigate the site and become thoroughly familiar with the facility. The Contractor shall plan the DVRS system installation such that the DVRS is installed and tested for proper operation in coordination with the CDTV system.

B. Install DVRS system in accordance with equipment manufacturer's written instructions and complying with applicable industry standards for Installation.

3.2 TESTING

A. Problem Correction: Any problems encountered including damage to airport owned equipment and DVRS elements during this test shall be documented and brought to eh attention of the Airport and corrected at Contractor's expense. The Contractor shall promptly correct all problems encountered, providing field service personnel appropriately trained for the types of problems encountered.
B. Test Documentation: The Contractor shall supply forms to be used during these tests for authorization and initialing by the Airport or designated representative and the Contractor. This form shall clearly define the items tested, leaving room for the date, DVRS component designation, confirmation of camera view, and initials. All DVRS functions shall be demonstrated to ensure operation as required by these Specifications and Drawings.

## 3.3 ACCEPTANCE

A. Acceptance will be withheld until the successful completion of the following:

1. Acceptance of all submittals.
2. Delivery of final documentation (including As-Built Documents).
3. Successful testing.
4. Successful demonstration of recording ability, operator and administrator training and documentation review by the engineer.

END OF SECTION 16781

# SECTION 16790 – DATA COMMUNICATIONS NETWORK EQUIPMENT

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This section contains the technical specifications for the data communications network system for the Entebbe International Airport. The system shall include all hardware, software configuration and accessories required to provide a fully functioning network system. The data network system shall support airfield operations, Common Use Terminal equipment (Cute) System, building systems, administrative local area network, master clock system, Electronic Flight Information Display System by using the airport Premise Distribution System (PDS). The associated Drawing Set, including the General notes, further specifies the Data Network System and is part of the technical specifications.

### 1.2 DEFINITIONS

A. LAN: Local Area Network

B. WAN: Wide Area Network

### 1.3 SUBMITTALS

A. The Contractor shall not perform any portion of the work requiring submittal and review of record drawings, shop drawings, product data, or samples until the Designer has approved the respective submittal. All work shall be in accordance with approved submittals.

B. Qualifications: The Contractor shall submit qualification data sheets for firms and persons as specified in the "Quality Assurance" article of this Section to demonstrate their capabilities and experience.

C. Proposed product data sheets: The Contractor shall submit catalogue cut-sheets that include manufacturer, trade name, and complete model number for each product specified. Model number shall be handwritten and/or highlighted to indicate exact selection. Identify applicable specification section reference for each product. Product data sheets shall be bound in a three ring binder and shall include a product index listing the model number and description of product.

D. Record Drawings: Furnish CAD drawings of completed work including labeling, where applicable. Refer to the "Identification" article in this Section for labeling conventions.

E. System test plans: The Contractor shall provide a typical example of their test plans.

F. System Block Diagram: The contractor shall supply a block diagram that depicts the final system, including locations, IP addresses and other specific attributes for each network device.

The Contractor shall update the network management system as well as the Cabling infrastructure management system with the LAN As-built information.

G. Installation schedule.

H. Parts List: Submit a complete list of major components showing a description and location for each component provided under this specification.

I. Submit technical and operations manuals. Manuals shall describe function, operation, and programmable parameters for each card and port for each device to be installed. Manuals shall include required maintenance to be performed.
   1. Manuals shall describe function, operation, and programmable parameters for each card and port for each device to be installed. Manuals shall include required maintenance to be performed.
   2. Manuals shall be suitable for the training of future personnel, and for use as a reference by currently employed personnel in performing work assignments.

## 1.4 QUALITY ASSURANCE

A. Contractor Qualifications: Submit written proof that the following experience requirements are being met:

   1. The contractor shall be certified by the manufacturer of the products, adhere to the engineering, installation and testing procedures and utilize the authorized manufacturer components and distribution channels in provisioning this Project.

   2. All members of the installation team shall be certified by the manufacturer as having completed the necessary training to complete their part of the installation. Resumes of the entire team shall be provided along with documentation of completed training course.

   3. The contractor shall provide five references for projects of equivalent scope, type and complexity of work completed within the last five years.

B. All hardware, software, firmware, and/or operating system requirements given are the minimum requirements. The Contractor's product shall meet or exceed these performance requirements specified herein. Additionally, due to the rapid advancement and antiquation of technology related products, the supplied product shall be the "contemporary technical equivalent" of that specified. "Contemporary technical equivalent" shall be based on a comparison of technology at the time of publication of specification to the technology at the time of the first product submittal. Final product approval is at the sole discretion of Entebbe International Airport.

C. Equipment and materials supplied for the LAN shall be a standard product of manufacturers regularly engaged in the manufacture and installation of information backbone technologies and

shall be the manufacturer's latest standard design. Items of the same classification shall be identical. This requirement includes equipment, modules, assemblies, parts, and components. Electrically powered equipment shall be UL approved. Electronic equipment shall meet the requirements of CFR 47 Part 15.

D. All components of each kind shall be covered by a single warranty program with a single point of contact.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Equipment delivered to the job site shall be opened and inspected immediately upon arriving and compared to the approved shop drawing submittal and checked for defects. If the equipment is not correct, the equipment shall be returned to the manufacturer immediately and a new order for the approved equipment shall be placed at no cost to the owner.

B. Equipment shall be delivered in original packages with labels intact and identification clearly marked.

C. Equipment shall not be damaged in any way and shall comply with manufacturer's operating specifications.

D. Equipment and components shall be protected from the weather, humidity, temperature variations, dirt, dust, or other contaminants. Equipment damaged prior o system acceptance shall be replaced at no cost to owner.

## 1.6 REFERENCES

A. The publications listed below form a part of this specification. The publications are referred to in the text by basic designation only.

B. Specific reference in specifications to codes, rules, regulations, standards, manufacturer's instructions, or requirements of regulatory agencies shall mean the latest printed edition of each in effect at the date of contract unless the document is shown dated.

C. Conflicts:

1. Between referenced requirements: Comply with the one establishing the more stringent requirements.
2. Between referenced requirements and contract documents: Comply with the one establishing the more stringent requirements.

D. References:

1. International Organization for Standardization (ISO)
   a. ISO 8802/3; Information Exchange between Systems, CSMA/CD
2. Institute of Electrical an d Electronics Engineers
   a. IEEE 802.3ae 10 Gigabit Specification
   b. IEEE 802.3ab 1000 Base-T Specification
   c. IEEE 8023u 100 Base-T Specification

d. IEEE 802.3 10 Base-T Specification
e. IEEE 802.1Q VLAN
f. IEEE 802.1P Prioritization
g. IEEE 802.11gWLAN MAC and PHY specifications--Amendment
h. IEEE 802.3af Power-over-Ethernet

3. Underwriters Laboratory (UL)
4. National Electrical Code (NEC)
5. National Fire Protection Agency (NFPA)
6. Building Industry Consulting Services International (BICSI)
7. International Organization for Standardization (ISO)
8. Internet Engineering Task Force (IETF)
9. American Society for Testing Materials (ASTM)
10. Local regulations and codes in effect as of date of purchase shall be complied with.
11. Telecommunications Distribution Methods Manual (TDMM).
12. Telecommunications Industry Association and Electronic Industry Alliance (TIA/EIA).
13. International Civil Aviation Organization Annex 9-Facilitation
14. International Air Transport Association Airport Development Reference Manual
15. Local codes and ordinances, as applicable.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. LAN Equipment: Cisco Systems or submitted and owner approved equivalent.

B. Wireless Access Point: Cisco Systems or submitted and owner approved equivalent.

C. Wireless Access Point Enclosure: Oberon, Inc. or submitted and owner approved equivalent.

D. 1 Rack Unit (1RU) Servers: Dell, Inc. or submitted and owner approved equivalent.

E. IP addressable KVM with 19" LCD: Rose Electronics or submitted and owner approved equivalent.

### 2.2 LAN HARDWARE REQUIREMENTS

A. All equipment shall be rack mountable in standard 19-inch racks. Contractor is responsible for providing fans, shelves, drawers, special power wiring, ground connections, and adapters of any kind necessary to accommodate the system installation, operation, testing, or maintenance. Contractor shall provide the appropriate factory or custom rack mount adapters for all equipment installed in the equipment rack, whether specifically itemized or not. Contractor shall cover unused slots using blank panels.

B. Fiber and Copper Patch Cords—Adequately sized fiber and copper patch cords shall e provided for each installed port in the LAN.

C. Core Networking Equipment

1. The Core networking equipment shall be located in the XXX data room as shown in the contract drawings.

D. Distribution Networking Equipment
   1. The Distribution networking equipment shall be located in the XXXX telecommunication room as shown in the contract drawings.

E. Access Networking Equipment
   1. The Access networking equipment shall be located in the XXXX telecommunication room as shown in the contract drawings.

F. 1 Rack Unit (1RU) Servers
   1. 1RU Server: The 1RU Server will be used for the following systems
      a. d
      b. d
   2. The servers shall be

G. IP addressable KVM with 17" LCD
   1. d

2.3 LAN PERFORMANCE REQUIREMENTS

A.

PART 3 – EXECUTION

3.1 EXAMINATION

A.

3.2 INSTALLATION

A. Install components in accordance with contract drawings, manufacturer's instructions and approved submittal data.

3.3 DOCUMENTATION

A. This Section requires complete documentation of the LAN for the purpose of system operation and maintenance during and after the Warranty period. It is intended that the operation and maintenance manuals be exhaustive in the coverage of the system to the extent that they may be used as the sole guide to the troubleshooting, identification, and repair of defective parts. All documentation, as described herein shall be submitted to the Owner for approval sixty (60) days prior to final submission.

B. Scope;

3.4 IDENTIFICATION

A.

3.5 FIELD QUALITY CONTROL

A. The contractor shall develop and execute an onsite acceptance-testing program.

3.6 MAINTENANCE AND SUPPORT

A. System Certification

B. Support Availability

3.7 WARRANTY

A. In addition to warranty requirements listed in section ????, the Contractor shall provide a joint written warranty of the manufacturer(s) and the installer(s), on a single document. The document shall warrant complete installation of the equipment, system, and software to be free from defects in materials and workmanship for a period no less than two (2) years, starting with the date of Final System Acceptance.

B. The Contractor shall warrant that the proposed merchandise will conform to its description and any applicable specifications, and shall e of good quality for the know purpose for which it is intended.

C. The product warranty shall cover the replacement or repair of defective products and labor for the replacement or repair of such defective products.

D. Software License

1. Required software licenses shall be identified and supplied by the Contractor. Licenses shall be "Site Licenses" which shall cover all equipment installed now or in the future.

2. All software licenses and warranties shall be registered in the name of Entebbe International Airport.

## 3.8 CLEANING

A. Upon completion of system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions and leave the project areas broom-clean.

## 3.9 ACCEPTANCE

A.

END OF SECTION 16790

# SECTION 16860 – MULTI-USER FLIGHT INFORMATION DISPLAY SYSTEM

## 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 Sections:
1. 16742 – Structured Cabling System
2. 16790 – Local Area Network
3. All general Division 16 electrical specifications

### 1.2 SUMMARY

A. This Section specifies the requirements for the Multi-User Flight Information Display System (MUFIDS) and the following related sub-systems:
1. Flight Information Display System (FIDS).
2. Baggage Information Display System (BIDS).
3. Gate Information Display System (GIDS).
4. Visual Paging system (VPS).
5. Video Advertising Capability

B. References: Installation and testing shall comply with the following codes, standards, and design guidelines:
1. National Fire Protection Association (NFPA).
2. NFPA 70 (2002); National Electrical Code (NEC)>
3. Telecommunications Distribution Methods Manual (TDMM).
4. Telecommunications Industry Association and Electronic Industry Alliance (TIA/EIA).
5. International Civil Aviation Organization Annex 9-Facilitation
6. International Air Transport Association Airport Development Reference Manual
7. Local codes and ordinances, as applicable.

### 1.3 SUBMITTALS

A. Proposed Products Data Sheets: The Contractor shall supply a catalogue cut-sheet for approval that includes manufacturer, trade name, model number, and related section number, and specification paragraph numbers for each listed product.

### 1.4 QUALITY ASSURANCE

A. The Contractor must currently be and have been in the business of selling, installing, and maintaining similar systems at airports for a minimum of three (3) years.

## 1.5 WARRANTY

A. General:
   1. The Contractor shall provide a joint written warranty of the manufacturer(s) and the installer(s), on a single document. The document shall warrant complete installation of the equipment, system, and software to be free from defects in materials and workmanship for a period of no less than twelve (12) months.

# PART 2 - PRODUCTS

## 2.1 SYSTEM REQUIREMENTS

A. Performance Requirements:
   1. Overview: The software shall be designed using a modular approach, in a commonly available development environment. Software code and functionality shall be well documented in order to facilitate maintenance by personnel other than the original programmer. A single user license of the development system and any tools/utilities used during development shall be included as a deliverable item.
   2. Capacity: The system as supplied shall be configured to support the operational, functional, and performance requirements, specified herein, for a minimum of 50 users simultaneously logged into the system.
   3. Peak Capacity Rate: The systems shall be designed to support the operational, functional, and performance requirements, specified herein, for a minimum of twenty-five (25) additional users (for a total of 75 users) logged in simultaneously using the MUFIDS application.

B. Distribution:
   1. The MUFIDS shall be designed to operate in a client/server environment. The digital data converter (DDC) shall act as a client to the Host Computers, which shall act as the server.
   2. All information shall be passed within the system using the Local Area Network via the Structured Cabling System.

## 2.2 SOFTWARE REQUIREMENTS

A. The software shall be designed using a modular approach, in a commonly available development environment. Software code and functionality shall be well documented in order to facilitate maintenance by personnel other than the original programmer. A single User license of the development system and any tools/utilities used during development shall be included as a deliverable item. Custom assembly language routines are not allowed.

## 2.3 SYSTEM MAINTENANCE AND COMPATIBILITY

A. Database Management

1. User Interface: Database shall allow a means for a user, dependent on user access rights, to manually add/modify/delete field contents of flight schedules.
2. Flight Schedule Databases: Database shall contain a minimum of three flight schedules. These include:
   a. Master Flight Database (MFD): Designated in the following table with an "M". This database shall contain all scheduled flights with associated start and end (9if scheduled) of operation. Also referred to as the Seasonal Flight Schedule.
   b. Active Flight Database (AFD): Designated in the following table with an "A." This database shall contain the current day's flight schedule and is constructed from the MFD.
   c. Historic Flight Database (HFD): Designated in the following table with an "H." This database shall contain a log of actual flight operational components.
3. Flight Schedule Fields: The MUFIDS data within the Host Computers shall consist of a minimum of the fields shown in the following table. In the rightmost column, there is a designation of the usage of that field; "M" would indicate that the field is used in the Master Flight Database, sometimes also known as the "seasonal" database; the "A" indicates that the field is to be used within the current day's flight database or "Active" database; the "H" indicates that the field is to be used within the Historical database.

B. External Connectivity

1. Data Formats: MUFIDS shall support connectivity with a minimum of three types of data formats. These include:
   a. TCP/IP Socket Connection
   b. Flat File
   c. SQL Database

C. Primary and Hot Backup Server:

1. Description: The MUFIDS shall utilize a multi-layer client-server system architecture. The central server shall operate on the highest hierarchy level of the MUFIDS and shall extract information from the database and prepare the information for display on display devices. The central server shall work independently and without attendance of any personnel. The functions available on the central server shall be accessible from system user workstations.
2. Resiliency: The central server shall consist of parallel servers. One server shall act as the main server the other as a hot standby. The standby server shall take over responsibilities of the main server automatically and without personnel intervention.
3. Scalability: The central server shall allow for additional servers to be added to initial configuration to either run in parallel with or as a replacement for a main or standby server.

D. User Workstation (MUW): The workstations shall be used to communicate with the MUFIDS system via the Local Area Network.

E. Digital data converter (DDC):

1. The digital data converter (DDC) shall be used by the MUFIDS to control the display output of video monitors. Each DDC shall have a unique TCP/IP address and shall communicate via the LAN. DDCs shall work independently and without attendance of any personnel.

## 2.4 LED DISPLAYS

## 2.5 LCD DISPLAYS

## 2.6 MOUNTING ASSEMBLIES

## 2.7 PAGE FORMAT REQUIREMENTS

A. LCD Flight Information (Arrivals/Departures)

1. Orientation: Portrait
2. Extent of Coverage: All LCD screens will contain airport-wide flight information.
3. Content: Provide split screens, half arriving flights and half departing flights. The quantity of displayed flights should be representative of flight activity sorted alphabetically by city of origin/destination and should maximize the screen display area. Provide only the current day's flight activity; do not provide flight activity for the following day. Provide visual paging messages in a scrolling manner at the bottom of the screen. Provide appropriate header and footer content. Coordinate layout and content with Airport during development. Include the following types of information:
   a. Arriving From/Departing To
   b. Airline
   c. Flight #
   d. Gate
   e. Scheduled Time
   f. Status (actual time, boarding, delayed, cancelled, etc.)
   g. Baggage claim number (arrivals only)

B. LCD Gate Information

1. Extent of Coverage: Each gate LCD sign will only contain information pertaining to that gate.
2. Content: Coordinate layout and content with Airport during system development. Include the following types of information:
   a. Departure City
   b. Airline
   c. Gate #
   d. Flight #
   e. Scheduled Time
   f. Status (actual time, boarding, delayed, cancelled, etc.)

C. LED Baggage Information

1. Extent of Coverage: Each baggage claim LED sign will only contain information pertaining to that baggage claim belt.
2. Content: Coordinate layout and content with Airport during system development. Include the following types of information:
   a. Arrival city
   b. Airline
   c. Flight #
   d. Baggage Belt #

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. General: The Contractor shall ensure that all Work performed under thee Specifications is in accordance with the requirements and standards defined and referenced in these Specifications. Any Work performed in deviation of these Specifications, any of the referenced material, or any applicable standards or requirements, shall immediately be corrected by the Contractor without additional charges, regardless of the stage of completion. The Contractor shall record all inspection observations. As a minimum, the record shall include the name(s) of personnel conducting the inspection, a brief description of the inspection and the observations. These records shall be available for the Owner to review at any time. Also, these records shall be delivered to the Owner before Final Acceptance.

### 3.2 INSTALLATION

A. Standards: All installation activities shall be performed in a neat and professional manner in accordance with all applicable local and national codes.
B. The Contractor shall install and inspect all hardware required in this Specification in accordance with the manufacturer's installation instructions.

### 3.3 DOCUMENTATION

### 3.4 IDENTIFICATION

A. Equipment: Each piece of equipment shall be tagged with information regarding date of installation, date of last service or maintenance, network ID, and connection point. The Contractor shall provide a log listing all such equipment and associated tags as part of the final System Acceptance.

### 3.5 FIELD QUALITY CONTROL

### 3.6 FACTORY ACCEPTANCE TEST

A. The purpose of this test is to validate that all specified interfacing features are met. All requirements of the specifications shall be tested including connectivity, networking, interaction, interface, format, transformation, and data flow requirements.

B. The MUFIDS Vendor shall ensure that development of the system is complete, required approvals of submittals have been obtained, and sufficient equipment has been procured to

completely demonstrate and test the MUFIDS solution. The Contractor shall provide the engineer a minimum of thirty (30) days notice prior to the start of the Factory Acceptance Test.

## 3.7 ON-SITE ACCEPTANCE TEST

A. The purpose of this test is to validate that the MUFIDS solution meets the performance and recovery requirements and to validate operational assumptions using partial/full load testing.

## 3.8 MAINTENANCE AND SUPPORT

A. General
   1. The Contractor shall provide maintenance and support of all components associated with this system at no additional charge during the Warranty period.
   2. The Contractor shall supply a list of special tools, test equipment, and outside inventory required for this Project.

B. Definitions

## 3.9 CLEANING

A. Upon completion of system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

## 3.10 ACCEPTANCE

A. Acceptance will be withheld until the following have been completed successfully:
   1. Acceptance of all submittals.
   2. Delivery of final documentation.
   3. Successful testing.
   4. Successful demonstration, including operation of systems using the cables, training and manual review.

END OF SECTION 16860

# SECTION 16865 – COMMON USE TERMINAL EQUIPMENT (CUTE)

## PART 1 - GENERAL

### 1.1 SUMMARY

A. A Common Use Terminal Equipment system shall be installed in the Entebbe International Airport. The system shall comprise the various aspects of passenger check-in and boarding including agent check-in and passenger self check-in. The CUTE system includes the following related subsystems:
   1. Common Use Terminal Equipment (CUTE)
   2. Local Boarding Application (LBA)
   3. Local Departure Control System *LDCS)
   4. Common Use Self-Service (CUSS)

B. The system includes software and hardware components such as Gateways, computer workstations, application servers, databases, and interfaces to other systems.

C. The system shall utilize the Airport Structured Cabling System (SCS) infrastructure and Local Area Network (LAN) equipment to communicate between the field devices and the servers.

### 1.2 REFERENCES

A. The Contractor shall design, install and test all CUTE equipment and applications per manufacturer's requirements and in accordance with internationally recognized standards as well as local codes and requirements of authorities having jurisdiction, and particularly the most recent pertinent publication of the following organizations:
   1. International Civil Aviation Organization (ICAO)
   2. International Air Transport Association (IATA)
      a. IATA RP 1797; Common Use Terminal Equipment (CUTE) Systems.
      b. IATA RP 1745; Baggage Service Messages.
      c. IATA RP 1722e, 722c, 722d, 722e; ATB related resolutions.
      d. IATA RP 740, 740a; BTP related resolutions.
      e. IATA RP 1706c; Common Use Self Service
   3. Underwriters Laboratory (UL)
   4. National Electrical Code (NEC)
   5. National Fire Protection Agency (NFPA)
   6. National Electrical Manufacturers Association (NEMA)
   7. Building Industry Consulting Services International (BICSI)
   8. International Organization for Standardization (ISO)
   9. International Building Code 2003

## 1.3 RELATED DOCUMENTS

A. Section 16742 – Structured Cabling System

B. Section 16790 – Local Area Network

C. Section 16860 – Multi User Flight Information Display System

## 1.4 SCOPE OF WORK

A. The Contractor shall provide all equipment, material, labor and services required to construct and install the CUTE including, but not limited to:
   1. All design services, drawing and specifications, equipment, materials, labor and services, not specifically mentioned or shown, which may be necessary to complete the design and installation of the CUTE.
   2. Hardware including servers, computers, gateways and rack accessories as specified for the system and any hardware that is specific to the Contractor system.
   3. Software application including CUTE, CUSS, LBA, LDCS and any other software that may be required to make the system fully operational as specified including the provision of Databases, interfaces and any other required configuration.
   4. Installation and setup of the system hardware and software.
   5. Final connection of hardware to power, infrastructure termination and patch cords connecting system equipment to the data outlets and/or LAN equipment.
   6. Specifications and As-built documentation for all CUTE hardware and software components.
   7. Test plans, system testing and commissioning.
   8. System warranty as specified herein.
   9. Training as specified herein.
   10. Maintenance and support as specified herein.

## 1.5 QUALIFICATIONS

A. Project Qualifications:
   1. The Contractor must currently be and have been in the business of designing, selling, installing, and maintaining similar systems at international airports for a minimum of five (5) year4s. The Contractor must have been actively engaged in installing, maintaining and operating similar systems and services as outlined in this document.
   2. A same or similar system shall satisfy the following conditions:
      a. An international airport serving ten (10) airlines at a minimum
      b. The CUTE system is utilized by at least six (6) international carriers
      c. Local Departure Control System is utilized by at least two non host-based operators
      d. The CUTE system operates on a standard Windows 2000 or XP environment utilizing TCP/IP Ethernet network

## 1.6 SUBMITTALS

A. Proposed Submittals:
   1. In addition to all required proposal submittals listed in the appropriate Division, the Contractor shall provide the following submittals:
      a. Proposed Products and Equipment: Submit to the Owner a catalogue cut-sheet for approval that includes manufacturer, trade name, model number, and related section number, specification paragraph numbers, and reference standards for each listed product as required by these specifications. All major second tier Sub-Contractors shall also be noted on the list.

## 1.7 INTELLECTUAL PROPERTY

## 1.8 WARRANTY

A. General:

   1. The Contractor shall warrant complete installation of the equipment, system, and software to be free from defects in materials and workmanship for a period of no less than twelve (12) months, starting with the date of Final System Acceptance. As an option, the Contractor shall supply pricing for an extended Warranty of the system. This option shall be renewable on a yearly basis, and pricing shall be supplied for a minimum of five (5) years from the expiration of the initial Warranty.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

A. CUTE Software
B. CUTE ATB, BGR and BTP Equipment:
C. CUTE Keyboard:
D. Multiform Dot-Matrix Document Printer:
E. Servers:
F. Desktop Computers:
G. Terminal Servers:
H. Keyboard, Video, Monitor (KVM) Switches:

## 2.2 GENERAL REQUIREMENTS

A. Common Use Terminal Equipment (CUTE): The CUTE system shall allow administration functions, ticketing functions, check-in functions and gate hardware to be used by multiple airlines. The CUTE system shall emulate each airlines host systems. At the CUTE workstation, the screen and keyboard interface shall be no different than a direct host connection. The CUTE connection to the host shall ensure that any applications that are available on the host

system shall be accessible through the CUTE. Workstations shall e connected via the Airport Telecommunications Distribution System (SCS) infrastructure and Local Area Network (LAN) to the communication rooms. The equipment in these rooms shall provide gateways to the host systems. Each workstation shall have various common use hardware connected depending on the location. The Automatic Ticket and boarding Pass Printers and the Bag Tag Printers shall use common stock, however, each airline shall be able to load their stock when utilizing a position. The Contractor shall insure that the airlines' PECTAB are cleared at he end of each session and the default PECTAB is restored for other airlines use.

B. Local Boarding Control System (LBA): The Local Boarding control System (LBA) shall allow each airline to perform automated passenger boarding reconciliation through the comparison of the Passenger Name List (PNL) and data from the passenger's boarding pass obtained via a Boarding Gate Reader (BGR). The LBA shall be capable of obtaining the PNL from each airline host system. Passenger reconciliation shall be done automatically as the passenger passes the encoded boarding pass through a Boarding Pas Reader and the LBA reconciles the data against the current PNL. The boarded passenger data shall also be transmitted dynamically to the Host. The LBA application may be offered as a subsystem of the Local Departure Control System application..

C. Local Departure Control System (LDCS): The Local Departure Control System (LDCS) shall provide computerized passenger check-in and boarding services for airlines that lack a host-based Carrier Reservation System (CRS). The LDCS shall include a database to store the passenger reservation information for each participating airline and flight. Each participating airline shall have the ability to load reservation information into the LDCS database by one of several methods. Agents shall be able to check-in passengers and issue boarding passes and bag tags as if using a host-based system. Agents shall be able to compare the PNL against government issued "no-fly" or "extra screening required" passenger list. Agents shall use the common equipment (CUTE workstations, etc.) to access the LDCS and perform check-in and boarding processes.

D. Common Use Self-Service (CUSS): Common Use Self-Service (CUSS) devices shall provide automatic ticketing service to multiple airlines. These devices shall be configured and implemented in accordance with the IATA RP 1716c standard.

## 2.3 SOFTWARE

Software provided shall be at least 32-bit based applications at a minimum. Software shall be built around a compliant operating system as defined in this Specification. Software shall not be built for a DOS operating environment or urn in a DOS shell in a Windows™ environment.

## 2.4 USER INTERFACE

A. All system applications shall have a graphical user interface to facilitate human interaction with the application and easy management of data.

## 2.4 OPERATING SYSTEM

## 2.6 SYSTEM ARCHITECTURE

## 2.7 SECURITY

A. Authorized users shall log into the system using a unique user name and password. Depending on assigned user access privileges, the user shall be either granted or denied access to individual applications, screens, or data.

## 2.8 DATABASE

## 2.9 PERFORMANCE REQUIREMENTS

## 2.10 SYSTEM MANAGEMENT

## 2.11 CUTE REQUIREMENTS

A. The CUTE system shall comply with the latest revision of IATA RP 1797.
B. The system shall provide access to the specified airline host computer system applications. From any CUTE workstation any authorized User shall be able to access host applications. Typical host applications which the system shall have the capability of supporting are (but are not limited to):
   1. Departure Control
   2. Reservations
   3. Ticketing
   4. Local Boarding Application
   5. Baggage Tracing
   6. Self-Service Ticketing and Check-In
   7. Flight Operations Control
   8. Message Switching
   9. Aircraft Maintenance Systems
   10. Cargo Systems
   11. Weights and Balances

C. From any CUTE workstation any authorized User shall be able to access other applications such as EVIDS (to initiate new display messages).
D. CUTE workstation shall have the capability of initiating a session are (but are not limited to):
   1. Local Boarding Application (LBA)
   2. Local Departure Control System (LDCS)
   3. Baggage Reconciliation System (BRS)

## 2.12 LOCAL DEPARTURE CONTROL SYSTEM (LDCS) REQUIREMENTS

A. The LDCS shall maintain passenger status (e.g. boarded, not boarded) for each departing flight and update it as passengers board.

## 2.13 LOCAL BOARDING APPLICATION (LBA) REQUIREMENTS

A. The LBA shall interface with each airline host in order to obtain passenger information (e.g., Passenger Name List-PNL). The interface should be a real-time interface. The LBA shall utilize the CUTE systems host link to obtain the passenger information.
B. The LBA shall interface with Boarding Gate Readers (BGR). The BGR shall red the encoded boarding pass. The BGR shall transmit the boarding pass information to the LBA.

## 2.14 COMMON USE SELF SERVICE (CUSS) REQUIREMENTS

## 2.15 EXTERNAL INTERFACES

## 2.16 NETWORK REQUIREMENTS

A. The system shall utilize the Airport LAN to provide services to all devices and workstations.

## 2.17 HARDWARE REQUIREMENTS

A. Server Requirements:
   a. CUTE, CUSS, LDCS and LBA Servers

B. CUTE Workstations:
   1. General: CUTE Workstations shall provide graphical user interface capabilities for all functions and all levels of the system.

C. Peripheral Devices
   1. The CUTE devices shall emulate the respective native devices of the various hosts. All peripheral devices shall be supplied with the necessary interface cabling.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. The Owner assumes no responsibility or liability for transportation from country of origin, storage fees, drayage, import taxes, duty taxes, or other costs associated with the delivery and storage of system components.

## 3.2 INSTALLATION

A. Standards: All installation activities shall be performed in a neat and professional manner in accordance with all applicable3 local and national codes. Additionally, the Contractor and all subsequent Sub-Contractors employed to satisfy the requirements of these specifications shall obtain, or satisfy, the following prior to installation:
   1. All licenses and permits
   2. All insurance and bonding as required
   3. All other standards or requirements specified in this document

## 3.3 DOCUMENTATION

A. This Section requires complete documentation of the Common Use Terminal Equipment (CUTE) for the purpose of system operation and maintenance during and after the Warranty period. It is intended that the operation and maintenance manuals be exhaustive in the coverage of the system to the extent that they may be used as the sole guide to the troubleshooting, identification, and repair of defective parts. All documentation, as described herein shall be submitted to the Owner for approval sixty (60) days prior to final submission.

## 3.4 GENERAL TESTING REQUIREMENTS

A. Phases of Testing:

1. Factory Acceptance Testing
2. Integration Testing
3. On-Site Performance Testing
4. On-Site Endurance Testing

## 3.5 FACTORY ACCEPTANCE TESTING

A. The purpose of this test is to validate that the CUTE function as a standalone system and all specified features are met.

## 3.6 INTEGRATION TESTING

## 3.7 PERFORMANCE TESTING

## 3.8 ENDURANCE TESTING

## 3.9 MAINTENANCE AND SUPPORT

## 3.10 CLEANING

A. Upon completion of system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

## 3.11 TRAINING

5. ACCEPTANCE
6. Completed Training as per the specifications as well as successful demonstration of the operation of the entire system
7. Escrow of all source code as defined under Intellectual Property

END OF SECTION 16865

3. Dispose of excess topsoil as specified for waste material disposal.
4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

## 2.7 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.
2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

## 2.8 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.

1. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

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.

### 1.2 SUMMARY

A. This Section includes the following:

1. Preparing subgrades for slabs-on-grade, walks and pavements.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for slabs-on-grade.
4. Subbase course for concrete walks.
5. Subbase and base course for asphalt paving.
6. Subsurface drainage backfill for walls and trenches.
7. Excavating and backfilling for utility trenches.
8. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.

B. Related Sections include the following:

1. Division 1 Section 01500 "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities.
2. Division 2 Section 02230 "Site Clearing" for temporary erosion and sedimentation control measures, site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
3. Divisions 2, 15, and 16 Sections for installing underground mechanical and electrical utilities and buried mechanical and electrical structures.

### 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: Course placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

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

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

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. (0.57 cu. m) or more in volume that exceed a standard penetration resistance of 100 blows/2 inches (97 blows/50 mm) when tested by an independent geotechnical testing agency, according to ASTM D 1586.

I. 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.

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

K. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

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

## 1.4 SUBMITTALS

A. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.
2. Laboratory compaction curve according to ASTM D 698 for each on-site and borrow soil material proposed for fill and backfill.

B. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

## 1.5 QUALITY ASSURANCE

A. 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.

B. Pre-excavation Conference: Conduct conference at Project site prior to commencement of work.

## 1.6 PROJECT CONDITIONS

A. 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.

B. 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.

# 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: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM, 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. 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.

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

D. 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.

E. 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.

F. 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.

G. 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.

H. 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.

I. 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.

J. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.

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

## 2.2 CONTROLLED LOW-STRENGTH MATERIAL

A. Controlled Low-Strength Material: Low-density, self-compacting, flowable concrete material as follows:

1. Portland Cement: ASTM C 150, Type II.
2. Fly Ash: ASTM C 618, Class C or F.
3. Normal-Weight Aggregate: ASTM C 33, 3/4-inch (19-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), when tested according to ASTM C 495.

C. Produce conventional-weight, controlled low-strength material with 80-psi (550-kPa) compressive strength when tested according to ASTM C 495.

## 2.3 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:

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 earthwork operations.

B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 2 Section "Site Clearing."

C. Protect and maintain erosion and sedimentation controls, which are specified in Division 2 Section "Site Clearing," during earthwork operations.

D. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

### 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 as required, to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

### 3.3 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.

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 gainst grade.
   c. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.

## 3.13 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.

## 3.14 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) 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 structures, building slabs, steps, and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 92 percent.
3. Under lawn or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 85 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

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

1. Lawn or Unpaved Areas: Plus or minus 1 inch (25 mm).
2. Walks: Plus or minus 1 inch (25 mm).
3. Pavements: Plus or minus 1/2 inch (13 mm).

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.

## 3.16 SUBBASE AND BASE COURSES

A. Place subbase and base course on subgrades free of mud.

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

1. Place base course material over subbase course under hot-mix asphalt pavement.
2. Shape subbase and base course to required crown elevations and cross-slope grades.
3. Place subbase and base course 6 inches (150 mm) or less in compacted thickness in a single layer.
4. Place subbase and base 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.
5. Compact subbase and base 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 698.

## 3.17 DRAINAGE COURSE

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. Place drainage course 6 inches (150 mm) or less in compacted thickness in a single layer.
2. 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.
3. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

## 3.18 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

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

C. 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.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, 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 1 test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than 3 tests.
2. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet (30 m) or less of wall length, but no fewer than 2 tests.
3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet (46 m) or less of trench length, but no fewer than 2 tests.

E. 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 to depth required; recompact and retest until specified compaction is obtained.

## 3.19 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic 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.

## 3.20 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

B. Disposal: Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.

1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 02300

# SECTION 02361 - TERMITE CONTROL

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following for termite control:

1. Soil treatment.

### 1.2 DEFINITIONS

A. EPA: Environmental Protection Agency.

B. PCO: Pest control operator.

### 1.3 SUBMITTALS

A. Product Data: Treatments and application instructions, including EPA-Registered Label.

B. Product Certificates: Signed by manufacturers of termite control products certifying that treatments furnished comply with requirements.

C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

D. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's record information, including the following as applicable:

1. Date and time of application.
2. Moisture content of soil before application.
3. Brand name and manufacturer of termiticide.
4. Quantity of undiluted termiticide used.
5. Dilutions, methods, volumes, and rates of application used.
6. Areas of application.
7. Water source for application.

E. Warranties: Special warranties specified in this Section.

## 3.3 APPLICATION, GENERAL

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

## 3.4 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute the treatment evenly.

1. Slabs-on-Grade: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
2. Foundations: Adjacent soil including soil along entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footers, piers, and chimney bases; and along entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
3. Masonry: Treat voids.
4. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

D. Post warning signs in areas of application.

E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION 02361

# SECTION 03000 - CONCRETE AND CEMENT FINISH

## PART 1 - GENERAL

### 1.1 DESCRIPTION OF WORK

A. Furnish and install all materials, labor and equipment necessary to properly perform all concrete work required as specified herein and/or shown on the drawings. To include all concrete, metal reinforcing and finishes.

1. Related Items of Work: Particular attention is directed to the drawings and other construction documents, and to the contract documents, for information pertaining to required items of work which are related to and usually associated with the work of this section of the Project Manual, but which are to be provided as part of the work of other sections of the Project Manual.

1.2 Codes and Standards: Comply with the provisions of the following codes, specifications, and standards, except as otherwise shown or specified:

A. ACI 301 "Specifications for Structural Concrete for Buildings."

B. ACI 311 "Recommended Practice for Concrete Inspection."

C. ACI 318 "Building Code Requirements for Reinforced Concrete."

D. ACI 347 "Recommended Practice for Concrete Formwork."

E. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete."

F. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."

### 1.3 WORKMANSHIP

A. The Contractor is responsible for correction of concrete work that does not conform to the specified requirements, including strength, tolerances and finishes. Correct deficient concrete as directed by the Architect.

### 1.4 SUBMITTALS

A. Product Data: Submit data for proprietary materials and items, including reinforcement and forming accessories, admixtures, joint systems, curing compounds, and others as requested by Architect.

B. Shop Drawings; Reinforcement: Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, diagrams of bent bars,

## 2.4 RELATED MATERIALS

A. Preformed Expansion Joint Fillers: Provide closed-cell synthetic rubber joint filler.

B. Expansion joint material: ASTM D1056-2C.1

C. Joint Sealing Compound: Provide polyurethane-sealant (see Section 07920.)

D. Moisture Barrier: Provide moisture barrier cover over prepared base material. Use only materials which are resistant to decay when tested in accordance with ASTM E154, as follows:

1. Water-Resistant Barrier: Paper consisting of heavy kraft papers laminated together with glass fiber reinforcement and overcoated with black polyethylene on each side. Use under all concrete slabs-on-grade.
2. Moisture-Retaining Cover: One of the following, complying with ASTM C-171:

   a. Waterproof paper.
   b. Polyethylene film.
   c. Polyethylene-coated burlap.

E. Reglets: Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 26 gauge galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.

F. Chemical Hardener: Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent, containing not less than 2 lbs. of fluosilicates per gal.

1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

   a. "Surfhard"; Euclid Chemical Co.
   b. "Lapidolith"; Sonneborn-Rexnord.
   c. "Saniseal"; Master Builders.

G. Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound complying with ASTM C 309, Type I, Class A. Moisture loss not more than 0.555 gr./sq. cm. when applied at 200 sq. ft./gal.

H. Bonding Compound: Polyvinyl acetate or acrylic base.

## 2.5 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing. Limit use of fly ash to not exceed 25 percent of cement content by weight.

B. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until the design mixes have been reviewed and approved by the Architect.

C. Design mixes to provide normal weight concrete with the following properties, as indicated on drawings and schedules:

1. Regular Weight (150 PCF): Based upon 28 days psi compressive strength requirements, provide concrete having compressive strength of 4000 psi (30 MPa) for all concrete.

D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.

## 2.6 COMPRESSIVE PROPORTIONS AND CONSISTENCY

A. Intent of specifications is to secure, for every part of work, structural concrete of homogeneous structure which, when hardened, will have required strength and resistance to weathering.

B. All concrete shall have water-reducing type chemical, admix at place of mixing. Amount of chemical admix per each bag of cement used shall be in strict accordance with manufacturer's recommendations as related to temperature, humidity, and wind conditions prevailing at site at time of pouring, and dependent upon type of admixture being used.

C. Water-Cement Ratio: Provide concrete for following conditions with maximum water-cement (W/C) ratios as follows:
1. W/C 0.40.

D. Volumetric proportioning not allowable. Measurement of materials shall be by weight only and by methods that will permit proportions to be accurately controlled and easily checked at any time during work operations.

E. **The use of calcium chloride in concrete is prohibited.**

F. Use air-entraining admixture in exterior exposed concrete, unless otherwise shown or specified. Add air-entraining admixture at the manufacturer's prescribed rate to result in concrete at the point of placement having air content within the following limits:
   a. 6% for maximum 3/4-inch aggregate.
   b. 7% for maximum 1/2-inch aggregate.

G. Use super plasticizer in concrete for all slab construction. Also use in all pumped concrete and as required for placement and workability.

## 2.7 SLUMP LIMITS

A. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows: (Slump may be increased when chemical admixtures are used, provided that the

admixture-treated concrete has the same or lower water/cement or water/cementitious material ratio and does not exhibit segregation potential or excessive bleeding.) Concrete mix shall indicate slump without chemical admixtures and with chemical admixtures,

1. Ramps, slabs, and sloping surfaces: Not more than 3 inches.
2. Reinforced foundation systems: Not less than 1 inch and not more than 4 inches.
3. Concrete containing HRWR admixture (super-plasticizer): Not more than 8 inches after addition of HRWR to site-verified 2 inches - 3 inches slump concrete.
4. Other concrete: Not less than 1 inch nor more than 4 inches.

## 2.8 CONCRETE MIXING - READY-MIX CONCRETE

A. Comply with the requirements of ASTM C-94, and as herein specified.

B. Delete the references for allowing additional water to be added to the batch for material with insufficient slump. Addition of water to the batch will not be permitted.

C. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C-94 may be required.

D. When the air temperature is between 85 degrees F and 90 degrees F, reduce the mixing and delivery time from 1-1/2 hours to 75 minutes, and when the air temperature is above 90 degrees F, reduce the mixing and delivery time to 60 minutes.

# PART 3 - EXECUTION

## 3.1 FORMS

A. Design, erect, support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by the concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position.

B. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.

C. Construct forms complying with ACI 347, to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, keyways, recesses, moldings, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required on work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

D. Fabricate forms for easy removal without hammering or prying against the concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.

E. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Place temporary openings on forms at inconspicuous locations.

F. Chamfer all exposed corners and edges as directed by Architect if not shown, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

G. Form Ties:
1. Factory-fabricated, adjustable-length, removable or snapoff metal ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal.
2. Unless otherwise shown, provide ties so portion remaining within concrete after removal is at least 1-1/2 inches inside concrete.
3. Unless otherwise shown, provide form ties which will not leave holes larger than 1-inch diameter in concrete surface.

H. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such ties. Accurately place and securely support items built into forms.

3.2 Vapor Retarder Installation: Following leveling and tamping of base for slabs on grade, place vapor retarder sheeting with longest dimension parallel with direction of pour. Lap joints 6 inches and seal with appropriate tape.

3.3 CONCRETE WORK TOLERANCES

A. Except when close coordination and fitting of various trades' work precludes allowances of tolerances, maximum total permissible deviations from established lines, grades, and dimensions shall be as stated herein below. Set and maintain forms in such a manner as to ensure completed work within specified tolerance limits. (See Monolithic Slab Finish For Concrete Slab Tolerances.)
1. Variation from the plumb:
   a. In lines and surfaces of columns, piers, and in arrises, in 10 feet: 1/4 inch.
   b. For exposed corner columns, control-joint grooves and other conspicuous lines in any bay or 20-foot maximum: 1/4 inch.
2. Variations from the level or from indicated grades:
   a. In structural concrete ceiling, beam soffits, and in arrises, in 10 feet: 1/4 inch.
   b. For exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, in any bay or 20-foot maximum: 1/4 inch.
3. Variations of the linear building lines from established position in plan and related position of columns, walls, and partitions in any bay or 20-foot maximum: 1/4 inch.
4. Variations in sizes and locations of sleeves, floor openings, and wall openings: 1/4 inch.
5. Variations in cross-sectional dimensions of columns and beams and in thickness of walls: 1/4 inch.
6. Variations in footings:
   a. Variation in dimensions in plan: Minus 1/2 inch; Plus 2 inches (applies to concrete only - not to reinforcing bars or dowels).

b. Misplacement or eccentricity: 2 percent of footing width in direction of misplacement, but not more than 2 inches. (Concrete only.)

7. Reduction in thickness: Minus 5 percent of specified thickness.
8. Variation in steps: In a flight of stairs:
   a. Rise: 1/8 inch.
   b. Tread: 1/4 inch.

## 3.4 PLACING REINFORCEMENT

A. Comply with the specified codes and standards, the Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports, and as herein specified. Avoid cutting or puncturing vapor retarder during reinforcing placement and concreting operations.

B. Clean reinforcement of loose rust and mill scale, soil, ice and other materials that would reduce or destroy bond with concrete.

C. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.

D. Place reinforcement to obtain at least the minimum coverages for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcements in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Do not place reinforcing bars more than 2 inches beyond the last leg of continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

F. Do not splice reinforcement at points of maximum stress. At points where bars lap or splice, including distribution steel, provide sufficient lap to transfer stress between bars by bond and shear. Stagger splices in adjacent bars. Lap splices in piers, struts, sufficiently to transfer full stress by bond.

G. Protect metal reinforcement by thickness of concrete indicated. Where not otherwise shown, thickness of concrete over reinforcement shall be as follows:

1. Where concrete is deposited against ground without use of forms: not less than 3 inches.
2. Where concrete is exposed to weather, or exposed to ground but placed in forms: not less than 2 inches for bars more than 5/8 inch in diameter and 1-1/2 inch for bars 5/8 inch or less in diameter.
3. In slabs and walls not exposed to ground: not less than 3/4 inch.
4. In all cases, thickness of concrete over reinforcement shall be at least equal to diameter of bars.

H. Position all reinforcement accurately. Secure at intersections with annealed wire ties or bar clips. Support with metal supports, spacers, or hangers of approved type. Metal supports (for reinforcing) that are placed directly against horizontal forms, shall have plastic coated legs

wherever the finished concrete surfaces will be exposed in the completed work, and wherever the finished concrete surfaces are to receive any type of directly-applied finish material which could be subject to damage due to stain from rusting of non-plastic-coated materials.

I. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction. Arrange runways over slabs to avoid traffic directly on mesh during pouring operations. Rolled wire shall be straightened into flat sheets before being placed.

## 3.5 JOINTS

A. Construction Joints:
   1. Locate and install construction joints, which are not shown on the drawings, so as not to impair the strength and appearance of the structure, as acceptable to the Architect. Locations to be approved by Architect.
   2. Provide keyways at least 1-1/2 inches deep in all construction joints in walls, slabs, and between walls and footings; accepted bulkheads designed for this purpose may be used for slabs.
   3. Place construction joints perpendicular to the main reinforcement. Continue all reinforcement across construction joints, except as otherwise indicated.

B. Isolation Joints in Slabs-On-Ground:
   1. Construction isolation joints in slabs-on-ground at all points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.

C. Joint filler and sealant materials are specified in this section and Division 7 of this Project Manual.

D. Contraction (Control) Joints in Slabs-on-Ground and Framed Structural Slabs: Construct contraction joints in slabs-on-ground and framed slab as indicated on drawings.

E. If joint pattern not shown for slab-on-grade, provide joints not exceeding 15 feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).

## 3.6 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto. No aluminum conduit or inserts shall be embedded in concrete.

B. Install reglets to receive top edge of foundation sheet waterproofing, and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.

C. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and

1. Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating, system.
2. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of FF 25 - FL 20. Grind smooth surface defects which would telegraph through applied floor covering system.

D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.

E. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps, driveways, walks, and ramps, and elsewhere as indicated. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

F. Chemical-Hardener Finish:
1. Apply chemical-hardener finish to all interior exposed concrete floors. See plans for other indicated areas. Apply liquid chemical-hardener after complete curing and drying of the concrete surface. Dilute liquid hardener with water (parts of hardener/water as follows), and apply in 3 coats; first coat, 1/3-strength; second coat, 1/2-strength; third coat, 2/3-strength. Evenly apply each coat, and allow 24 hours for drying between coats.
2. Apply proprietary chemical hardeners, in accordance with manufacturer's printed instructions.
3. After final coat of chemical-hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.

## 3.10 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
1. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
2. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

B. Curing Methods: Water cure concrete slabs that are to receive a terrazzo topping. For other concrete perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified.
1. Provide moisture curing by following methods.
   a. Keep concrete surface continuously wet by covering with water.
   b. Continuous water-fog spray.
   c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide

coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.

2. Provide moisture-cover curing as follows: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape of adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Provide curing and sealing compound to exposed interior slabs and to exterior slabs, walks, and curbs, as follows: Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
4. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting, and other coatings and finish materials.
5. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
6. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing method.
7. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.
8. Sealer and Dustproofer: Apply a second coat of specified curing and sealing compound only to surfaces given a first coat.

## 3.11 REMOVAL OF FORMS

A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 degrees F (10 degrees C) for 4 days after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days and until concrete has attained design minimum compressive strength at 28 days.

## 3.12 MISCELLANEOUS CONCRETE ITEMS

A. Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

## 3.13 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas:
1. Repair and patch defective areas with cement mortar immediately after removal of forms, but only when acceptable to Architect.
2. Cut out honeycomb, rock pockets, voids over 1/2 inch in diameter, and holes left by tie-rods and bolts, down to solid concrete, but in no case to a depth of less than 1 inch. Make edge of cuts perpendicular to the concrete surface. Before placing cement mortar, thoroughly clean, dampen with water and brush-coat the area to be patched with neat cement grout. Proprietary patching compounds may be used when acceptable to Architect.
3. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color of surroundings.
4. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

B. Repair of Formed Surfaces:
1. Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets and holes left by tie-rods and bolts; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning.
2. Repair concealed formed surfaces where possible, that contain defects that adversely affect the durability of the concrete. If defects cannot be repaired, remove and replace the concrete.

C. Repair of Unformed Surfaces:
1. Test unformed surfaces, such as monolithic slabs, for smoothness and to verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surface sloped to drain for trueness of slope, in addition to smoothness, using a template having required slope.
2. Repair finished unformed surfaces that contain defects which adversely affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01 inch wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.
3. Correct high areas in unformed surfaces by grinding, after concrete cured at least 14 days.
4. Correct low areas in unformed surfaces during, or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete.

Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Architect.

5. Repair defective areas except random cracks and single holes not exceeding 1 inch diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete, and brush with a neat cement grout coating or concrete bonding agent. Place patching concrete before grout takes its initial set. Mix patching concrete of same materials to provide concrete of the same type or class as original concrete. Place, compact and finish to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.
6. Repair isolated random cracks and single holes not over 1 inch in diameter by dry-pack method. Groove top of cracks and cut-out holes to sound concrete and clean of dust, dirt and loose particles. Dampen cleaned concrete surfaces and brush with neat cement grout coating. Place dry-pack, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched areas continuously moist for not less than 72 hours.
7. Repair methods not specified above may be used, subject to acceptance of Architect.
8. Perform structural repairs with prior approval of Architect or Structural Engineer for method and procedure, using specified epoxy adhesive and mortar.

## 3.14 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. The Contractor will employ a testing laboratory, approved by the Architect, to perform tests and to submit test reports.

B. Sampling and testing for quality control during placement of concrete includes the following:
1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
2. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
3. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
4. Concrete Temperature: Test hourly when air temperature is 40 degrees F (4 degrees C) and below, and when 80 degrees F (27 degrees C) and above; and each time a set of compression test specimens made.
5. Compression Test Specimen: ASTM C 31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
6. Compressive Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. over and above the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
   a. When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
   b. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

c. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.

C. Test results will be reported in writing to Architect, Structural Engineer and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.

D. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests.

## 3.15 CLEAN-UP

A. Immediately after completion of concrete operations, remove all debris resulting from work.

B. Immediately prior to final inspection, preliminary to acceptance, wash/clean all exterior and interior uncovered concrete wearing surfaces. Leave all concrete in clean, acceptable condition.

END OF SECTION 03000

# SECTION 04810 - UNIT MASONRY ASSEMBLIES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes unit masonry assemblies consisting of the following:

1. Concrete masonry units.
2. Mortar and grout.
3. Reinforcing steel.
4. Masonry joint reinforcement.
5. Ties and anchors.
6. Miscellaneous masonry accessories.

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

1. Hollow-metal frames in unit masonry openings, furnished under Division 8 Section " Steel Doors and Frames."

### 1.2 DEFINITIONS

A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

### 1.3 SUBMITTALS

A. Product Data: For each different masonry unit, accessory, and other manufactured product specified.

B. Shop Drawings: Show fabrication and installation details for the following:

1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.

C. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Each type of masonry unit required.
2. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
3. Each combination of masonry unit type and mortar type. Include statement of net-area compressive strength of masonry units, mortar type, and net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
4. Each material and grade indicated for reinforcing bars.
5. Each type and size of joint reinforcement.
6. Each type and size of anchor, tie, and metal accessory.

## 1.4 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

C. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

## 1.6 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

C. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.

1. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

## PART 2 - PRODUCTS

### 2.1 CONCRETE MASONRY UNITS

A. General: Provide shapes indicated and as follows:

1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
2. Provide square-edged units for outside corners, unless indicated as bullnose.

B. Concrete Masonry Units: ASTM C 90 and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
2. Weight Classification: Normal weight, unless otherwise indicated.
3. Provide Type II, nonmoisture-controlled units.
4. Size (Width): Manufactured to the following dimensions:

   a. 4 inches nominal; 3-5/8 inches actual.
   b. 8 inches nominal; 7-5/8 inches actual.
   c. 12 inches nominal; 11-5/8 inches actual.

5. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.

## 2.2 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color cement.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.

D. Mortar Cement: ASTM C 1329.

E. Masonry Cement: ASTM C 91.

F. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

G. Aggregate for Grout: ASTM C 404.

H. Water: Potable.

## 2.3 REINFORCING STEEL

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M; ASTM A 616/A 616M, including Supplement 1; or ASTM A 617/A 617M, Grade 60.

## 2.4 MASONRY JOINT REINFORCEMENT

A. General: ASTM A 951 and as follows:

1. Hot-dip galvanized, carbon-steel wire for both interior and exterior walls.
2. Wire Size for Side Rods: W1.7 or 0.148-inch diameter.
3. Wire Size for Cross Rods: W1.7 or 0.148-inch (3.8-mm) diameter.
4. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units where indicated.

B. For single-wythe masonry, provide either ladder or truss type with single pair of side rods and cross rods spaced not more than 16 inches o.c.

## 2.5 TIES AND ANCHORS, GENERAL

A. General: Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, unless otherwise indicated.

B. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.

C. Steel Sheet, Galvanized after Fabrication: ASTM A 366/A 366M cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153.

## 2.6 ADJUSTABLE ANCHORS FOR CONNECTING TO STEEL FRAME

A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section: Crimped 1/4-inch diameter, hot-dip galvanized steel wire anchor section for welding to steel.
2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.25-inch diameter, hot-dip galvanized steel wire.

## 2.7 ADJUSTABLE MASONRY-VENEER ANCHORS

A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to metal studs, and as follows:

1. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.

B. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie section and a metal anchor section complying with the following requirements:

1. Anchor Section: Sheet metal plate with screw holes top and bottom and with raised rib-stiffened strap stamped into center to provide a slot between strap and plate for connection of wire tie.

   a. Plate 1-1/4 inches wide by 6 inches long with strap 5/8 inch wide by 3-5/8 inches long; slot clearance formed between face of plate and back of strap shall not exceed diameter of wire tie by more than 1/32 inch.

2. Wire Tie Section: Triangular shaped wire tie sized to extend at least halfway through veneer but with at least 5/8-inch cover on outside face.
3. Fabricate sheet metal anchor sections and other sheet metal parts from 0.0677-inch thick, steel sheet, galvanized after fabrication.
4. Fabricate wire tie sections from 0.1875-inch hot-dip galvanized steel wire.

C. Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene washer, No. 10 diameter by length required to penetrate steel stud flange by not less than 3 exposed threads, and with the following corrosion protective coating:

1. Organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.

D. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

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

1. Screw-Attached, Masonry-Veneer Anchors:

   a. D/A 213; Dur-O-Wal, Inc.
   b. DW-10; Hohmann & Barnard, Inc.
   c. RJ-711; Masonry Reinforcing Corporation of America.

2. Organic-Polymer-Coated, Steel Drill Screws:

   a. Dril-Flex; Elco Industries, Inc.
   b. Traxx; ITW-Buildex.

3. For Postinstalled Anchors in Concrete: Capability to sustain, without failure, a load equal to four times the loads imposed.
4. For Postinstalled Anchors in Grouted Masonry Units: Capability to sustain, without failure, a load equal to six times the loads imposed.

## 2.8 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Fabricate from the following metal complying with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim" and below:

1. Stainless Steel: 0.0156 inch thick.
2. Fabricate metal drip edges from sheet metal indicated above. Extend at least 3 inches into wall and 1/2 inch out from wall, with a hemmed outer edge bent down 30 degrees.

## 2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Preformed Control-Joint Gaskets: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

1. Styrene-Butadiene-Rubber Compound: ASTM D 2000, Designation M2AA-805.

C. Wicking Material: Cotton or polyester rope, 1/4 to 3/8 inch in diameter, in length required to produce 2-inch exposure on exterior and 18 inches in cavity between wythes.

D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.187-inch steel wire, hot-dip galvanized after fabrication.

E. Available Products: Subject to compliance with requirements, cavity drainage materials that may be incorporated into the Work include, but are not limited to, the following:

1. Reinforcing Bar Positioners:

   a. D/A 816; Dur-O-Wal, Inc.
   b. No. 376 Rebar Positioner; Heckman Building Products, Inc.
   c. #RB Rebar Positioner; Hohmann & Barnard, Inc.

## 2.10 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

## 2.11 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, or other admixtures, unless otherwise indicated.

   1. Do not use calcium chloride in mortar or grout.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification.

   1. Extended-Life Mortar for Unit Masonry: Mortar complying with ASTM C 1142 may be used instead of mortar specified above, at Contractor's option.
   2. Limit cementitious materials in mortar to portland cement, mortar cement, and lime.
   3. For reinforced masonry and where indicated, use Type S or RS.
   4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N or RN.

D. Grout for Unit Masonry: Comply with ASTM C 476.

   1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 5 of ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
   2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

## 3.2 INSTALLATION, GENERAL

A. Thickness: Build single-wythe walls to the actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this Section and in other Sections of the Specifications.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.

D. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide a continuous pattern and to fit adjoining construction. Where possible, use full-size units without cutting. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

1. Mix units from several pallets or cubes as they are placed.

## 3.3 CONSTRUCTION TOLERANCES

A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:

B. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4 inch in 20 feet maximum.

C. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet maximum.

D. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than 1/4 inch in 20 feet maximum.

E. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.

F. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

## 3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

1. One-half running bond with vertical joint in each course centered on units in courses above and below.

C. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.

D. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

E. Fill space between hollow-metal frames and masonry solidly with mortar, unless otherwise indicated.

F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

G. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

## 3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow masonry units as follows:

1. With full mortar coverage on horizontal and vertical face shells.
2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
3. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.

C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

## 3.6 MASONRY JOINT REINFORCEMENT

A. General: Provide continuous masonry joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.

   a. Reinforcement above is in addition to continuous reinforcement.

B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

## 3.7 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Provide an open space not less than 1 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

## 3.8 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joints in unit masonry where indicated, or if not indicated at distances not exceeding 24 feet. Build-in related items as masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

B. Form control joints in concrete masonry as follows:

1. Fit bond-breaker strips into hollow contour in ends of concrete masonry units on one side of control joint. Fill resultant core with grout and rake joints in exposed faces.
2. Install preformed control-joint gaskets designed to fit standard sash block.

## 3.9 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry lintels where shown and where openings of more than 24 inches for block-size units are shown without structural steel or other supporting lintels.

1. Provide prefabricated or built-in-place masonry lintels. Use specially formed bond beam units with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

## 3.10 FLASHING, WEEP HOLES, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Unless otherwise indicated, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.

C. Install flashing as follows:

1. At lintels and shelf angles, extend flashing a minimum of 4 inches into masonry at each end. At heads and sills, extend flashing 4 inches at ends and turn flashing up not less than 2 inches to form a pan.
2. Install metal drip edges beneath flashing at exterior face of wall. Stop flashing 1/2 inch back from outside face of wall and adhere flashing to top of metal drip edge.

D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashing and as follows:

1. Use wicking material to form weep holes.
2. Space weep holes 24 inches o.c.

E. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.

## 3.11 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores to support reinforced masonry elements during construction.

1. Construct formwork to conform to shape, line, and dimensions shown. Make it sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements of ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.

## 3.12 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Protect adjacent nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
4. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain on exposed surfaces.

## 3.13 MASONRY WASTE DISPOSAL

A. Recycling: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Excess Masonry Waste: Remove excess, clean masonry waste, broken masonry units, waste mortar, excess or soil contaminated sand, other material items associated with the masonry construction, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04810

# SECTION 05500 - METAL FABRICATIONS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:
   1. Steel framing and supports for mechanical and electrical equipment.
   2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
   3. Metal edgings.
   4. Edge angles at slab edges.
   5. Miscellaneous metal trim.
   6. Metal floor plate and supports.
   7. Pipe bollards.

B. Related Sections include the following:
   1. Division 5 Section "Pipe and Tube Railings" for metal pipe and tube handrails and railings.

### 1.2 SUBMITTALS

A. Product Data: For the following:

   1. Nonslip aggregates and nonslip-aggregate surface finishes.
   2. Paint products.
   3. Grout.

B. Shop Drawings: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

   1. Provide templates for anchors and bolts specified for installation under other Sections.

C. Samples for Verification: For each type and finish of extruded nosing and tread.

D. Welding Certificates: Copies of certificates for welding procedures and personnel.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

## 1.3 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.2, "Structural Welding Code--Aluminum."
3. AWS D1.3, "Structural Welding Code--Sheet Steel."
4. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

## 1.4 PROJECT CONDITIONS

A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

## 1.5 COORDINATION

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

# PART 2 - PRODUCTS

## 2.1 METALS, GENERAL

A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

## 2.2 FERROUS METALS

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

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

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

D. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500.

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

F. Slotted Channel Framing: Cold-formed metal channels with flange edges returned toward web and with 9/16-inch- (14.3-mm-) wide slotted holes in webs at 2 inches (51 mm) o.c.

1. Width of Channels: 1-5/8 inches (41 mm).
2. Depth of Channels: 1-5/8 inches (41 mm).
3. Metal and Thickness: Galvanized steel complying with ASTM A 653/A 653M, structural quality, Grade 33 (Grade 230), with G90 (Z275) coating; 0.079-inch (2-mm) nominal thickness.
4. Finish: Hot-dip galvanized after fabrication.

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

## 2.3 PAINT

A. Shop Primer for Ferrous Metal: Organic zinc-rich primer, complying with SSPC-Paint 20 and compatible with topcoat.

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

   a. Carboline 621; Carboline Company.
   b. Aquapon Zinc-Rich Primer 97-670; PPG Industries, Inc.
   c. Tneme-Zinc 90-97; Tnemec Company, Inc.

B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

C. Shop Primer for Galvanized Steel: Zinc-dust, zinc-oxide primer formulated for priming zinc-coated steel and for compatibility with finish paint systems indicated, and complying with SSPC-Paint 5.

D. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

## 2.4 FASTENERS

A. General: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.

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

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

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

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

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

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

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

I. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four 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: Alloy Group 1 or 2 stainless-steel bolts complying with ASTM F 593 (ASTM F 738M) and nuts complying with ASTM F 594 (ASTM F 836M).

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

## 2.5 GROUT

A. 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.

## 2.6 CONCRETE FILL

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

## 2.7 FABRICATION, GENERAL

A. 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.

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

C. 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.

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

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

E. 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.

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

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

H. Allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

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

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

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

## 2.8 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work.

B. General: Provide steel framing and supports indicated and as necessary to complete the Work.

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

1. Fabricate units from slotted channel framing where indicated.
2. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors 1-1/4 inches (32 mm) wide by 1/4 inch (6 mm) thick by 8 inches (200 mm) long at 24 inches (600 mm) o.c., unless otherwise indicated.
3. Furnish inserts if units must be installed after concrete is placed.

## 2.9 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 where possible.

B. Provide cutouts, fittings, and anchorages as needed 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.

## 2.10 METAL FLOOR PLATE

A. Abrasive-Surface Floor Plate: Fabricate from steel plate, of thickness indicated below, with abrasive material metallically bonded to steel by a proprietary process. Provide material with coefficient of friction of 0.6 or higher when tested according to ASTM C 1028.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

   a. Mebac; IKG Borden.
   b. SLIP-NOT; W. S. Molnar Company.

2. Thickness: 1/4 inch (6.4 mm).

B. Include steel angle stiffeners, as indicated and as required.

## 2.11 PIPE BOLLARDS

A. Fabricate pipe bollards from Schedule 40 steel pipe of size as indicated.

B. Fabricate bollards with 3/8-inch- (10-mm-) thick steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch (19-mm) anchor bolts.

1. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.

C. Fabricate sleeves for bollard anchorage from steel pipe with 1/4-inch (6-mm) thick steel plate welded to bottom of sleeve.

## 2.12 FINISHES, GENERAL

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

B. Finish metal fabrications after assembly.

## 2.13 STEEL AND IRON FINISHES

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

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

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

1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

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

# PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing 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.

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

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 surfaces of exterior units that have been hot-dip galvanized after fabrication and are 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 no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

## 3.2 SETTING BEARING AND LEVELING PLATES

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

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

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

## 3.3 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

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

## 3.4 INSTALLING PIPE BOLLARDS

A. Anchor bollards in concrete in formed or core-drilled holes not less than 8 inches (200 mm) deep and 3/4 inch (19 mm) greater than OD of bollard. After bollards have been inserted into holes, fill annular space surrounding bollard solidly with nonshrink, nonmetallic grout, mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch (3 mm) toward bollard.

B. Anchor bollards in place with concrete footings. Support and brace bollards in position in footing excavations until concrete has been placed and cured.

C. Fill bollards solidly with concrete, mounding top surface.

## 3.5 ADJUSTING AND CLEANING

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

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

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

END OF SECTION 05500

# SECTION 05521 - PIPE AND TUBE RAILINGS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:
   1. Steel pipe and tube handrails and railings.

### 1.2 PERFORMANCE REQUIREMENTS

A. General: In engineering handrails and railings to withstand structural loads indicated, determine allowable design working stresses of handrail and railing materials based on the following:
   1. Structural Steel: AISC S335, "Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design with Commentary."
   2. Cold-Formed Structural Steel: AISI SG-673, Part I, "Specification for the Design of Cold-Formed Steel Structural Members."

B. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads without exceeding allowable design working stresses of materials for handrails, railings, anchors, and connections:

   1. Top Rail of Guards: Capable of withstanding the following loads applied as indicated:

      a. Concentrated load of 200 lbf (890 N) applied at any point and in any direction.
      b. Uniform load of 50 lbf/ft. (730 N/m) applied horizontally and concurrently with uniform load of 100 lbf/ft. (1460 N/m) applied vertically downward.
      c. Concentrated and uniform loads above need not be assumed to act concurrently.

   2. Handrails Not Serving As Top Rails: Capable of withstanding the following loads applied as indicated:

      a. Concentrated load of 200 lbf (890 N) applied at any point and in any direction.
      b. Uniform load of 50 lbf/ft. (730 N/m) applied in any direction.
      c. Concentrated and uniform loads above need not be assumed to act concurrently.

   3. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 lbf (890 N) applied to 1 sq. ft. (0.09 sq. m) at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area.

      a. Load above need not be assumed to act concurrently with loads on top rails in determining stress on guard.

C. Thermal Movements: Provide handrails and railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

## 1.3 SUBMITTALS

A. Shop Drawings: Show fabrication and installation of handrails and railings. Include plans, elevations, sections, component details, and attachments to other Work.

1. For installed handrails and railings indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

## 1.4 QUALITY ASSURANCE

A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of handrails and railings that are similar to those indicated for this Project in material, design, and extent.

B. Source Limitations: Obtain each type of handrail and railing through one source from a single manufacturer.

## 1.5 STORAGE

A. Store handrails and railings in a dry, well-ventilated, weathertight place.

## 1.6 PROJECT CONDITIONS

A. Field Measurements: Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

## 1.7 COORDINATION

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

## 1.8 SCHEDULING

A. Schedule installation so handrails and railings are mounted only on completed walls. Do not support temporarily by any means that does not satisfy structural performance requirements.

## PART 2 - PRODUCTS

### 2.1 METALS

A. General: Provide metal free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.

B. Steel and Iron: Provide steel and iron in the form indicated, complying with the following requirements:

1. Steel Pipe: ASTM A 53; finish, type, and weight class as follows:

   a. Black finish, unless otherwise indicated.
   b. Galvanized finish for exterior installations and where indicated.
   c. Type F, or Type S, Grade A, standard weight (Schedule 40), unless another grade and weight are required by structural loads.

2. Steel Tubing: Cold-formed steel tubing, ASTM A 500, Grade A, unless another grade is required by structural loads.
3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
4. Iron Castings: Gray iron complying with ASTM A 48, Class 30 (ASTM A 48M, Class 200).

C. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

### 2.2 STEEL TUBE HANDRAILS AND RAILINGS

A. General: Fabricate handrails and railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.
1. Configuration: 1-1/2-inch- (38-mm-) square top and bottom rails, 1-1/2-inch- (38-mm-) square posts, and 1/2-inch- (13-mm-) square pickets spaced not more than 4 inches (101 mm) clear.
2. Configuration: 1-1/2-inch- (38-mm-) square top and bottom rails and posts, and 1/2-inch- (13-mm-) square pickets spaced not more than 6 inches (152 mm) clear.
3. Configuration: 1-1/2-inch- (38-mm-) square top, bottom, and intermediate rails and posts. Space intermediate rails not more than 12 inches (305 mm) clear.
4. Gates: Form gates from steel tube of same size and shape as top rails. Provide with hinges for fastening to wall and overlapping stop with rubber bumper to restrict gate to opening in the direction of egress.

B. Interconnect members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.

1. At tee and cross intersections, cope ends of intersecting members to fit contour of tube to which end is joined, and weld all around.

C. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

D. Close exposed ends of handrail and railing members with prefabricated end fittings.

E. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.

F. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting railings and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.

1. Connect railing posts to stair framing by direct welding, unless otherwise indicated.

G. For galvanized handrails and railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous-metal components.

H. For nongalvanized handrails and railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.

## 2.3 WELDING MATERIALS, FASTENERS, AND ANCHORS

A. Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Fasteners for Anchoring Handrails and Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring handrails and railings to other types of construction indicated and capable of withstanding design loads.
1. For steel handrails, railings, and fittings, use plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.

C. Fasteners for Interconnecting Handrail and Railing Components: Use fasteners fabricated from same basic metal as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.

1. Provide concealed fasteners for interconnecting handrail and railing components and for attaching them to other work, unless otherwise indicated.

D. Cast-in-Place and Postinstalled Anchors: Anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Cast-in-place anchors.
2. Expansion anchors.

## 2.4 PAINT

A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in 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. Shop Primer for Galvanized Steel: Zinc-dust, zinc-oxide primer formulated for priming zinc-coated steel and for compatibility with finish paint systems indicated, and complying with SSPC-Paint 5.

## 2.5 GROUT AND ANCHORING CEMENT

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

B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

## 2.6 FABRICATION

A. General: Fabricate handrails and railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble handrails and railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Welded Connections: Fabricate handrails and railings for connecting members by welding. Cope components at perpendicular and skew connections to provide close fit, or use fittings designed for this purpose. Weld connections 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 flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

D. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect handrail and railing members to other work, unless otherwise indicated.

E. Provide inserts and other anchorage devices for connecting handrails and railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.

F. For railing posts set in concrete, provide preset sleeves of steel not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (12 mm) greater than outside dimensions of post, and steel plate forming bottom closure.

G. For removable railing posts, fabricate slip-fit sockets from steel tube whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height. Provide socket covers designed and fabricated to resist being dislodged.

1. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.

H. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.

I. 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 the Work.

J. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.

K. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.

L. Fabricate joints that will be exposed to weather in a watertight manner.

M. Close exposed ends of handrail and railing members with prefabricated end fittings.

N. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of railing and wall is 1/4 inch (6 mm) or less.

O. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

## 2.7 FINISHES, GENERAL

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

## 2.8 STEEL FINISHES

A. Galvanized Handrails and Railings: Hot-dip galvanize exterior steel and iron handrails and railings to comply with ASTM A 123. Hot-dip galvanize hardware for exterior steel and iron handrails and railings to comply with ASTM A 153/A 153M.

B. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

C. For galvanized handrails and railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

D. For nongalvanized steel handrails and railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.

E. Preparation for Shop Priming: After galvanizing, thoroughly clean handrails and railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic-phosphate process.

F. 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 handrails and railings:

1. Exteriors (SSPC Zone 1B): SSPC-SP 6, "Commercial Blast Cleaning."

G. Apply shop primer to prepared surfaces of handrail and railing components, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

### 3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required to install handrails and railings. Set handrails and railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.

1. Do not weld, cut, or abrade surfaces of handrail and railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
3. Align rails so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).

C. Adjust handrails and railings before anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated, but not less than that required by structural loads.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings and for properly transferring loads to in-place construction.

## 3.3 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches (50 mm) beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches (150 mm) of post.

## 3.4 ANCHORING POSTS

A. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's written instructions:

1. Nonshrink, nonmetallic grout.

B. Leave anchorage joint exposed; wipe off surplus anchoring material; and leave 1/8-inch (3-mm) build-up, sloped away from post.

C. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

D. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

## 3.5 ANCHORING RAILING ENDS

A. Anchor railing ends into concrete and masonry with round flanges connected to railing ends and anchored into wall construction with postinstalled anchors and bolts.

B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces.

1. Weld flanges to railing ends.

## 3.6 ATTACHING HANDRAILS TO WALLS

A. Attach handrails to wall with wall brackets. Provide bracket with 1-1/2-inch (38-mm) clearance from inside face of handrail and finished wall surface.

B. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

C. Secure wall brackets to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.
3. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.

## 3.7 CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material.

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

## 3.8 PROTECTION

A. Protect finishes of handrails and railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05521

# SECTION 05580 - FORMED METAL FABRICATIONS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Furnish and install formed stainless steel baggage pass-through enclosures, stainless steel corner guards, and stainless steel bumper rails at ticket counters, oversize bag shelves, and overhead doors and shutters which are not a part of other metal systems specified in other sections of these specifications.

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

1. Division 6 Section "Interior Architectural Woodwork" for cabinets to receive sheet metal fabrication finishes.

### 1.2 SUBMITTALS

A. Shop drawings for each sheet metal fabrication specified, including plans, elevations and detail sections. Indicate jointing, fasteners, anchorage, and accessory items, and specify finishes.

B. Coordination drawings for sheet metal fabrications housing items specified under other sections of these specifications.

### 1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firm which employs skilled persons and which has successfully fabricated products similar to those required for this Project and which has sufficient capacity to produce required units without causing delay in the Work.

B. Single Source Responsibility: Obtain sheet metal fabrications from a single manufacturer.

C. Coordinate fabrication and installation of items specified in this section with other, adjoining units of work.

D. Shop Assembly: Preassemble items in the shop to the greatest extent possible, so as to minimize field splicing and assembly. Disassemble units only to the extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

E. Inserts and Anchorages: Furnish anchoring devices, which are appropriate for installing the stainless steel materials as drawn. Coordinate delivery with other work to avoid delay.

### 1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal fabrications as factory assembled units with protective crating and covering.

B. Store products on elevated platforms in a dry location.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify size, location, and placement of sheet metal fabrications with adjoining construction prior to fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering sheet metal products that may be incorporated in the Work include, but are not limited to, the following:

American Steel Products Corp.
Brandt-Airflex Corp.
Custom Enclosures, Inc.
Superior Fireproof Door Inc.

2.2 SHEET METALS

A. General: Provide sheet metals selected for their surface flatness, smoothness and freedom from surface blemishes where exposed to view in the finished unit. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, variations in flatness exceeding those permitted by referenced standards for stretcher-leveled metal sheet, stains, discoloration or other imperfections.

B. Stainless Steel Sheet: ASTM A 167, Type 302 or 304, stretcher leveled, with the following mill finish:

1. Polished for surfaces requiring little or no polishing after fabrication to produce the uniform polished finish specified under "Stainless Steel Finishes."

2.3. MISCELLANEOUS MATERIALS

A. Welding Electrodes and Filler Metal: Type and alloy of filler metal and electrodes as recommended by producer of metal to be welded, complying with applicable AWS specifications, and as required for strength and compatibility in the fabricated items.

1. Use filler metals and welding procedures which will blend with and match the color of sheet metal being joined and will avoid discoloration at welds.

B. Fasteners: Of same basic metal and alloy as fastened metal, unless otherwise indicated. Do not use metals, which are corrosive or incompatible with metals joined.

1. Provide concealed fasteners for interconnection of sheet metal fabrications and for their attachment to other work except where exposed fasteners are unavoidable.

2. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

C. Bituminous Paint: SSPC-Paint 12 (cold-applied asphalt mastic).

D. Lacquer: Clear methacrylate, of type recommended by metal producer for protection of the finished metal surface.

## 2.4 FABRICATION, GENERAL

A. General: Fabricate sheet metal fabrications to comply with requirements indicated for design, dimensions, materials, joinery, and performance.

B. Coordinate dimensions and attachment methods of sheet metal fabrications with those of adjoining products and construction to produce integrated assemblies with closely fitting joints, and edges and surfaces aligned with one another in relationship indicated.

C. Increase metal thickness or reinforce metal with concealed stiffeners or backing materials or both as required to produce surfaces whose variations in flatness exceed those permitted by referenced standards for stretcher-leveled metal sheet and to impart sufficient strength for use indicated.

1. Where stiffeners are used, fill space between them with sound deadening insulation permanently attached to face sheet.

E. Preassemble sheet metal fabrications in the shop to the greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

F. Form sheet metal fabrications to profiles indicated in maximum lengths to minimize joints and without exposed cut edges. Fold back exposed ends of unsupported sheet metal to form a 1/2-inch wide hem on the concealed side, or ease exposed edges with backing to a radius of approximately 1/32 inch. Produce flat, flush surfaces without cracking and grain separation at bends.

G. Continuously weld all joints and seams except where other methods of joining are indicated; grind, fill, and dress welds to produce smooth flush exposed surfaces in which welds are invisible after final finishing is completed.

H. Build-in straps, plates and brackets as required for support and anchorage of fabricated items to adjoining construction; reinforce sheet metal units as required for attachment and support of other construction.

## 2.5 STAINLESS STEEL FABRICATIONS

A. Form members from sheet metal of type and minimum nominal thickness as indicated below. Incorporate components required for support and installation of closures and trim. Fabricate closures and trim to tightly close with adjoining construction.

1. Metal for Interior Installations: Steel sheet, 0.0478 inch (18 gage).

B. Conceal fasteners where possible; otherwise locate where they will be as inconspicuous as possible. Size fasteners to support closures and trim, with fasteners spaced to prevent buckling or waviness in finished surfaces.

C. Drill and tap holes required for securing closures and trim to other surfaces.

D. Incorporate gaskets where indicated or required for concealed, continuous seal at abutting surfaces.

E. Support joints with concealed stiffeners as required to hold exposed faces of adjoining sheets in flush alignment.

F. Miter or cope trim members at corners to form tight joint.

2.6 FINISHES, GENERAL

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

2.7 STAINLESS STEEL FINISHES

A. Bright, Directional Polish: AISI No. 4 finish.

2.8 SHOP FINISHING

A. Corrosion Protection: Coat concealed surfaces that will be in contact with concrete, masonry, wood, or dissimilar metals, in exterior work and work to be built into exterior and below grade walls and decks, with a heavy coat of bituminous paint. Do not extend coating onto exposed surfaces.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for the installation of anchorages, such as concrete inserts, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to the project site.

3.2 GENERAL INSTALLATION

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing ornamental metal items to in-place construction; including, threaded fasteners, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect sheet metal surfaces and to make a weathertight connection.

B. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of the ornamental metal items. Set the work accurately in location, alignment and elevation, plumb, level, and true, measured from established lines and levels.

C. Locate and place sheet metal fabrications plumb, level and in alignment with adjacent construction.

D. Form tight joints with exposed connections accurately fitted with uniform reveals and spaces for sealants and joint fillers. Where cutting, welding and grinding are required for proper shop fitting and jointing of the work, restore finishes to eliminate any evidence of such corrective work.

E. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing or provide new units at Contractor's option.

F. Restore protective coverings that have been damaged during shipment or installation of the work. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at the same location. Retain protective coverings intact and remove simultaneously from similarly finished items to preclude nonuniform oxidation and discoloration.

G. Field Welding: Comply with AWS Code for the procedures of manual shielded metal-arc welding, the appearance and quality of welds made, and the methods used in correcting welding work.

## 3.3 ADJUSTING

A. Repair finishes damaged during installation and construction period so that no evidence remains of correction work. Return items which cannot be refinished in the field to the factory; make required alterations and refinish entire unit, or provide new units as required.

## 3.4 PROTECTION

A. Protect finishes of sheet metal fabrications from damage during construction period. Remove temporary protective coverings at time of Substantial Completion.

END OF SECTION 05580

# SECTION 06100 - ROUGH CARPENTRY

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:
   1. Wood blocking and nailers.
   2. Plywood panels.

### 1.2 DEFINITIONS

A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise indicated.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
   1. NLGA - National Lumber Grades Authority.
   2. SPIB - Southern Pine Inspection Bureau.
   3. WCLIB - West Coast Lumber Inspection Bureau.
   4. WWPA - Western Wood Products Association.

### 1.3 SUBMITTALS

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

   1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
   2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
   3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

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

   1. Preservative-treated wood.
   2. Power-driven fasteners.
   3. Expansion anchors.

## 1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

# PART 2 - PRODUCTS

## 2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber, S4S, unless otherwise indicated.
4. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.

## 2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA C2 (lumber) and AWPA C9 (plywood), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and one of the following:
   a. Ammoniacal, or amine, copper quat (ACQ).
   b. Copper bis (dimethyldithiocarbamate) (CDDC).
   c. Ammoniacal copper citrate (CC).
   d. Copper azole, Type A (CBA-A).
   e. Oxine copper (copper-8-quinolinolate) in a light petroleum solvent.

B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

3. Wood framing members less than 18 inches (460 mm) above grade.
4. Wood floor plates that are installed over concrete slabs directly in contact with earth.

## 2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, provide materials that comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures, when tested by a qualified independent testing agency according to ASTM D 5664, for lumber and ASTM D 5516, for plywood.
2. Use treatment that does not promote corrosion of metal fasteners.
3. Use Exterior type for exterior locations and where indicated.
4. Use Interior Type A High Temperature (HT), unless otherwise indicated.

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

## 2.4 MISCELLANEOUS LUMBER

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

1. Rooftop equipment bases and support curbs.
2. Blocking.
3. Nailers.

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

1. Mixed southern pine; SPIB.
2. Hem-fir or Hem-fir (north); NLGA, WCLIB, or WWPA.
3. Spruce-pine-fir (south) or Spruce-pine-fir; NELMA, NLGA, WCLIB, or WWPA.
4. Eastern softwoods; NELMA.
5. Northern species; NLGA.
6. Western woods; WCLIB or WWPA.
7. Spruce-pine-fir (south) or Spruce-pine-fir, D Select grade; NELMA, NLGA, WCLIB, or WWPA.
8. Western red cedar, A grade; NLGA or WWPA.

C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.
2. Hem-fir or Hem-fir (north), Construction or 2 Common grade; NLGA, WCLIB, or WWPA.

3. Spruce-pine-fir (south) or Spruce-pine-fir, Construction or 2 Common grade; NELMA, NLGA, WCLIB, or WWPA.
4. Eastern softwoods, No. 2 Common grade; NELMA.
5. Northern species, No. 2 Common grade; NLGA.
6. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

## 2.5 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 23/32 inch (18.3 mm) thick.

## 2.6 FASTENERS

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

1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: CABO NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

## 2.7 MISCELLANEOUS MATERIALS

A. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

# PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Do not use materials with defects that impair quality of rough carpentry or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

C. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. CABO NER-272 for power-driven fasteners.
2. Published requirements of metal framing anchor manufacturer.

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

F. Use finishing nails for exposed work, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

## 3.2 WOOD BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

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

END OF SECTION 06100

# SECTION 06402 - INTERIOR ARCHITECTURAL WOODWORK

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes interior woodwork including for the following applications:

1. Standing and running trim.
2. Plastic-laminate cabinets.
3. Plastic-laminate countertops.
4. Solid-surfacing-material countertops.

5. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips, unless concealed within other construction before woodwork installation.

### 1.2 SUBMITTALS

A. Product Data: For the following:

1. Cabinet hardware and accessories.
2. Handrail brackets.
3. Finishing materials and processes.

B. Shop Drawings: Include location of each item, plans and elevations, large-scale details, attachment devices, and other components.

C. Samples:

1. Lumber and panel products for transparent finish, for each species and cut, finished on one side and one edge.
2. Lumber and panel products with shop-applied opaque finish, for each finish system and color, with exposed surface finished.
3. Plastic-laminate-clad panel products, for each type, color, pattern, and surface finish.
4. Thermoset decorative-overlay surfaced panel products, for each type, color, pattern, and surface finish.
5. Solid-surfacing materials.

### 1.3 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of woodwork.

B. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.

1. Provide AWI certification labels or compliance certificate indicating that woodwork complies with requirements of grades specified.

C. Quality Standard: Unless otherwise indicated, comply with WIC's "Manual of Millwork" for grades of interior architectural woodwork, construction, finishes, and other requirements.

1. Provide WIC-certified compliance certificate indicating that woodwork complies with requirements of grades specified.
2. Provide WIC-certified compliance certificate for installation.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wood for Opaque Finish:

1. Species: Any closed-grain hardwood.

B. Wood Products:

1. Hardboard: AHA A135.4.
2. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
3. Particleboard: ANSI A208.1, Grade M-2.
4. Softwood Plywood: DOC PS 1, Medium Density Overlay.
5. Hardwood Plywood and Face Veneers: HPVA HP-1.

C. Thermoset Decorative Overlay: Particleboard or medium-density fiberboard with surface of thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

D. High-Pressure Decorative Laminate: NEMA LD 3.

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

a. Formica Corporation.
b. International Paper; Decorative Products Div.
c. Laminart.
d. Pioneer Plastics Corp.
e. Westinghouse Electric Corp.; Specialty Products Div.

f. Wilsonart International; Div. of Premark International, Inc.

E. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ANSI Z124.3, for Type 5 or Type 6 material and performance requirements, without a precoated finish.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

a. Avonite, Inc.; Avonite.
b. DuPont Polymers; Corian.
c. Formica Corporation; Surell.
d. International Paper, Decorative Products Div.; Fountainhead.
e. Swan Corporation (The); Swanstone.
f. Wilsonart International, Div. of Premark International, Inc.; Gibraltar.

## 2.2 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Lumber and Plywood: Materials impregnated with fire-retardant chemical formulations to comply with AWPA C20 (lumber) and AWPA C27 (plywood), Exterior Type or Interior Type A. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Kiln-dry material after treatment.

B. Fire-Retardant Particleboard: Panels made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture with flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E 84.

C. Fire-Retardant Fiberboard: ANSI A208.2 medium-density fiberboard panels made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture with flame-spread index of 25 or less and smoke-developed index of 200 or less per ASTM E 84.

## 2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials for a complete installation of architectural woodwork, except for items specified in Division 8 Section "Door Hardware."

B. Hardware Standard: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers or items referenced to this standard.

C. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, self-closing.

D. Wire Pulls: Back mounted, 4 inches (100 mm) long, 5/16 inches (8 mm) in diameter.

E. Catches: Magnetic, BHMA A156.9, B03141.

F. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.

G. Drawer Slides: Side-mounted, full-extension, zinc-plated steel drawer slides with steel ball bearings, BHMA A156.9, B05091, and rated for the following loads:

1. Box Drawer Slides: 75 lbf (330 N).

H. Door Locks: BHMA A156.11, E07121.

I. Drawer Locks: BHMA A156.11, E07041.

J. Exposed Hardware Finishes: Complying with BHMA A156.18 for BHMA finish number indicated.
1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.

## 2.4 INSTALLATION MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

B. Rough Carriages for Stairs: Comply with requirements in Division 6 Section "Rough Carpentry ." Kiln-dry to less than 15 percent moisture content.

## 2.5 FABRICATION

A. General: Complete fabrication to maximum extent possible before shipment to Project site. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.

1. Interior Woodwork Grade: Custom complying with the referenced quality standard.
2. Shop cut openings to maximum extent possible. Sand edges of cutouts to remove splinters and burrs.
3. Seal edges of openings in countertops with a coat of varnish.
4. Install glass to comply with applicable requirements in Division 8 Section "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.
5. For trim items wider than available lumber, use veneered construction. Do not glue for width.
6. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
7. Assemble casings in plant except where limitations of access to place of installation require field assembly.

B. Plastic-Laminate Cabinets:

1. AWI Type of Cabinet Construction: Flush overlay.
2. WIC Construction Style: Style A, Frameless.
3. WIC Construction Type: Type I, multiple self-supporting units rigidly joined together.
4. WIC Door and Drawer Front Style: Flush overlay.
5. Reveal Dimension: 1/2 inch (13 mm).
6. Laminate Cladding for Exposed Surfaces: High-pressure decorative of grade indicated.

a. Horizontal Surfaces Other Than Tops: HGS.
b. Postformed Surfaces: HGP.
c. Vertical Surfaces: HGS.
d. Edges: HGS.

7. Materials for Semiexposed Surfaces Other Than Drawer Bodies: Thermoset decorative overlay.

a. Drawer Sides and Backs: Thermoset decorative overlay.
b. Drawer Bottoms: Hardwood plywood.

8. Colors, Patterns, and Finishes: As selected from manufacturer's full range.
9. Provide dust panels of 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

C. Plastic-Laminate Countertops:

1. High-Pressure Decorative Laminate Grade: HGS.
2. Colors, Patterns, and Finishes: As selected from manufacturer's full range.
3. Edge Treatment: Same as laminate cladding on horizontal surfaces.
4. Core Material at Sinks: Exterior-grade plywood.

D. Solid-Surfacing-Material Countertops:

1. Solid-Surfacing-Material Thickness: 3/4 inch (19 mm).
2. Colors, Patterns, and Finishes: As selected from manufacturer's full range.
3. Fabricate tops in one piece with shop-applied backsplashes and edges, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
4. 75] [25] or less and smoke-developed index of 450 or less per ASTM E 84.

## 2.6 SHOP FINISHING

A. Finish architectural woodwork at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.

B. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling.

C. Opaque Finish: Comply with requirements indicated below for grade, finish system, color, effect, and sheen, with sheen measured on 60-deg ree gloss meter per ASTM D 523.

1. Grade: Custom.
2. AWI Finish System: OP-6, catalyzed polyurethane.
3. WIC Finish System: #3, catalyzed polyurethane.
4. Color: As selected in finish system specified.
5. Sheen: Semigloss, 55-75 gloss units.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Condition woodwork to average prevailing humidity conditions in installation areas and examine and complete work as required, including removal of packing and backpriming before installation.

B. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in this Section for type of woodwork involved.

C. Quality Standard: Install woodwork to comply with WIC Section 26 for the same grade specified in this Section for type of woodwork involved.

D. Install woodwork level, plumb, true, and straight to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm). Shim as required with concealed shims.

E. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.

F. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails [or finishing screws] for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

G. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base, if finished.

H. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.

1. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c. with No. 10 wafer-head screws sized for 1-inch (25-mm) penetration into wood framing, blocking, or hanging strips.

2. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop. Calk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."

END OF SECTION 06402

# SECTION 07100 – WATERPROOFING MEMBRANE

## PART I GENERAL

### 1.01 SUMMARY

A. This specification serves as a guideline and should be adapted to suit the needs of each individual project by the architect. It is prepared in accordance with the CSI three-part section format and should be included as a separate section under DIVISION 7 - Thermal and Moisture Protection. Improvements and other changes to the contents may be made only with the written approval of the architect.

### 1.02 RELATED SECTIONS

A. DIVISION 3 - Concrete Section 03300.

The coordination of this section is necessary to facilitate the successful installation of the waterproofing membrane.

Cast In Place Concrete/Composite Deck

A. Strength/density: minimum 2,500 psi (17,235 kPa) compressive strength
minimum 115 pcf (1842 kg/m$^3$) density

B. Finish: Wood-float or wood-troweled equivalent finish. Steel troweled is not desirable.

C. Concrete Hydration (Cure):

1. Method of Cure: Water cure, wet coverings, paper sheets, plastic sheets or approved liquid curing compound (sodium silicate preferred). Contact Manufacturer for other alternatives.
2. Duration of Cure/Dry:
   a. Structural Weight Concrete: recommend 28 days, minimum 14 days, prior to application of the membrane.
   c. The above minimum cure/dry times are recommended based upon basic concrete fundamentals and experience. Depending on conditions (i.e., ambient temperature, humidity) the concrete may be dry enough to receive application of the membrane in less than the 14 day minimum recommendation. Consult Manufacturer for specifics when less than the minimum is desired.
3. Form Release Agents: Contact Manufacturer

D. DIVISION 06100 – Rough Carpentry

E. DIVISION 07605 – Flashing and Sheet Metal

F. DIVISION 07920 - Caulking and sealants

### REFERENCES

A. American Society for Testing and Materials (ASTM).

B. Canadian Government Specification Board CGSB-37.50-M89, Standard for "Asphalt, Rubberized, Hot Applied, for Roofing and Waterproofing."

### SYSTEM DESCRIPTION

A. Furnish and install a completed waterproofing assembly including surface conditioner, a monolithic, reinforced rubberized asphalt membrane, protection course and flashings. To ensure total system compatibility all products must by purchased from a single-source manufacturer.

1.05 SUBMITTALS

A. Certification from an approved independent testing laboratory experienced in testing this type material, that th material meets the CGSB-37.50-M89 standard for rubberized asphalt membranes, including applicable ASTM procedures. Testing shall be done by Ortech International or other national testing laboratory acceptable to the engineer.

B. Certification showing full time quality control of production facilities and that each batch of material is tested to insure conformance with the manufacturer's published physical properties.

C. Certification showing that all waterproofing components are being supplied and warranted by a single-source manufacturer.

D. The plant manufacturing this type material must have ISO9002 approval as evidenced by a notarized copy of the official certificate.

1.06 QUALITY ASSURANCE

A. Refer to Section 1.05 SUBMITTALS. Include items A., B., C. & D.

B. The Waterproofing Contractor shall demonstrate qualifications to perform the work of this Section by submitting the following documentation:

1. Certification or license by the membrane manufacturer as a locally based, authorized applicator of the product the installer intends to use, for a minimum of five (5) years.

2. List of at least three (3) projects, satisfactorily completed within the past five (5) years, of similar scope and complexity to this project. Previous experience submittal shall correspond to specifi membrane system proposed for use by applicator.

C. Refer to Section 1.04 SYSTEM DESCRIPTION. Include single-source for all components from the manufacturer.

D. The rubberized asphalt membrane product shall contain an inert clay filler to enable the product to be resistant to acids (fertilizers, building washes and acid rain).

E. Membrane Manufacturer shall have available an in-house technical staff to assist the contractor, when necessary, in application of the products and final inspection of the assembly.

F. Membrane Manufacturer Qualification: Manufacturer shall demonstrate qualifications to supply materials of this section by certifying the following:

1. Membrane Manufacturer must show evidence that the specified rubberized asphalt has been manufactured by the same source for fifteen (15) years and successfully installed on a yearly basis for a minimum of fifteen (15) years on projects of similar scope and complexity.

2. Membrane Manufacturer must not issue warranties for terms longer than they have been manufacturing their hot fluid rubberized asphalt membrane.

G. Pre-Construction Conferences. The manufacturer will meet with the necessary parties at the jobsite to review and discuss project conditions as it relates to the integrity of the waterproofing assembly.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original unopened containers of packaging clearly labeled with manufacturer's name, brand name, instruction for use and all identifying numbers.

B. Materials shall be stored in a neat, safe manner, not to exceed the allowable structural capacity of the storage area.

C. Store materials in a clean, dry area protected from water and direct sunlight.

D. Store all adhesives at temperatures between 60°F (15.5°C) and 80°F (26.6°C). If exposed to lower temperatures, restore materials to 60°F (15.5°C) minimum temperature before using.

1.08 PROJECT CONDITIONS

A. Application of the membrane shall not commence nor proceed during inclement weather. All surfaces to receive the membrane shall be free of water, dew, frost, snow and ice.

B. Application of membrane shall not commence nor proceed when the ambient temperature is below 0°F (-17.7°C).

C. Preparation and application of membrane must be conducted in well ventilated areas.

D. Over its service life, do not expose membrane or accessories to a constant temperature in excess of 180°F (82°C) (i.e., hot pipes and vents or direct steam venting, etc.).

E. Adhesives contain petroleum distillates and are extremely flammable. Do not breathe vapors or use near an open fire. Do not use in confined areas without adequate ventilation. Consult container or packaging labels and Material Safety Data Sheets (MSDS) for specific safety information.

F. Do not allow waste products (petroleum, grease, oil, solvents, vegetable or mineral oil, animal fat, etc.) to come in contact with the waterproofing membrane. Any exposure to foreign materials or chemical discharges must be presented to membrane manufacturer for evaluation to determine any impact on the waterproof membrane assembly performance.

G. Concrete Deck/Wall Surface Condition. IMPORTANT - Refer to 1.02 Related Sections.

H. Deck/Wall Preparation; refer to Section 3.02 Preparation.

I. General contractor shall assure adequate protection during installation of the waterproofing assembly.

WARRANTY

A. Upon completion of the work, the contractor must supply the owner with a single-source warranty of U.S. origin direct from the manufacturer.

B. Each warranty varies in scope and terms. Contact Manufacturer for exact warranty terms and conditions to meet the specific project requirements.

C. Warranties available from the manufacturer:

1. Material Warranties; excludes labor.
Duration: 10-year

2. Watertightness Warranties; includes labor and material.
Duration: 10-year

3. Total System Warranties; covers components of the waterproofing assembly, including membrane, flashing, insulation and pavers. Includes removal and replacement of the pedestal installed pavers when installed per Hydrotech's requirements.

C. Flashing/Reinforcing
1. 60-mil (1.5 mm) thick, uncured neoprene flashing/(heavy duty) reinforcing sheet.
- American Hydrotech, Inc., Flex Flash UN

D. Adhesives/Sealant
1. Contact adhesive to bond elastomeric flashing together.
- American Hydrotech, Inc., Splicing Cement
2. Contact adhesive to bond elastomeric flashing to an approved substrate.
- American Hydrotech, Inc., Bonding Adhesive
3. Sealant to seal elastomeric flashing seam edge.
- American Hydrotech, Inc., Lap Sealant

E. Protection Course
1. A fiberglass reinforced rubberized asphalt sheet.
- American Hydrotech, Inc., Hydroflex 30

***Certain project conditions may warrant additional protection. CONTACT Hydrotech's Technical Service Department.***

H. Filter Fabric Sheet

1. Water permeable polymeric fabric.
- American Hydrotech, Inc., Filter Fabric Sheet

I. Topping Materials (Edit to project requirements)

1. Concrete Pour Topping

Dow Chemical Company, manufacturers of STYROFOAM® Brand insulation, recommends the incorporation of an air layer between the insulation and concrete. Hydrotech suggests the use of Hydrodrain AL for this purpose. CONTACT Hydrotech for specific recommendations.

2. Asphalt Paving Overlay

When asphalt paving will be placed directly over the waterproofing, CONTACT Hydrotech for suggestions and recommendations.

PART III EXECUTION

3.01 INSPECTION

A. The waterproofing contractor shall examine all surfaces to receive the waterproofing assembly to verify it is acceptable and proper for the application of the membrane. Refer to American Hydrotech's Pre-Installation & Application Guidelines.

B. The waterproofing contractor shall not proceed with the installation of the waterproofing membrane assembly until all deck defects have been corrected.

3.02 PREPARATION

A. All surfaces must be dry, smooth, free of depressions, voids, protrusions, clean and free of unapproved curing compounds, form release agents and other surface contaminants.

1. Cast in-place concrete/Composite deck

   a. Poured in place concrete must be monolithic, smooth, free of voids, spalled areas, laitance, honeycombs, and sharp protrusions.
   b. Refer to Section 1.02 of this specification, Division 3.

2. Precast concrete decks

   a. Precast units shall be mechanically secured to minimize differential movement and all joints between units shall be grouted.

3. Retrofit/Tear-Off Application

   a. Asphalt, coal tar pitch or other existing membrane must be removed. CONTACT Hydrotech.
   b. Deck type acceptable to Hydrotech.

B. Substrate cleaning

1. Thoroughly sweep the substrate which is to receive the waterproofing membrane.

2. Substrate must also be blown clean using an air compressor to remove any remaining loose debris.

3. Final check to determine if concrete has been properly cleaned is to apply a test patch of Monolithic Membrane 6125 to the surface and check its adhesion.

## 3.03 INSTALLATION

A. Surface conditioner application (to concrete)

1. Apply the surface conditioner to the concrete using a hand held sprayer evenly at a rate of 300 to 600 SF/gallon (7.4 - 14.7 $m^2$/L) depending on surface texture. Surface conditioner should "tan" the surface, not blacken it.

2. Allow sufficient time for the surface conditioner to thoroughly dry prior to the membrane application.

B. Membrane preparation

1. The membrane shall be heated in double jacketed, oil bath or air jacketed melter with mechanical agitation, specifically designed for the preparation of a rubberized asphalt membrane.

2. Heat membrane until membrane can be drawn-free flowing at a temperature range between 350°F (176°C) and 400°F (204°C).

C. Detailing/Flashing

1. All detailing and flashing shall be done in accordance with the manufacturer's standard guideline details.

2. All detailing and flashing shall be completed before installing the membrane over the field of the substrate.

D. Membrane Application

1. a. Apply the rubberized asphalt membrane at a rate to provide a continuous, monolithic coat of 90 mil minimum (approximately 2.3 mm), into which is fully embedded a layer of the spunbonded polyester fabric reinforcing sheet, followed by another continuous monolithic coat of membrane at an average thickness of 125 mil (approx. 3.2 mm). Total membrane thickness is to be 215 mils average (approx. 5.5 mm), 180 mils minimum.

   b. For foundation wall application woven fiberglass, fabric reinforcing sheet may be used in lieu of spunbonded polyester.

2. Overlap fabric reinforcing sheet 1-2 inches (25.4 mm - 50.8 mm) with membrane between sheets.

3.04 SEPARATION/PROTECTION LAYER INSTALLATION

A. Protection layer shall be installed as follows:

1. Embed the protection sheet/rigid insulation board into the membrane while it is still hot to insure a good bond.

2. Overlap adjoining sheet edges (dry) a minimum of 2"-3" (50.8 mm - 76.2 mm) to insure complete coverage. Rigid insulation board materials are not to be overlapped.

3. The completed membrane/protection assembly must be covered with subsequent topping materials as soon as possible, within 30 days of membrane installation.

3.05 WATER TEST

A. It is strongly recommended that the deck area or portions thereof be water tested by means of electronic testing or ponding water to a minimum depth of 2" (50.8 mm) for a period of 48 hours to check the integrity of the membrane installation.

B. VERIFY that the structure can support the deadload weight of a watertest before testing.

C. If leaks should occur, the water must be drained completely and the membrane installation repaired.

3.06 JOB COMPLETION

A. Contractor and a representative of the membrane manufacturer shall inspect the waterproofing assembly and notify the contractor of any defects. All defects must be corrected.

B. Clean up all debris and equipment.

END OF SECTION

# SECTION 07210 - BUILDING INSULATION

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:
   1. Cavity wall insulation.
   2. Concealed building insulation.
   3. Loose-fill building insulation.
   4. Vapor retarders.

### 1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Product test reports.

### 1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84 for surface-burning characteristics and other methods indicated with product, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

## PART 2 - PRODUCTS

### 2.1 INSULATING MATERIALS

A. General: Provide insulating materials that comply with requirements and with referenced standards and, for preformed units, in sizes to fit applications indicated, selected from manufacturer's standard thicknesses, widths, and lengths.

B. Molded-Polystyrene Board Insulation: ASTM C 578, Type II, 1.35 lb/cu. ft. (22 kg/cu. m)], with maximum flame-spread and smoke-developed indices of 75 and 450, respectively.

C. Glass-Fiber Board Insulation:

   1. Foil-Faced, Glass-Fiber Board Insulation: ASTM C 612, Type IA or Types IA and IB; faced on one side with foil-scrim-kraft or foil-scrim-polyethylene vapor retarder, with maximum flame-spread and smoke-developed indices of 25 and 50, respectively; and of the following properties:
      a. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), thermal resistivity of not less than 4.34 deg F x h x sq. ft./Btu x in. at 75 deg F (30.1 K x m/W at 24 deg C).

D. Mineral-fiber blanket insulation consisting of fibers manufactured from glass, slag wool, or rock wool:

1. Faced Mineral-Fiber Blanket Insulation: ASTM C 665, Type III, Class A; Category 1, faced with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on one face.

## 2.2 VAPOR RETARDERS

A. Fire-Retardant, Reinforced-Polyethylene Vapor Retarders: 2 outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either a nonwoven grid of nylon cord or polyester scrim and weighing not less than 22 lb/1000 sq. ft. (10 kg/100 sq. m), with maximum permeance rating of 0.1317 perm (7.53 ng/Pa x s x sq. m), and flame-spread and smoke-developed indices of not more than 5 and 60, respectively.

B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

## 2.3 AUXILIARY INSULATING MATERIALS

A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. General: Install insulation to comply with insulation manufacturer's written instructions applicable to products and application indicated. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

B. Installation of General Building Insulation: Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

1. Seal joints between closed-cell (nonbreathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant.
2. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.

   a. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

3. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:

a. Use blanket widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
b. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

4. Retain insulation in place by metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width of
5. Stuff glass-fiber insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).

C. Installation of Vapor Retarders: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

1. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs. Fasten vapor retarders to framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches (406 mm) o.c.
2. Seal overlapping joints in vapor retarders with adhesives or vapor-retarder tape according to vapor-retarder manufacturer's instructions. Seal butt joints and fastener penetrations with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
3. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor-retarder manufacturer.
4. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.
5. Repair any tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

END OF SECTION 07210

# SECTION 07411 - METAL FASCIA PANELS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Factory-formed and field-assembled, metal facia panels.

### 1.2 PERFORMANCE REQUIREMENTS

A. Wind-Uplift Resistance: Comply with UL 580 for wind-uplift resistance class indicated.

B. Structural Performance: Capable of withstanding the effects of gravity loads and the following loads and stresses, based on testing according to ASTM E 330:

1. Wind Loads: Minimum design wind pressures of 44-lbf/sq. ft., acting inward or outward.
2. Deflection Limits: Vertical deflections no greater than 1/240 of the span.

### 1.3 SUBMITTALS

A. Product Data: For each type of metal panel and accessory indicated.

B. Shop Drawings: Show layouts of metal panels, including plans, elevations, sections, details, and attachments to other work.

1. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories.
2. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Coordination Drawings: Drawn to scale and coordinating metal fascia panel installation with penetrations and fascia-mounted items.

D. Samples: For each exposed finish.

E. Material certificates.

F. Field quality-control inspection reports.

G. Product test reports.

H. Maintenance data.

## 1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1. Installer's responsibilities include fabricating and installing metal fascia panel assemblies and providing professional engineering services needed to assume engineering responsibility.

## 1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal fascia panel assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including rupturing, cracking, or puncturing.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal fascia panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Applicator Warranty on Watertightness: Applicator shall furnish a written guarantee covering watertightness of the system.

1. Warranty Period: Two years from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

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

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2. Manufacturers:

a. Atas Metal Panels.
b. CENTRIA Architectural Systems.
c. Garland Co., Inc. (The).
d. Merchant & Evans, Inc.
e. Morin Corporation; a Metecno Group Company.

## 2.2 METAL FASCIA PANELS

A. Metal Fascia Panels: Factory-formed, designed to be field assembled by mechanically fastening metal touge and groove panels, interconnecting and lapping over concealed anchors. Include trims and accessories required for weather tight installation.

1. Manufacturers:

   a. Atas Metal Wall Panels, OPF060, with smooth flat finish (used as design standard). www.atas.com.

2. Type: Opaline, 6" mechanically fastened vertical tongue and groove.
3. Material: Factory painted steel sheet, 24 gauge thick.

   a. Panel Finish: Kynar 500, Patina Green (To Match Existing Panels).

4. Joint Type: As standard with manufacturer.
5. Panel Coverage: 6 inch on center.
6. Panel Height: 3/4 inch high.
7. Uplift Rating: UL 90.

B. Panel Sealants:

1. Sealant Tape: Pressure-sensitive, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
2. Joint Sealant: ASTM C 920; as recommended in writing by metal fascia panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

## 2.3 UNDERLAYMENT MATERIALS

A. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felts.

## 2.4 SUBSTRATE BOARDS

A. Substrate-Board: ¾" exterior grade plywood.

## 2.5 MISCELLANEOUS METAL FRAMING

A. Cold-Rolled Furring Channels: 0.0538-inch (1.37-mm) bare steel thickness, with minimum 1/2-inch- (13-mm-) wide flange.

1. Depth: As indicated.
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare steel thickness of 0.0312 inch (0.79 mm).
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- (1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.

## 2.6 MISCELLANEOUS MATERIALS

A. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal fascia panels by means of plastic caps or factory-applied coating.

1. Fasteners for Fascia Panels: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with a stainless-steel cap or zinc-aluminum-alloy head and EPDM or neoprene sealing washer.
2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
3. Blind Fasteners: High-strength stainless-steel rivets.

B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

## 2.7 ACCESSORIES

A. Fascia Panel Accessories: Provide components required for a complete metal fascia panel assembly including trim, copings, fascia, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal fascia panels, unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal fascia panels.
2. Clips: Minimum 0.0625-inch- (1.6-mm-) thick, stainless steel panel clips designed to withstand negative-load requirements.
3. Cleats: Mechanically seamed cleats formed from minimum 0.0250-inch- (0.64-mm-) thick, stainless steel or nylon-coated aluminum sheet.
4. Closure Strips: Closed-cell, expanded, cellular, rubber or cross linked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal fascia panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

B. Flashing and Trim: Formed from 0.0179-inch- (0.45-mm-) thick, metallic-coated steel sheet. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include corners, bases, framed openings and fillers. Finish flashing and trim with same finish system as adjacent metal fascia panels.

C. Vinyl Weather seal Insert: By Manufacturer.

## 2.8 FABRICATION

A. General: Fabricate and finish metal fascia panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile for full length of panel.

C. Where indicated, fabricate metal fascia panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will minimize noise from movements within panel assembly.

D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

E. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

## PART 3 - EXECUTION

### 3.1 PREPARATION

A. Substrate Board: Install ¾" plywood fascia sheathing onto lightweight framing to cover entire fascia surface area.

1. Install plywood sheathing with long joints in continuous straight lines, perpendicular to fascia surface with end joints staggered between rows. Tightly butt plywood sheathing boards together.
2. Comply with UL requirements for fire-rated construction.

B. Install flashings and other sheet metal to comply with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim."

### 3.2 UNDERLAYMENT INSTALLATION

A. Felt Underlayment: Install felt underlayment sheet on plywood sheathing under metal fascia panels. Use adhesive for temporary anchorage. Apply at locations indicated on Drawings, in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

### 3.3 METAL FACIA PANEL INSTALLATION, GENERAL

A. General: Provide metal fascia panels of full length from top to bottom, unless otherwise indicated or restricted by shipping limitations. Anchor metal fascia panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Field cutting of metal fascia panels by torch is not permitted.
2. Rigidly fasten metal facia panels and allow free movement due to thermal expansion and contraction. Predrill panels.
3. Provide metal closures at caps and edges.
4. Flash and seal metal fascia panels with weather closures as required. Fasten with self-tapping screws.

5. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
6. Lap metal flashing over metal fascia panels to allow moisture to run over and off the material.

B. Fasteners:

1. Steel Fascia Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal fascia panel manufacturer.

1. Coat back side of aluminum fascia panels with bituminous coating where fascia panels will contact wood, ferrous metal, or cementitious construction.

D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal fascia panel assemblies.

1. Seal metal fascia panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal fascia panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

## 3.4 FIELD-ASSEMBLED METAL FASCIA PANEL INSTALLATION

A. Metal Fascia Panels: Fasten metal fascia panels to substrate with concealed fasteners at each joint at location, spacing, and with fasteners recommended by manufacturer.

1. Panel Joint: Nest tongue and groove into place and fasten together by interlocking and completely engaging field-applied sealant.

## 3.5 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal fascia panel assembly including trim, copings, closures, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners as required, and set units true to line and level as indicated. Install work with joints, and seams that will be permanently watertight and weather resistant.

## 3.6 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal fascia panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal fascia panel installation, clean finished surfaces as recommended by metal fascia panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 07411

# SECTION 07531 – EPDM MEMBRANE ROOFING

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes adhered membrane roofing system.

### 1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.

C. Samples: For each product included in membrane roofing system.

D. Research/evaluation reports.

E. Maintenance data.

### 1.3 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.

B. Source Limitations: Obtain components for membrane roofing system from same manufacturer as roofing membrane.

C. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Exterior Fire-Test Exposure: Class C; ASTM E 108, for application and roof slopes indicated.

D. Preinstallation Conference: Conduct conference at Project site.

### 1.4 PROJECT CONDITIONS

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

## 1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.

1. Warranty Period: 15 years from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 EPDM ROOFING MEMBRANE

A. EPDM Roofing Membrane: ASTM D 4637, Type II, scrim or fabric internally reinforced uniform, flexible sheet made from EPDM, and as follows:

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

   a. Carlisle SynTec Incorporated.
   b. Celotex Corporation.
   c. ERSystems.
   d. Firestone Building Products Company.
   e. GenFlex Roofing Systems.
   f. International Diamond Systems.
   g. Johns Manville International, Inc.
   h. Mule-Hide Products Co., Inc.
   i. Protective Coatings, Inc.
   j. Roofing Products International, Inc.
   k. Stafast Roofing Products.
   l. Versico Inc.

3. Thickness: 60 mils (1.5 mm), nominal.
4. Exposed Face Color White-on-black.

## 2.2 AUXILIARY MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.

B. Sheet Flashing: 60-mil- (1.5-mm-) thick EPDM, partially cured or cured, according to application.

C. Bonding Adhesive: Manufacturer's standard bonding adhesive.

D. Seaming Material: Single-component butyl splicing adhesive and splice cleaner.

E. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.

F. Miscellaneous Accessories: Provide lap sealant, water cutoff mastic, metal termination bars, metal battens, pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

## 2.3 ROOF INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, 1.6-lb/cu. ft. (26-kg/cu. m) minimum density, square edged.

B. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48), unless otherwise indicated.

C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

## 2.4 INSULATION ACCESSORIES

A. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

B. Cold Fluid-Applied Adhesive: Manufacturer's standard cold fluid-applied adhesive formulated to adhere roof insulation to substrate.

C. Cover Board: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, 1/2 inch (13 mm) thick.

D. Cover Board: DOC PS 2, Exposure 1, oriented strand board, 7/16 inch (11 mm) thick.

E. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/4 inch (6 mm) thick.

## 2.5 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch (5 mm) thick, and acceptable to membrane roofing system manufacturer.

## PART 3 - EXECUTION

### 3.1 SUBSTRATE BOARD

A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.

1. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions.

### 3.2 INSULATION INSTALLATION

A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with membrane roofing system manufacturer's written instructions for installing roof insulation.

C. Install tapered insulation under area of roofing to conform to slopes indicated.

D. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 1 inch (25 mm) or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.

E. Loosely Laid Insulation: Loosely lay insulation units.

F. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:

1. Prime surface of concrete deck with asphalt primer at rate of 3/4 gal./100 sq. ft. (0.3 L/sq. m) and allow primer to dry.
2. Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F (14 deg C) of equiviscous temperature.
3. Set each layer of insulation in a cold fluid-applied adhesive.

G. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

H. Mechanically Fastened and Adhered Insulation: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.

2. Install subsequent layers of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F (14 deg C) of equiviscous temperature.
3. Install subsequent layers of insulation in a cold fluid-applied adhesive.

I. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Loosely butt cover boards together and fasten to roof deck.

1. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

## 3.3 ADHERED ROOFING MEMBRANE INSTALLATION

A. Install roofing membrane over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.

B. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

C. Bonding Adhesive: Apply bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry. Do not apply bonding adhesive to splice area of roofing membrane.

D. Mechanically or adhesively fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.

E. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.

F. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.

G. Repair tears, voids, and lapped seams in roofing that does not meet requirements.

## 3.4 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.

E. Terminate and seal top of sheet flashings.

## 3.5 WALKWAY INSTALLATION

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

B. Roof-Paver Walkways: Install walkway roof pavers according to manufacturer's written instructions in locations indicated, to form walkways. Leave 3 inches (75 mm) of space between adjacent roof pavers.

## 3.6 FIELD QUALITY CONTROL

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

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.

C. Repair or remove and replace components of membrane roofing system where test results or inspections indicate that they do not comply with specified requirements.

END OF SECTION 07531

# SECTION 07605 – FLASHING AND SHEET METAL, EXTRUDED METALS

## PART 1 - SUMMARY

### 1.1 SUMMARY

A. This Section includes flashing and sheet metal items, preformed or extruded metal items and elastomeric materials for wall and roof areas and specific items as follows:

a. Sheet Metal Items:
   1. Laminated through wall flashing.
   2. Counterflashings
   3. Scuppers
   4. Flashings through roofs

b. Elastomeric Materials and Products
   1. Sheet flashing

c. Miscellaneous materials
   1. Related work specified elsewhere
      a. Built-up roofing:

B. REFERENCES

1. Applicable Standards:

a. American Iron and Steel Institute (AISI).

b. American Society for Testing and Materials
   1. A167 – Stainless and Heat Resisting Chromium Nickel Steel Plate, Sheet, and Strip
   2. A446 – Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process, Structural (Physical) Quality
   3. A525 – Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process, General Requirements
   4. A526 – Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process, Commercial Quality
   5. B69 – Rolled Zinc
   6. B101 – Lead Coated Copper Sheet
   7. B209 – Aluminum and Aluminum Alloy Sheet and Plate
   8. B370 – Copper Sheet and Strip for Building Construction
   9. D41 – Asphalt Primer Used in Roofing and Waterproofing

c. Federal Specifications (FS):

1. QQ-L-201 – Lead Sheet
2. SS-C-153 – Cement, Bituminous, Plastic
3. TT-C-494 – Coating Compound, Bituminous, Solvent Type, Acid Resistant

d. National Roofing Contractors Association (NRCA).

e. Sheet Metal and air Conditioning Contractors' National Association (SMACNA)

C. SUBMITTALS

.1. Submit as specified in GENERAL CONDITIONS

2. Include, but not limited to, the following:

a. Product data and specifications of materials and installation

b. Catalog cuts

c. Shop drawings indicating thicknesses, dimensions, fastenings and anchoring methods, and expansion provisions where applicable.

D. DELIVERY, STORAGE AND HANDLING

1. Adequately package and protect materials during shipment and storage.

2. Store materials in dry, weathertight, ventilated areas and in accordance with manufacturers or fabricators instructions for each item.

3. Replace all damaged or permanently stained materials that cannot be restored to like-new condition.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

A. Zinc-Coated Steel Sheet:

a. Commercial quality carbon steel sheet with minimum of 0.20 percent copper content conforming to ASTM-A526; hot-dip-galvanized conforming to ASTM-A525, designation G90.

b. 26 gauge

c. Use for the following items:
   1. Sheet metal indicated
   2. Relief scuppers

B. Copper Sheet:

a. Cold-rolled copper sheet conforming to ASTM-B370, cold-rolled unless soft temper is required for forming.
b. 16 ounces per square foot
c. Use for the following items:
   1. Counterflashing

2.2 ELASTOMERIC MATERIALS

A. Sheet Flashing:

a. Flexible weather elements, self-extinguishing, -20 degree F brittleness temperature. 60-mil thickness minimum. Provide with applicable bonding adhesive.
b. Use for the following items:
   1. Vent stack flashing
   2. Perimeter-flashing where indicated
c. Manufacturers:
   1. B.F. Goodrich Company – B/W Flexible Flashing
   2. Perimeter flashing where indicated
   3. York Manufacturing, Inc. – Superflash Elastic Roof Flashing

B. Pipe and Conduit Penetrations Flashings:

a. Preformed EPDM and neoprene units with effective temperature range of 60 degrees F to +270 degrees F.
b. (Low-profile) (8-inch high) base
c. Provide with base and cap for proper opening size and number or openings required.
d. Provide with adhesive, adapters and clamp as required for complete and weathertight installation
e. Use for penetrations indicated
f. Manufacturer:
   1. York Manufacturing, Inc. – superflash Mult-Seal

## 2.3 MISCELLANEOUS MATERIALS

A. Solder and fasteners for metal work as recommended by sheet metal manufacturer and as required by installation.

B. Primers, adhesives, tapes and fasteners for nonmetallic work as recommended by flashing manufacturer and as required by installation.

C. Roofing cement to conform to FS-SS-C-153, (Type I – asphaltic) (Type II – coal tar)

D. Bituminous coating to conform to FS-TT-C-494, cold applied bituminous mastic, compounded for 15-mil dry film thickness.

# PART 3 - EXECUTION

## 3.1 GENERAL

A. Fabricate all metal work required by this section conforming to profiles and details indicated. Installation of items not shown in detail or not covered by specification shall meet standard industry practices as shown by SMACNA in the Architectural Sheet Metal Manual. (and NRCA in "Here's How to Make A Roof Drain.")

B. Coordinate the work with other work for the correct sequencing of items which make up the weatherproofing system.

C. Install sheet metal work with lines, arises and angles sharp and true. Exposed surfaces shall be free from visible wave, warp, buckle and tool marks.

D. Install all exterior flashing and sheet metal to make the work weathertight and with provisions for expansion and contraction.

## 3.2 PREPARATION

A. "Broom-clean" roof surfaces, nailers, blocking, tops of parapets and other areas receiving flashing or sheet metal work.

B. Tighten and realign loose wood nailers and blocking. Surfaces to receive sheet metal must be plumb and true, clean, smooth, dry and free from defects and projections which might affect the installation.

C. Clean reglets free of mortar, dirt, grease, and other foreign materials.

D. Straighten warped or bent metal sheets and preformed metal flashings.

3.3 FABRICATION AND INSTALLATION: Sheet metal and pre-painted fabricated metals products.

A. Through-Wall Scuppers and Overflow Scuppers in Masonry Walls:

a. Join liner to inside and outside flange, with flat-lock seams.

b. Extend flange 9-inches on top of roofing and r-inches in all other directions. Secure flange to nailer with nails spaced 6-inches oc.

c. Extend outside flange one-inch in all directions. Seal edges of flange with sealant placed between flange and wall face.

d. Counterflash top of inside flange.

B. Pipe Flashing through roof – 4-inches and Smaller:

a. Install at all locations where conduit, or small pipe projections penetrate the roof, except plumbing vents

b. Fabricate and in two pieces. Lap joints one=inch, fasten ad solders. Provide collar with flared top to fit projection, and a drawband. Install after base flashing is in place.

c. Seal around pipe collar with sealant.

C. Plumbing Vent Flashing through Roof: Install as indicated at locations where plumbing vents penetrate the roof.

3.4 INSTALLATION – ELASTOMERIC MATERIALS:

A. Sheet Flashing:

1. Install at all locations where small piping 2-inches in diameter or less and plumbing vents penetrate the roof.

2. Fabricate at least 14-inches larger than the outside diameter of pipe.

3. Cut a round hole in the center of flashing approximately ½ to 2/3 the outside diameter of the pipe.

4. Apply 1/8-inch layer of plastic flashing cement to built up roof and bottom 3-inches of pipe.

5. Install flashing over pipe and embed into flashing cement, ensuring adequate bond to roof and pipe.

6. Trowel-back over flashing edges and install a 4-inch wide strip of roofing felt centered over flashing edge. Cover felt strip with plastic cement.

B. Pipe and Conduit Penetrations:

1. Conform to manufacturer's installation instructions

2. Secure base flange to insulation in accordance with roof system specified.

3. Install cap, secure to base and to pipe or conduit with clamps to provide a weathertight installation.

3.5 REPAIRING AND CLEANING:

A. As work progresses, clean surfaces of all dirt, grease, oils, flux, excess adhesives, sealants, and foreign substances.

B. Leave work clean and free of stains, dents, waves, scratch marks and solder or weld marks.

C. Scratches, abrasions and minor surface defects of finish may be repaired in accordance with the manufacturer's instructions and as approved. Repaired surfaces shall be uniform and free from blemishes, and from variations of color and surface texture.

END OF SECTION 07605

# SECTION 07920 - JOINT SEALANTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes sealants for the following:

1. Exterior joints in vertical surfaces.
2. Exterior joints in horizontal traffic surfaces.
3. Interior joints in vertical surfaces and horizontal nontraffic surfaces.
4. Interior joints in horizontal traffic surfaces.

### 1.2 SUBMITTALS

A. Product Data: For each joint sealant product indicated.

B. Samples: For each joint sealant product indicated.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

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

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.

### 2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: As indicated or as selected by Architect from manufacturers full range for this characteristic.

### 2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants, General: ASTM C 920.

B. Low-Modulus Nonacid-Curing Silicone Sealant:

1. Available Products:

a. Dow Corning; 790.
b. GE Silicones; Silpruf, UltraPruf SCS2300.
c. NUCO Industries, Inc.; HiFlex 331, NuFlex 309.
d. Ohio Sealants, Inc.; VP 275.
e. Pecora Corporation; 864, 890.
f. Polymeric Systems, Inc.; PSI-641.
g. Sonneborn Building Products Div., ChemRex Inc.; Omniseal.
h. Tremco; Spectrem 1.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Exposure: Use NT (nontraffic).
5. Substrates: Uses M, G, A, and, as applicable to joint substrates indicated, O.

C. Medium-Modulus Neutral-Curing Silicone Sealant:

1. Available Products:

a. Dow Corning; 791, 795.
b. NUCO Industries, Inc.; HiFlex 393.
c. Polymeric Systems, Inc.; PSI-631.
d. Schnee-Morehead, Inc.; SM5731, SM5733 Poly-Glaze.
e. Tremco; Spectrem 2,Tremsil 600.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Exposure: Use NT (nontraffic).
5. Substrates: Uses M, G, A, and, as applicable to joint substrates indicated, O.

D. Multicomponent Nonsag Urethane Sealant:

1. For joints not subject to traffic and requiring additional movement capability, provide the following:

a. Available Products:

1) Mameco International; Vulkem 922.
2) Pecora Corporation; Dynatrol II.
3) Polymeric Systems, Inc.; Flexiprene 2000.
4) Sika Corporation; Sikaflex - 2c NS.
5) Tremco; DYmeric 511.

b. Type and Grade: M (multicomponent) and NS (nonsag).
c. Class: 25.
d. Additional Movement Capability: 50 percent movement in extension and 50 percent in compression when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719.
e. Exposure: Use NT (nontraffic).
f. Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

2. For joints subject to traffic and nontraffic joints, provide the following:

a. Available Products:

1) Bostik Inc.; Chem-Calk 2641.
2) Mameco International; Vulkem [227] [922].
3) Pacific Polymers, Inc.; Elasto-Thane 920 Gun Grade.
4) Pecora Corporation; Dynatred.
5) Polymeric Systems, Inc.; PSI-270.
6) Sonneborn Building Products Div., ChemRex Inc.; NP 2.

b. Type and Grade: M (multicomponent) and NS (nonsag).
c. Class: 25.
d. Exposure: Use T (traffic) and NT (nontraffic).
e. Substrates: Uses M, G, A, and, as applicable to joint substrates indicated, O.

## 2.4 SOLVENT-RELEASE JOINT SEALANTS

A. Butyl-Rubber-Based Solvent-Release Joint Sealant: ASTM C 1085.

1. Available Products:

a. Bostik Inc.; Bostik 300.
b. H.B. Fuller Company; PTI 707, 757.
c. NUCO Industries, Inc.; NuFlex 232.
d. Pecora Corporation; BC-158.
e. Polymeric Systems, Inc.; PSI-301.
f. Sonneborn Building Products Div., ChemRex, Inc.; Sonneborn Multi-Purpose Sealant.
g. Tremco; Tremco Butyl Sealant.

## 2.5 LATEX JOINT SEALANTS

A. Latex Sealant: ASTM C 834.

1. Available Products:

a. Bostik Inc.; Chem-Calk 600.
b. NUCO Industries, Inc.; NuFlex 330.
c. Ohio Sealants, Inc.; LC 160 All Purpose Acrylic Caulk.
d. Pecora Corporation; AC-20.
e. Polymeric Systems, Inc.; PSI-701.
f. Sonneborn Building Products Div., ChemRex, Inc.; Sonolac.
g. Tremco; Tremflex 834.

## 2.6 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

1. Type: C (closed-cell material with a surface skin), O (open-cell material), B, (bicellular material with a surface skin), C, O, or B.

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F (minus 32 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

## 2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.

1. Remove foreign material from joint substrates that could interfere with adhesion of joint sealant.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues could interfere with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

D. Sealant Installation: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

E. Install sealant backings to support sealants during application and at position required to produce optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

F. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.

G. Place sealants so they directly contact and fully wet joint substrates.

1. Completely fill recesses provided for each joint configuration.
2. Produce uniform, cross-sectional shapes and depths that allow optimum sealant movement capability.

H. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.
2. Use tooling agents that are approved by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Joint Configuration: Concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

I. Clean excess sealants or sealant smears adjacent to joints as installation progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

## 3.2 JOINT SEALANT SCHEDULE

A. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:

1. Control and Expansion Joints in Cast-in-Place Concrete: Single component neutral cure silicone sealant.

2. Joints between Metal Panels: Neutral cure silicone sealant.

3. Perimeter Joints between Materials Listed above and Frames of Doors and Windows: Single component neutral cure silicone sealant.

B. Exterior joints in the following horizontal traffic surfaces:

1. Control, Expansion, and Isolation Joints in Cast-in-Place Concrete Slabs: multi-component nonsag urethane sealant.

C. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:

1. Perimeter Joints between Interior Wall Surfaces and Frames of Interior Doors and Windows: Latex sealant.
2. Joints between Plumbing Fixtures and Adjoining Walls, Floors, and Counters: Butyl-rubber sealant.

D. Interior joints in the following horizontal traffic surfaces:

1. Control and Expansion Joints in Cast-in-Place Concrete Slabs: multi-component nonsag urethane sealant.

END OF SECTION 07920

# SECTION 08110 - STEEL DOORS AND FRAMES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Steel doors.
2. Steel door frames.
3. Fire-rated door and frame assemblies.

B. Related Sections include the following:

1. Division 4 Section "Unit Masonry" for installing anchors and grouting frames in masonry construction.
2. Division 8 Section "Door Hardware " for door hardware and weather stripping.
3. Division 9 Section "Painting" for field painting factory-primed doors and frames.

### 1.2 DEFINITIONS

A. Steel Sheet Thicknesses: Thickness dimensions, including those referenced in ANSI A250.8, are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic-coated steel sheets.

### 1.3 SUBMITTALS

A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.

B. Shop Drawings: Show the following:

1. Elevations of each door design.
2. Details of doors including vertical and horizontal edge details.
3. Frame details for each frame type including dimensioned profiles.
4. Details and locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, accessories, joints, and connections.

C. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.

### 1.4 QUALITY ASSURANCE

A. Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect. Remove and replace damaged items that cannot be repaired as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4-inch- (100-mm) high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch (6-mm) spaces between stacked doors to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Steel Doors and Frames:

a. Amweld Building Products, Inc.
b. Benchmark Commercial Doors; a division of General Products Co., Inc.
c. Ceco Door Products; a United Dominion Company.
d. Curries Company.
e. Deansteel Manufacturing, Inc.
f. Kewanee Corporation (The).
g. Mesker Door, Inc.
h. Pioneer Industries Inc.
i. Republic Builders Products.
j. Steelcraft; a division of Ingersoll-Rand.

2.2 MATERIALS

A. Metallic-Coated Steel Sheets: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with an A40 (ZF120) zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.

2.3 DOORS

A. General: Provide doors of sizes, thicknesses, and designs indicated.

B. Exterior and Interior Doors: Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:

1. Level 4 and Physical Performance Level A (Maximum Duty), Model 2 (Seamless).

## 2.4 FRAMES

A. General: Provide steel frames for doors that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.

B. Frames of 0.093-inch- (2.3-mm-) thick steel sheet for:

1. Level 4 steel doors.

C. Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.

D. Plaster Guards: Provide 0.016-inch- (0.4-mm-) thick, steel sheet plaster guards or mortar boxes to close off interior of openings; place at back of hardware cutouts where mortar or other materials might obstruct hardware operation.

E. Supports and Anchors: Fabricated from not less than 0.042-inch- (1.0-mm-) thick, electrolytic zinc-coated or metallic-coated steel sheet.

1. Wall Anchors in Masonry Construction: 0.177-inch- (4.5-mm-) diameter, steel wire complying with ASTM A 510 (ASTM A 510M) may be used in place of steel sheet.

F. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153/A 153M, Class C or D as applicable.

## 2.5 FABRICATION

A. General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.

B. Door Construction: For all exterior locations, fabricate doors, panels, and frames from galvannealed metallic-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053-inch- (1.3-mm-) thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.

C. Core Construction: One of the following manufacturer's standard core materials that produce a door complying with SDI standards:

1. Polyurethane.
2. Polystyrene.

D. Single-Acting, Door-Edge Profile: Square edge.

E. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

F. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.

G. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

H. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.

1. For concealed overhead door closers, provide space, cutouts, reinforcement, and provisions for fastening in top rail of doors or head of frames, as applicable.

I. Frame Construction: Fabricate frames to shape shown.

1. Fabricate frames with mitered or coped and continuously welded corners and seamless face joints.
2. Provide welded frames with temporary spreader bars.

J. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.

K. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

## 2.6 FINISHES

A. Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

B. Placing Frames: Comply with provisions in SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

1. Except for frames located in existing walls or partitions, place frames before construction of enclosing walls and ceilings.

2. In masonry construction, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.
3. Install fire-rated frames according to NFPA 80.

C. Door Installation: Comply with ANSI A250.8. Fit hollow-metal doors accurately in frames, within clearances specified in ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/DHI A115.1G.

3.2 ADJUSTING AND CLEANING

A. Prime-Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-drying primer.

B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION 08110

# SECTION 08210 - WOOD DOORS

## PART 1 - GENERAL

A. SUMMARY:
1. This Section includes wood doors and accessories.
2. Related Work Specified Elsewhere:
a. Finish Hardware: SECTION 08710.
b. Protective Coatings: SECTION 09900.

B. REFERENCES:
1. Applicable Standards:
a. Architectural Woodwork Institute (AWI):
(1) Architectural Woodwork Quality Standards, Guide Specifications and Quality Certification Program - Section 1300: Architectural Flush Doors.
b. Door and Hardware Institute (DHI):
(1) Abbreviations and Symbols.
(2) Recommended Procedure for Processing Hardware Schedules and Templates.
(3) Wood Door Standards Series W1/W5 and Series WDHS-1/WDHS-3.
c. National Woodwork Manufacturer's Association (NWMA):
(1) I.S.-1 - Wood Flush Doors.
d. National Fire Protection Association (NFPA):
(1) No. 80 - Standards for Fire Doors and Windows.
e. Underwriters' Laboratories (UL).
(1) Building Materials Directory.

C. SUBMITTALS:
1. Submit as specified in GENERAL CONDITIONS.
2. Includes, but not limited to, the following:
a. Product data and specifications.
b. Details, elevations.
c. Door schedule showing type, size, swing, undercut.
3. Certificates:
a. Include certifications as may be required to show compliance with specifications.

D. QUALITY ASSURANCE:
1. Acceptable products are those which comply with the acceptance criteria and recommended standards of the above References, and which satisfy the performance requirements specified in PART 2 - MATERIALS and as indicated.
2. All doors, regardless of core types specified, shall be products of a single manufacturer.

3. This is a performance specification. Manufacturers products expected to conform to work of this section are specified in PART - 2. Product to designations and descriptions of individual manufacturers are given for purposes of reference. Acceptability of products depends on conference with features, characteristics, and performance parameters specified herein as indicated.

E. GUARANTEES:

1. Submit 2 copies of written guarantee on door manufacturer's standard form signed by the manufacturer, installer and Contractor.
2. Length of guarantee shall be as follows:
   a. Solid-core exterior doors: Two years.

F. DELIVERY, STORAGE AND HANDLING:

1. Provide protective covering at the factory prior to shipping. Mark with identification required for proper installation.
2. Store flat on a level surface on a minimum of three sleepers raised above floor surface in a well ventilated building to prevent warping, soiling, damage and deterioration. Cover to keep clean, but allow air circulation.
3. Store in area where there will be no abnormal heart, extreme dryness, humid conditions or sudden changes therein. Condition to average prevailing relative humidity before hanging.

## PART 2 - PRODUCTS

A. GENERAL:

1. Door construction types are identified in accordance with criteria established in AWI Quality Standards, Guide Specifications and Quality Certification Program.
2. Specification particulars regarding types of materials, dimensions, tolerance, term definitions, and construction methods shall conform to NWMA Industry Standard - Wood Flush Doors, ANSI/NWMA I.S.-1.
3. Hardware preparations shall conform to Door and Hardware Institute (DHI) W1/W5 and WDHS-1/WDHS-5 Wood Door Hardware Standards. Mineral core wood fire doors are specified in Finish Hardware to receive half-surface hinges. In the event such doors are provided with the Cal-Wood SLM Edge System, so advise the builders hardware supplier for conversion to full-mortise hinges.

B. TYPES:

1. Exterior Type Solid Core:
   a. SLC, stiles edge-glued, rails edge-glued or tongue-in-groove, glued staved lumber core; 5-ply minimum construction. Glue Bond Type I, waterproof for face assembly.
   b. Provide flashing and/or chemical treatment as required to obtain the specified warranty of 2 years.

c. Manufacturers:
(1) Algoma: Grade SLC.
(2) Cal-Wood: ILC.
(3) Eggars: Master Flush - Stave.
(4) Graham: GSLC.
(5) Mohawk: Architectural Grade Bonded Stave.
(6) Oshkosh: Edge Glued SLC.
(7) Weyerhauser: DSC-1.

C. VENEERS: Exposed Surfaces of Stain Finish: NEMA good grade of oak species. Rotary sliced. Random match face veneer joints. (Sharp contrast note permitted at veneered joints.) Exposed edges of manufacturer's standard hardwood. Plain stiles or manufacturer's thicknesss stile edgebands of species affording color compatibility with face veneers.

D. VISION PANELS:
1. Flush moldings and glass stops of hardwood (same as face veneer where transparent finish specified).
2. Provide metal flashing and lipped moldings for exterior doors.

E. PREFITTING AND PREPARATION FOR HARDWARE:
1. The utility or structural strength of the door must not be impaired in the fitting of the door, application of hardware, or cutting the door for lights, louvers, panels or other special details.
2. Comply with the tolerance requirements of NWMA for prefitting. Machine doors for hardware requiring cutting of doors. Comply with final hardware schedules and door frame shop drawings, and with final hardware templates and other essential information required to ensure proper fit of doors and hardware.
3. (Fire-rated doors and plastic laminated doors shall be factory prefit and premachined). (All doors shall be prefit and premachined).
4. Check hardware layout templates and take accurate field measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with any field preparations.

F. SHOP TRANSPARENT FINISH:
1. Where transparent finish is specified, prefinish all doors at the factory.
2. Comply with recommendations of AWI factory finishing of doors.
3. Provide finish of varnish type, clear, and standard of the manufacturer.

G. SHOP AND FIELD STAIN FINISH: Apply all finish coats as specified in SECTION 09901 before installing door.

PART 3 - EXECUTION

A. PREPARATION:

1. Condition doors to average prevailing relative humidity prior to hanging.

B. INSTALLATION:

1. Conform to manufacturer's printed instructions and as indicated.
2. Fit doors to frame and machine for hardware as required for proper fit and uniform clearance at each edge. Seal cut surfaces after fitting and machining.
3. Provided clearances of:
   a. 1/8-inch at jambs and heads.
   b. 1/8-inch at meeting stiles for pairs of doors.
   c. 1/2-inch from bottom of door to top of floor covering, except1/8-inch from bottom of door to top of threshold.
4. Restore finish on edges of shop-finished doors before installation, if fitting and machining is required at the jobsite.

C. ADJUSTMENT AND CLEANING:

1. Adjust doors for proper operation and fit.
2. Rehang or replace doors which do not swing or operate freely.
3. Restore finish or replace doors damaged during or after installation, as required by County.
4. Protect doors from damage or deterioration after installation until acceptance of the Work.

END OF SECTION 08210

# SECTION 08311 - ACCESS DOORS AND FRAMES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Wall access doors and frames.
2. Ceiling access doors and frames.

### 1.2 SUBMITTALS

A. Product Data: For each type of door and frame indicated. Include construction details relative to materials, individual components and profiles, finishes, and fire ratings (if required) for access doors and frames.

B. Schedule: Provide complete door and frame schedule, including types, general locations, sizes, construction details, latching or locking provisions, and other data pertinent to installation.

### 1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain doors and frames through one source from a single manufacturer.

B. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are labeled and listed by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction:

C. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

### 1.4 COORDINATION

A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed equipment, and indicate on schedule specified in "Submittals" Article.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Access Doors:
   a. Jensen Industries.
   b. J. L. Industries, Inc.
   c. Karp Associates, Inc.
   d. Milcor Limited Partnership.
   e. Nystrom Building Products Co.
   f. Williams Bros. Corporation of America (The).

## 2.2 MATERIALS

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

B. Hot-Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B; free of scale, pitting, and surface defects; pickled and oiled; with minimum thickness indicated representing specified nominal thickness according to ASTM A 568/A 568M.

C. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified nominal thickness according to ASTM A 568/A 568M. Electrolytic zinc-coated steel sheet, complying with ASTM A 591/A 591M, Class C coating, may be substituted at fabricator's option.

D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), with Class C coating and phosphate treatment to prepare surface for painting; with minimum thickness indicated representing specified nominal thickness according to ASTM A 568/A 568M for uncoated base metal.

E. Drywall Beads: Edge trim formed from 0.0299-inch (0.76-mm) zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of .

## 2.3 PAINT

A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in 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.

## 2.4 ACCESS DOORS AND FRAMES

A. Flush Access Doors and Frames with Exposed Trim: Fabricated from steel sheet.

1. Locations: Concrete masonry wall and metal or plaster ceiling surfaces.
2. Door: Minimum 0.060-inch- (1.5-mm-) thick sheet metal, set flush with exposed face flange of frame.
3. Frame: Minimum 0.060-inch- (1.5-mm-) thick sheet metal with 1-inch- (25-mm-) wide, surface-mounted trim.
4. Hinges: Continuous piano hinge.
5. Latch: Screwdriver-operated cam latch.

## 2.5 FABRICATION

A. General: Provide access door assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Steel Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.

1. Exposed Flanges: Nominal 1 inch (25 mm) wide around perimeter of frame.
2. For trimless frames with drywall bead for installation in gypsum board assembly, provide edge trim for gypsum board securely attached to perimeter of frames.
3. Provide mounting holes in frames to attach frames to metal or wood framing in drywall construction.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

## 2.6 FINISHES, GENERAL

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

B. Finish metal fabrications after assembly.

## 2.7 STEEL FINISHES

A. Surface Preparation: 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. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

B. Apply shop primer to uncoated surfaces of metal fabrications. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

# PART 3 - EXECUTION

## 3.1 PREPARATION

A. Advise installers of other work about specific requirements relating to access door and floor door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices.

## 3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Install access doors with trimless frames flush with adjacent finish surfaces or recessed to receive finish material.

## 3.3 ADJUSTING AND CLEANING

A. Adjust doors and hardware after installation for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08311

# SECTION 08334 - OVERHEAD COILING GRILLES

## PART 1 - SUMMARY

### 1.1 GENERAL

A. Performance Requirements: Design overhead coiling grille components and operator to operate for not less than 10,000 cycles. One complete cycle of a grille begins with the grille in the closed position. The grille is then moved to the open position and back to the closed position.

B. Submittals: Submit manufacturer's product data, rough-in diagrams, templates, and installation instructions for each type of product specified, include operating instructions and maintenance data.

C. Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled as defined in NFPA 70, Article 100.

D. Furnish each overhead coiling grille as a complete unit produced by one manufacturer, including hardware, accessories, mounting, and installation components.

E. Related Sections include the following:

1. Division 8 Section "Door Hardware" for lock cylinders and keying.

2. Division 16 Sections for electrical service and connections for powered operators and accessories.

## PART 2 PRODUCTS

### 2.1 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alpine Overhead Doors, Inc.
2. Atlas Door Corp.; Div. of Clopay Building Products Co.
3. The Cookson Company.
4. McKeon Rolling Steel Door Company, Inc.
5. Overhead Door Corporation.

B. Grille Curtain: Consisting of a network of 5/16-inch- (8-mm-) minimum diameter horizontal rods, or rods covered with tube spacers, spaced as indicated. Interconnect rods by vertical links approximately 5/8 inch (16 mm) wide, spaced as indicated and rotating on rods.
1. Space rods at approximately 2 inches (51 mm) o.c.
2. Space links in line at approximately 6 inches (152 mm).
3. Stainless-Steel Grilles: ASTM A 666, Type 300 series.

a. Endlocks: Continuous end links, chains, or other devices at ends of rods, locking and retaining grille curtain in guides against excessive pressures, maintaining curtain alignment, and preventing lateral movement.

b. Bottom Bar: Consisting of extruded shape or 2 angles, not less than 1/8 inch (3 mm) thick, metal to match slats.

   i. Astragal: Provide a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene at underside of bar.
   ii Provide motor-operated grilles with combination bottom astragal and sensor edge.

c. Curtain Jamb Guides: Manufacturer's standard extruded-aluminum shape, with continuous integral wear strips and removable stops on guides.

d. Hood: Metal to match slats. Manufacturer's standard metal thickness and hood shape. Provide closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sag. Furnish removable metal soffit when hood is mounted above ceiling of same material and finish as slats.

   i. Lock cylinder is specified in another Division 8 Section.

e. All grille units are power operated, provide safety interlock switch to disengage power supply when grille is locked.

f. Counterbalance: Adjustable, oil-tempered, heat-treated steel helical torsion springs mounted around structural carbon-steel pipe, and contained in barrel of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. (2.5 mm/m) of span under full load. With grease-sealed bearings or self-lubricating graphite bearings.

g. Brackets: Manufacturer's standard design, either cast-iron or cold-rolled steel plate.

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

i. Stainless-Steel Finish: No. 4.

j. Electric Grille Operator: Type, size, and capacity recommended and provided by grille manufacturer for grille and operational life specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking grille, disconnect device, emergency auxiliary operator, and accessories required for proper operation. Comply

with NFPA 70. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.

i. Electric Motors: Provide polyphase, medium-induction type with high-starting torque, reversible, continuous-duty, Class A insulated, electric motors, complying with NEMA MG 1, with overload protection, sized to start, accelerate, and operate grille in either direction, from any position, at not less than 2/3 fps (0.2 m/s) or more than 1 fps (0.3 m/s), without exceeding nameplate ratings or considering service factor. Coordinate wiring requirements and electric characteristics of motors with building electrical system.

   1. Provide totally enclosed, nonventilated or fan-cooled motors, fitted with plugged drain, and controller with NEMA ICS 6, Type 4 enclosure where indicated.

ii. Remote-Control Station: Provide key-operated momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."

   1. Provide interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
   2. Control Equipment must interface with building Access Control System, requiring card reader approval before system will open grille.

iii. Obstruction Detection Device: Provide each motorized grille with self-monitoring, 4-wire-configured-type, electrically actuated, external automatic safety sensor able to protect full width of grille opening. Activation of sensor immediately stops and reverses downward grille travel.

iv. Adjustable Limit Switches: Interlocked with motor controls and set to automatically stop grille at fully opened and fully closed positions.

k. Provide electric operators with ADA-compliant audible alarm and visual indicator lights.

l. Emergency Egress Release: Provide grille with flush, wall-mounted handle mechanism, for ADA-compliant egress feature, not dependant on electric power, that allows grill to open to permit passage and automatically resets motor drive, without affecting limit switches, with return of handle to original position.

PART 3 EXECUTION

## 3.1 EXECUTION

A. Installation: Install grille and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified.

B. Lubricate bearings and sliding parts; adjust grilles to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

END OF SECTION 08334

# SECTION 08411 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Exterior aluminum-framed storefronts.

   a. Glazing is retained mechanically with gaskets on four sides.

2. Exterior manual-swing aluminum doors.

B. Related Sections include the following:

1. Division 7 Section "Joint Sealants" for installation of joint sealants installed with aluminum-framed systems and for sealants to the extent not specified in this Section.
2. Division 8 Section "Door Hardware" for hardware to the extent not specified in this Section.
3. Division 8 Section "Glazing" for glazing requirements to the extent not specified in this Section.

### 1.2 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:

1. Structural loads.
2. Thermal movements.
3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
4. Dimensional tolerances of building frame and other adjacent construction.
5. Failure includes the following:

   a. Deflection exceeding specified limits.
   b. Thermal stresses transferred to building structure.
   c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
   d. Glazing-to-glazing contact.
   e. Noise or vibration created by wind and thermal and structural movements.
   f. Loosening or weakening of fasteners, attachments, and other components.
   g. Sealant failure.
   h. Failure of operating units to function properly.

B. Structural Loads:

1. Wind Loads: 30 psf/90 mph whichever is greater applied in accordance with IBC 2003.

2. Seismic Loads: Per Chapter 16, IBC 2003.

C. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches (4.1 m) and to 1/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 13 feet 6 inches (4.1 m) or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.

D. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

E. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. (0.03 L/s per sq. m) of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft. (75 Pa).

F. Water Penetration Under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).

G. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 53 when tested according to AAMA 1503.

## 1.3 SUBMITTALS

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

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.

1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. Include details of provisions for system expansion and contraction and for draining moisture occurring within the system to the exterior.
3. For entrances, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

C. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

D. Warranties: Special warranties specified in this Section.

## 1.4 QUALITY ASSURANCE

A. Installer Qualifications: Capable of assuming engineering responsibility and performing work of this Section and who is acceptable to manufacturer.

1. Engineering Responsibility: Preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer's standard assemblies.

## 1.5 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating aluminum-framed systems without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

## 1.6 WARRANTY

A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Structural failures including, but not limited to, excessive deflection.
   b. Noise or vibration caused by thermal movements.
   c. Deterioration of metals and other materials beyond normal weathering.
   d. Water leakage through fixed glazing and framing areas.
   e. Failure of operating components to function properly.

2. Warranty Period: One year from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Arch Aluminum & Glass Co., Inc.
2. CMI Architectural Products, Inc.
3. Kawneer.
4. United States Aluminum.

5. Vistawall Architectural Products.
6. YKK AP America Inc.

## 2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209 (ASTM B 209M).
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.

B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

## 2.3 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Framing members are composite assemblies of two separate extruded-aluminum components permanently bonded by an elastomeric material of low thermal conductance.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.

E. Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to

match framing and of sufficient thickness to maintain a flat appearance without visible deflection.

F. Framing System Gaskets and Sealants: Manufacturer's standard recommended by manufacturer for joint type.

## 2.4 GLAZING SYSTEMS

A. Glazing: As specified in Division 8 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types, replaceable, molded or extruded, that maintain uniform pressure and watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric types.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

## 2.5 DOORS

A. Doors: Manufacturer's standard glazed doors, for manual swing operation.

1. Door Construction: 2-inch (50.8-mm) overall thickness, with minimum 0.188-inch- (4.8-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie rods.

2. Door Design: Medium stile; 3-1/2-inch (88.9-mm) nominal width.

   a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches (255 mm) above floor or ground plane.

3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.

   a. Provide nonremovable glazing stops on outside of door.

## 2.6 DOOR HARDWARE

A. General: Provide heavy-duty units in sizes and types recommended by entrance system and hardware manufacturers for entrances and uses indicated.

1. Opening-Force Requirements:

   a. Egress Doors: Not more than 30 lbf (133 N) required to set door in motion and not more than 15 lbf (67 N) required to open door to minimum required width.
   b. Accessible Interior Doors: Not more than 5 lbf (22.2 N).

B. Scheduled Door Hardware: Provide door hardware according to the Door Hardware Schedule below.

1. References to BHMA Standards: Provide products complying with standards referenced in this Article and with requirements for description, quality, type, and function listed in the Door Hardware Schedule.

2. Hardware set for exterior doors to include 11/2 pair ball bearing butts, tubular push / pulls, hookbolt lock device with interior thumbturn and cylinder per section 08710, strike box, surface mounted overhead closer, weather stripping, weather sweep, and threshold.

C. Ball-Bearing Butts:

1. Standard: BHMA A156.1, Grade 1, radius corner.
2. Provide nonremovable pins at hinges exposed to outside of door.
3. Provide nonferrous hinges where hinges are exposed to weather.
4. Quantities:

a. For doors with heights up to 87-inches 2210 mm, provide 3 hinges per leaf.

D. Locking Devices, General: Do not require use of key, tool, or special knowledge for operation.

1. Opening-Force Requirements:

a. Latches and Exit Devices: Not more than 15 lbf (67 N) required to release latch.

2. Locking device to be Adams-Rite MS 1853A-50 hookbolt, standard backset.

E. Cylinders: As specified in Division 8 Section "Door Hardware."

F. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

G. Closers: With accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use, and adjustable to meet field conditions and requirements for opening force.

1. Standard: BHMA A156.4, Grade 1.

H. Weather Stripping: Manufacturer's standard replaceable components.

1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
2. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

I. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

J. Thresholds: Raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch (13 mm).

1. Standard: BHMA A156.21.

K. Push / Pulls: C style pulls of 1" diameter extruded aluminum, 90 degree offset, 9" on center mounting (concealed), projection 2 ¾ " from door face, US32D stainless finish. Bar style horizontal push of 1" diameter extruded aluminum, bent at each end, concealed mounting, projection 2 ¾" from door face, US32D stainless finish.

## 2.7 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 7 Section "Joint Sealants."

B. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

## 2.8 FABRICATION

A. Form aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from interior.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing (without projecting stops).

E. Door Frames: Reinforce as required to support loads imposed by door operation and for installing hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.
2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

F. Doors: Reinforce doors as required for installing hardware.

1. At exterior doors, provide weather sweeps applied to door bottoms.

G. Hardware Installation: Factory install hardware to the greatest extent possible. Cut, drill, and tap for factory-installed hardware before applying finishes.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.9 ALUMINUM FINISHES

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. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

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

## 3.2 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight, unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, without warp or rack.

F. Install glazing as specified in Division 8 Section "Glazing."

G. Entrances: Install to produce smooth operation and tight fit at contact points.

1. Exterior Entrances: Install to produce tight fit at weather stripping and weathertight closure.
2. Field-Installed Hardware: Install surface-mounted hardware according to hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install perimeter joint sealants as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.

I. Erection Tolerances: Install aluminum-framed systems to comply with the following maximum tolerances:

1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.
2. Alignment:

   a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm).
   b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).

3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).

## 3.3 ADJUSTING

A. Entrances: Adjust operating hardware for smooth operation according to hardware manufacturers' written instructions.

1. For doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches (75 mm) from the latch measured to the leading door edge.

END OF SECTION 08411

# SECTION 08461 - SLIDING AUTOMATIC ENTRANCE DOORS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes automatic entrance door systems with bi-parting sliding operation.

B. See Division 8 Section "Aluminum Entrances and Storefront" for adjacent related work.

C. See Division 8 Section "Door Hardware" for lock cylinders.

D. See Division 8 Section "Glazing" for glazing requirements for automatic entrance doors.

### 1.2 PERFORMANCE REQUIREMENTS

A. General: Provide automatic entrance door systems that have the following capabilities based on testing manufacturer's standard units in assemblies similar to those indicated for this Project:

1. Operating Temperature Range: Door operators capable of operating between minus 10 deg F and plus 120 deg F (minus 23 deg C and plus 49 deg C).
2. Maximum Opening Force:

   a. Exterior Doors: 15 lbf (67 N).
   b. Interior Doors: 5 lbf (22.2 N).

### 1.3 SUBMITTALS

A. Product Data: For each type of sliding automatic entrance door indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, wiring diagrams, and attachments to other Work.

C. Hardware Schedule: Organize schedule into sets based on hardware specified. Include name of item and manufacturer, and complete designation of every item required for each automatic entrance door.

D. Samples: For each exposed finish and for each color and texture required.

E. Product Certificates: Certifying that products furnished comply with emergency exit door requirements.

F. Maintenance data.

### 1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer, approved by manufacturer to install and maintain manufacturer's products.

B. Manufacturer's Certificate: Issued by the American Association of Automatic Door Manufacturers.

C. Welding Standards: Comply with AWS D1.2, "Structural Welding Code--Aluminum."

D. ANSI/BHMA Standard: ANSI/BHMA A156.10, "Power Operated Pedestrian Doors."

E. UL Standard: Provide power door operators that comply with UL 325.

F. Emergency Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrance doors serving as a required means of egress.

## 1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturers agrees to repair or replace components of automatic entrance door system that fail in materials or workmanship, excessive air leakage, faulty operation of operators and hardware, or deterioration of metals, metal finishes, and other materials beyond normal weathering within three years from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Besam Inc.
2. Horton Automatics; Div. of Overhead Door Corporation.
3. KM Systems, Inc.

## 2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Extruded: ASTM B 221 (ASTM B 221M).
2. Sheet and Plate: ASTM B 209 (ASTM B 209M).
3. Welding Rods and Bare Electrodes: AWS A5.10.

B. Glazing: As specified in Division 8 Section "Glazing."

C. Sealants and Joint Fillers: Refer to Division 7 Section "Joint Sealants" for joints at perimeter of entrance system.

D. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, premixed, nonmetallic, noncorrosive, nonstaining grout; of consistency suitable for application.

E. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30-mil (0.76-mm) thickness per coat.

## 2.3 AUTOMATIC ENTRANCE DOOR SYSTEM

A. General: Manufacturer's standard automatic entrance door system, complete with doors, sidelite and transom framing, operators, controls, activation devices, safety devices, and accessories as indicated.

1. Configuration: Bi-parting sliding doors, with sidelite on each side of door.

   a. Traffic Pattern: Two-way.
   b. Emergency Breakaway Capability
   c. Mounting: Between jambs.

B. Activation Devices:

1. Infrared-scanner presence detector.

C. Operator Safety Devices:

1. Photoelectric beams.

## 2.4 COMPONENTS

A. Doors: Manufacturer's standard 1-3/4-inch- (44.5-mm-) thick glazed doors with minimum 0.125-inch- (3.2-mm-) thick, extruded tubular stile and rail members. Fabricate corners with mechanically fastened reinforcing brackets or by welding. Incorporate concealed tie-rods that span full length of top and bottom rails.

1. Glazing Stops and Gaskets: Manufacturer's standard snap-on, extruded-aluminum, bevel glazing stops and preformed resilient glazing gaskets.
2. Stile Design: Medium stile.
3. Rail Design: 6-1/2-inch (165-mm) nominal height, 10 inch minimum at sill member.
4. Muntin Bars: Horizontal tubular rail member for each door; match stiles and rails.

B. Framing Members: Fabricate from extruded aluminum or formed-aluminum sheet or plate.

1. Main Extrusions: Minimum wall thickness of 0.125 inch (3.2 mm).
2. Extruded Glazing Stops and Applied Trim: Minimum wall thickness of 0.062 inch (1.6 mm).
3. Muntin Bars: Horizontal tubular rail members for sidelites; match stiles and rails.

C. Headers: Fabricated from minimum 0.125-inch- (3.2-mm-) thick, extruded aluminum or formed-aluminum sheet or plate. Conceal operator and roller track in header, providing access by means of hinged or removable access panel to permit service and adjustment. Secure panel to prevent unauthorized access.

1. Header Type: Concealed, fabricated to match depth of framing and to extend full width of door opening.

D. Carrier Assembly and Overhead Roller Track: Manufacturer's standard carrier assembly that allows vertical adjustment; consisting of nylon- or delrin-covered ball-bearing-center steel wheels operating on a continuous roller track, or ball-bearing-center steel wheels operating on a nylon- or delrin-covered continuous roller track. Support doors from carrier assembly by cantilever and pivot assembly.

1. Rollers: Minimum two ball-bearing roller wheels and two antirise rollers for each active leaf.

E. Sills: Manufacturer's standard sill members and bottom guide system, with stainless-steel ball-bearing-center roller wheels, and threshold and configuration indicated below:

1. Configuration: Saddle type threshold across door opening and pin-guide track system at sidelites.

F. Brackets and Reinforcements: Manufacturer's standard; compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.

G. Fasteners and Accessories: Manufacturer's standard corrosion resistant, nonstaining, nonbleeding; compatible with adjacent materials.

1. Reinforcement: Reinforce members as required to retain fastener threads.
2. Exposed Fasteners: Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.

H. Signage: Comply with ANSI/BHMA A156.10.

## 2.5 DOOR OPERATORS

A. General: Of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.

1. Type: Power operated, complying with ANSI/BHMA A156.10.
2. Connections: For power and control wiring.
3. Adjustment Features: Fully adjustable without removing entrance doors, including adjustable speed, adjustable time delay for length of time door remains open, automatic door re-open if stopped while closing.
4. On/Off Feature: On/off/hold-open switch controls electric power to operator.

B. Electromechanical Operators: Self-contained overhead units, with power opening and closing mechanism, with checking in both opening and closing cycles, with safety-release clutch for obstructed closing, and that slides manually when power is off.

1. Closing Mechanism: Spring or Power operated.
2. Mounting: Concealed.

## 2.6 ACTIVATION AND SAFETY DEVICES

A. Infrared-Scanner Presence Detector: Self-contained, infrared-scanner presence-sensing device that activates door operator; that is adjustable to provide detection patterns and sensitivity equivalent to those required for control mats; and with metal or plastic housing in black finish.

## 2.7 HARDWARE

A. General: Refer to Division 8 Section "Door Hardware" for requirements for hardware items other than those indicated to be provided by automatic entrance door manufacturer.

B. Heavy-Duty Hardware: Provide units as indicated in size, number, and type recommended by manufacturer for entrances required. Finish exposed parts to match door finish, unless otherwise indicated.

C. Emergency Breakaway Hardware: Provide release hardware that allows panel to swing out in the direction of egress to a full 90 degrees from any position in the sliding mode with maximum force required to open panel of 50 lbf (222 N) according to ANSI/BHMA A156.10. Interrupt operation of breakaway panel operator while in breakaway mode.

D. Deadlocks: Manufacturer's standard mortise hook bolt with 5-ply laminated steel, hook-shaped throw bolt, complying with ANSI/BHMA A156.5, Grade 1 requirements.

1. Cylinders: On door exterior, as specified in Division 8 Section "Door Hardware."
2. Two-Point Locking: Provide bottom bolt and mechanism that automatically throws active-leaf bottom bolt into threshold when deadlock engages inactive leaf and that provides one-stage unlocking.

E. Push Bars: As selected from manufacturer's full range.

F. Compression Weather Stripping: Manufacturer's standard replaceable, compressible gaskets of molded neoprene or molded PVC. Include bumper-type gaskets at door stops and laps.

G. Sliding Weather Stripping: Manufacturer's standard replaceable weather stripping of wool, polypropylene, or nylon woven pile, with nylon-fabric or aluminum-strip backing, complying with AAMA 701.

## 2.8 FABRICATION

A. Prefabrication: Complete automatic door fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.

1. Perform fabrication operations, including cutting, fitting, forming, drilling, and grinding of metalwork in manner that prevents damage to exposed finish surfaces. For hardware, perform these operations before applying finishes.
2. Prepare components to receive concealed fasteners and anchor and connection devices.

B. Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to GANA's "Glazing Manual."

D. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

E. Hardware: Install hardware, except surface-mounted hardware, at fabrication plant. Remove only as required for final finishing operation and for delivery to and installation at Project site.

F. Doors: Fabricate doors in profiles indicated. Reinforce as required to support imposed loads and for installing hardware. Factory assemble door and frame units.

1. Exterior Doors: Provide compression weather stripping at fixed stops. At locations without fixed stops, provide sliding weather stripping retained in adjustable strip mortised into door edge.

G. Framing: Fabricate tubular and channel frame assemblies in configuration indicated, with welded or mechanical joints according to manufacturer's standards. Provide subframes and reinforcement of types indicated or, if not indicated, as needed for a complete system to support required loads.

1. Exterior Framing: Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior. Provide anchorage and alignment brackets for concealed support of assembly from the building structure. Allow for thermal expansion of exterior units.

## 2.9 FINISHES

A. Aluminum High-Performance Organic Finish: Three-coat, thermocured system with fluoropolymer coats containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 605.2.

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

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. Templates and Diagrams: Furnish templates, diagrams, and other data to fabricators and installers of related work, as necessary for coordinating automatic entrance door installation.

B. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.

C. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

D. Entrances: Install entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place. Lubricate operating hardware and other moving parts.

1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
2. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

E. Door Operators: Install door operator system, including control wiring. Refer to Division 16 Sections for connection to electrical power distribution system.

F. Activation and Safety Devices: Install control devices and wiring, including connections to door operators, as follows:

1. Infrared-Scanner Presence Detectors: Install scanners on both interior and exterior sides of each sliding automatic entrance door as indicated.

G. Glazing: Comply with installation requirements in Division 8 Section "Glazing."

H. Sealants: Comply with requirements in Division 7 Section "Joint Sealants" for installing sealants, fillers, and gaskets.

1. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction.
2. Seal frame perimeter with sealant to provide weathertight construction.

I. Adjusting: Adjust door operators, controls, and hardware for smooth and safe operation and for weathertight closure.

## 3.2 DEMONSTRATION

A. Engage manufacturer's certified inspector to train Owner's maintenance personnel to adjust, operate, and maintain automatic entrance doors and operators.

END OF SECTION 08461

# SECTION 08521 - ALUMINUM PROJECTED WINDOWS

## PART 1 - GENERAL

A. WORK INCLUDED:

1. Provide all materials, labors, equipment and services necessary to furnish, deliver and install all work of this section as shown on the drawings, as specified and as required by job conditions including, but not limited to, the following:
   a. Extruded aluminum windows, complete with glass and glazing.
   b. Sealants for windows.

B. RELATED WORK:

2. Section 08411: Aluminum Storefront.
3. Section 08800: Glass and Glazing.
4. Section 07920: Joint Sealant.

C. REFERENCE STANDARDS:

1. ANSI/AAMA 302.9 Voluntary Specifications for Aluminum Prime Windows.

D. SHOP DRAWINGS AND PRODUCT DATA:

1. Submit shop drawings and product data in accordance with Section 01300.
2. Indicate pertinent dimensioning, general construction, component connections and locations, anchorage methods and locations, hardware locations, installation details.

E. DELIVERY OF MATEIRALS:

1. Delivery windows in manufacturer's packaging complete with installation instructions.

F. SAMPLES:

1. Submit, in accordance with Section 01300, 6 inch square sample of window, corner construction, indicating finish, profile, size and jointing method. Also submit sample of each type of operable hardware, indicated style and finish.

G. GARANTEE/WARRANTY:

1. Provide written guarantee in accordance with General Conditions.
2. Guarantee: Provide for replacing, at no cost to Owner, new hermetically sealed glass units for all units which exhibit interpane dusting or misting within minimum period of ten (10) years from date of substantial completion date.

## PART 2 - PRODUCTS

A. ACCEPTABLE MANUFACTURERS:
1. Manufacturer and Type: #8225T Projected (Terminal) type manufactured by Kawneer Window Co.
2. Substitutions: Items of same function and performance are acceptable inconformance with Section 01300.

B. WINDOWS:
1. Type: Extruded aluminum; ASTM B221 - GS 10A-T5 alloy, with fixed lights and projecting bottom such as indicated on drawing, complete with operable hardware, weatherstripping and insect screens.
2. Finish: Factory apply to exposed surfaces a clear anodized finish conforming to AA-M12 C22 A31.

C. GLASS AND GLAZING:
1. In accordance with Section 08800 - Glass and Glazing.

D. COMPONENTS:
1. Glazing Materials: Manufacturer's standard type, to suit location and applications.
2. Insect Screens: Aluminum mesh, FS RR-W-365 readily removable.
3. Weatherstripping: Manufacturer's standard type, water repellent, rot proof, resilient.
4. Operable Sash Hardware: Manufacturer's standard type to suit sash operation; corrosion resistant.
5. Bituminous Paint: Acid alkali resistant type, black color.

E. FABRICATION:
1. Fabricate window units in conformance with ANSI/AAMA 302.9 for window type P-A3.
2. Fabricate aluminum windows to allow for adequate clearances and shim spacing around perimeter of assemblies to enable proper installation. Allow for thermal movement within window construction.
3. Provide sufficient corrosion resistant anchorage devices to securely and ridigly fit windows in place.
4. Accurately and rigidly fit together joints and corners. match components carefully ensuring continuity of line and design. Ensure joints and connections are flush, hair line and weatherproof.
5. Provide internal reinforcing where required to maintain rigidity.
6. Provide for moisture entering joints, and condensation occuring within frame construction to drain exterior.

7. Apply coat of bituminous paint on concealed aluminum surfaces in contact with cementitious or dissimilar materials.

PART 3 - EXECUTION

A. INSTALLATION:

1. Install aluminum windows in accordance with manufacturer's recommendations, to achieve weathertight installation. Ensure assemblies are plumb, level and free of wrap or twist. Maintain dimensional tolerances and alignment wit adjacent work.
2. Install sufficient corrosion resistant anchorage devices to securely and rigidly fasten windows to building, without causing detrimental effects to shape or performance.
3. Set Window sills level and uniform. Accurately and rigidly fit joints. Ensure joints are flush, hair line and weatherproof.
4. Place batt insulation in shim spaces around perimeter, to maintain continuity of thermal barrier.
5. Install sealants and related backing materials around perimeter of windows in accordance with workmanship and installation requirements indicated in Sealant Section.

END OF SECTION 08521

# SECTION 08711 - DOOR HARDWARE

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Commercial door hardware for the following:

   a. Swinging doors.
   b. Aluminum storefront doors.
   c. Other doors to the extent indicated.

2. Cylinders for doors specified in other Sections.

B. Related Sections include the following:

1. Division 8 Section "Steel Doors and Frames" for astragals provided as part of a fire-rated labeled assembly and for door silencers provided as part of the frame.
2. Division 8 Section "Aluminum Entrances and Storefronts" for entrance door hardware, except cylinders.

### 1.2 SUBMITTALS

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

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening.

   a. Organize door hardware sets in same order as in the Door Hardware Schedule at the end of Part 3.

3. Content: Include the following information:

   a. Type, style, function, size, label, hand, and finish of each door hardware item.
   b. Manufacturer of each item.
   c. Fastenings and other pertinent information.

d. Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware.
g. Door and frame sizes and materials.
h. Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.

1) 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.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the 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 Schedule.

C. Keying Schedule: Prepared by or under the supervision of supplier, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

D. Product Certificates: Signed by manufacturers of electrified door hardware certifying that products furnished comply with requirements.

1. Certify that door hardware approved for use on types and sizes of labeled fire doors complies with listed fire door assemblies.

E. Maintenance Data: For each type of door hardware to include in maintenance manuals specified in Division 1.

F. Warranties: Special warranties specified in this Section.

## 1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Supplier Qualifications: Door hardware supplier with warehousing facilities in Project's vicinity and who is or employs a qualified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

1. Scheduling Responsibility: Preparation of door hardware and keying schedules.

C. Architectural Hardware Consultant Qualifications: A person who is currently certified by the Door and Hardware Institute as an Architectural Hardware Consultant and who is experienced

in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

1. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer.

D. Regulatory Requirements: Comply with provisions of the following:

1. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," as follows:

   a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
   b. Door Closers: Comply with the following maximum opening-force requirements indicated:

      1) Interior Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
      2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

   c. Thresholds: Not more than 1/2 inch (13 mm) high.

2. NFPA 101: Comply with the following for means of egress doors:

   a. Latches, Locks, and Exit Devices: Not more than 15 lbf (67 N) to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
   b. Door Closers: Not 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. Thresholds: Not more than 1/2 inch (13 mm) high.

E. Keying Conference: Conduct a conference at Project site coordinate keying requirements. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
2. Preliminary key system schematic diagram.
3. Requirements for key control system.
4. Address for delivery of keys.

## 1.4 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 Schedule, and include basic installation instructions with each item or package.

C. Deliver keys to Owner.

1.5 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements. Verify location of existing door hardware to be replaced and coordinate with frame manufacturing.

1.6 WARRANTY

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

B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of operators and door hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

C. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.

D. Warranty Period for Manual Closers: 10 years from date of Substantial Completion.

1.7 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in this Section, door hardware sets indicated in door and frame schedule, and the Door Hardware Schedule at the end of Part 3.

1. Door Hardware Sets: Requirements for quantity, item, design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Schedule at the end of Part 3. Products are identified by descriptive titles corresponding to requirements specified in Part 2.

2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

## 2.2 HINGES, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hinges:
   a. Hager Companies.
   b. McKinney Products Company; Div. of ESSEX Industries, Inc.
   c. Mont-Hard Corporation; Div. of Fanal, SA.
   d. PBB, Inc.
   e. Stanley Commercial Hardware; Div. of The Stanley Works.

C. Standards: Comply with the following:

1. Butts and Hinges: BHMA A156.1.
2. Template Hinge Dimensions: BHMA A156.7.
3. Self-Closing Hinges: BHMA A156.17.

D. 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).

E. Size: 4-1/2" x 4-1/2" Unless noted otherwise.

F. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

G. Hinge Applications: Unless otherwise indicated, provide the following:

1. Doors with Closers: Antifriction-bearing hinges.
2. Interior Doors: Standard-weight hinges.
3. Exterior Doors (All hollow metal doors): Heavy-weight hinges.

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

1. Interior Hinges: Stainless steel, with stainless-steel pin.
2. Exterior Doors (All hollow-metal doors): Stainless steel, with stainless-steel pin.
3. Hinges for Fire-Rated Assemblies: Stainless steel, with stainless-steel pin.

I. Hinge Options: Comply with the following where indicated in the Door Hardware Schedule 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.
2. Corners: Square.

J. 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 screws; Finish screw heads to match surface of hinges.

K. Antifriction-Bearing, Standard-Weight, Full-Mortise, Slip-in-Type Hinges: BHMA Grade 2, equipped with 2 ball bearings:

1. Base Metal: Stainless Steel.

2. Pins: Non-Removable

L. Finish – All Hinges: US32D

2.3 LOCKS AND LATCHES, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Mechanical Locks and Latches:
   a. Corbin Russwin Architectural Hardware; Div. of Yale Security Inc.
   b. Schlage Lock Company; an Ingersoll-Rand Company.
   c. Yale Security Inc.; Div. of Williams Holdings.

C. Standards: Comply with the following:

1. Bored Locks and Latches: BHMA A156.2.
2. Exit Locks: BHMA A156.5.
3. Auxiliary Locks: BHMA A156.5

D. Bored Locks: BHMA Grade 1 Series 4000.

E. Certified Products: Provide door hardware listed in the following BHMA directories:

1. Mechanical Locks and Latches: BHMA's "Directory of Certified Locks & Latches."

F. Lock Trim: Comply with the following:

1. Lever: Cast, 4-1/2" long, returned to within ½" of the door face.

2. Escutcheon (Rose): Wrought.
3. Dummy Trim: Match lever lock trim and escutcheons.

G. Lock Functions: Function numbers and descriptions indicated in the Door Hardware Schedule comply with the following:

1. Bored Locks: BHMA A156.2.

H. Lock Throw: Comply with testing requirements for length of bolts to comply with labeled fire door requirements, and as follows:

1. Bored Locks: Minimum 1/2-inch (12.7-mm) latchbolt throw.
2. Deadbolts: Minimum 1-inch (25-mm) bolt throw.

I. Rabbeted Doors: Provide special rabbeted front and strike on locksets for rabbeted meeting stiles.

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

K. Finish – All Locksets – 630

## 2.4 MECHANICAL LOCKS AND LATCHES

A. Bored Auxiliary Locks: Comply with the following:

1. Material: Stainless steel.
2. Deadlocks: Deadbolt operated by key either side.

## 2.5 DOOR BOLTS, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Flush Bolts:
   a. Door Controls International.
   b. Hager Companies.
   c. Hiawatha, Inc.
   d. Ives: H. B. Ives.

B. Standards: Comply with the following:

1. Surface Bolts: BHMA A156.16.
2. Automatic and Self-Latching Flush Bolts: BHMA A156.3.
3. Manual Flush Bolts: BHMA A156.16.

C. Flush Bolts: BHMA designed for mortising into door edge.

D. Bolt Throw: Comply with testing requirements for length of bolts to comply with labeled fire door requirements, and as follows:

1. Dutch-Door Bolts: Minimum 3/4-inch (19-mm) throw.
2. Mortise Flush Bolts: Minimum 3/4-inch (19-mm) throw.

## 2.6 DOOR BOLTS

A. Dutch-Door Surface Bolts: Polished brass bolt and knob, minimum 3/4-inch (19-mm) throw, with standard strike.

B. Automatic Flush Bolts: Fabricated from steel and brass components, with spring-activated bolts that automatically retract when active leaf is opened and that automatically engage when active door depresses bolt trigger listed and labeled for fire-rated doors. Provide brass or stainless-steel cover plate, top and bottom strikes, guides, guide supports, wear plates, and shims.

C. Manual-Extension Flush Bolts: Fabricated from extruded brass or aluminum, with 12-inch (305-mm) rod actuated by flat lever listed and labeled for fire-rated doors. Provide matching strike.

D. Slide Flush Bolts: Cast brass, with rod actuated by slide. Provide matching strike.

## 2.7 EXIT DEVICES, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc.
2. Von Duprin; an Ingersoll-Rand Company.

C. Standard: BHMA A156.3.

1. BHMA Grade: Grade 1

D. Certified Products: Provide exit devices listed in BHMA's "Directory of Certified Exit Devices."

E. 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.

F. Outside Trim: Lever with cylinder material and finish to match locksets, unless otherwise indicated.

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

G. Through Bolts: For exit devices and trim on metal doors.

## 2.8 EXIT DEVICES

A. Rim Exit Devices: Comply with the following:
   1. Actuating Bar: Push pad.
   2. Material: Stainless steel.

2.9 CYLINDERS AND KEYING

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   1. Cylinders: Same manufacturer as for locks and latches.

C. Standards: Comply with the following:

   1. Cylinders: BHMA A156.5.

D. Cylinder Grade: BHMA Grade 1

E. 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. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
   3. Bored-Lock Type (Key in Lever): Cylinders with tailpieces to suit locks.

      a. High-Security Grade: BHMA Grade 1A, listed and labeled as complying with pick- and drill-resistant testing requirements of UL 437 (Suffix A).

F. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:

   1. Interchangeable Cores: Core insert, removable by use of a special key, and usable with other manufacturers' cylinders.

G. Construction Keying: Comply with the following:

   1. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.
   2. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

      a. Replace construction cores with permanent cores, as directed by Owner.

H. Keying System: Unless otherwise indicated, provide a factory-registered keying system complying with the following requirements.

1. System: Master key or grand master key locks to Owner's airport campus system requirements.

I. Keys: Provide nickel-silver keys complying with the following:

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

a. Notation: "DO NOT DUPLICATE."

2. Quantity: In addition to one extra blank key for each lock, provide the following:

a. Cylinder Change Keys: Three.
b. Master Keys: Five.
c. Grand Master Keys: Five.
d. Great-Grand Master Keys: Five.

## 2.10 STRIKES

A. Standards: Comply with the following:

1. Strikes for Bored Locks and Latches: BHMA A156.2.
2. Strikes for Auxiliary Deadlocks: BHMA A156.5.
3. Dustproof Strikes: BHMA A156.16.

B. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.

C. Dustproof Strikes: BHMA Grade1, complying with the following:

1. Floor Type: Polished wrought bras, with ¾-inch (19mm) diameter, spring-tension plunger.

## 2.11 ACCESSORIES FOR PAIRS OF DOORS, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Coordinators:
a. Door Controls International.
b. Glynn-Johnson; an Ingersoll-Rand Company.
c. Ives: H. B. Ives.

C. Standards: Comply with the following:

1. Coordinators: BHMA A156.3.

D. Coordinators: Consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release and with internal override.

## 2.12 CLOSERS, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Surface-Mounted Closers:
   a. LCN Closers; an Ingersoll-Rand Company.
   b. Norton Door Controls; Div. of Yale Security Inc.
   c. Yale Security Inc.; Div. of Williams Holdings.

C. Standards: Comply with the following:

1. Closers: BHMA A156.4.

D. Surface Closers: BHMA Grade 1.

E. Certified Products: Provide door closers listed in BHMA's "Directory of Certified Door Closers."

F. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

## 2.13 CLOSERS

A. Modern-Type-without-Cover Surface Closers: Rack-and-pinion hydraulic type; with adjustable sweep and latch speeds controlled by key-operated valves; with forged-steel main arm; enclosed in a cast-aluminum alloy shell; complying with the following:

1. Mounting: Hinge side.
2. Type: Regular arm.
3. Backcheck: Adjustable, effective between 60 and 85 degrees of door opening.
4. Closing Power Adjustment: At least 15 percent more than minimum tested value.

## 2.14 PROTECTIVE TRIM UNITS, GENERAL

A. Standard: Comply with BHMA A156.6.

B. Materials: Fabricate protection plates from the following:

1. Stainless Steel: 0.050 inch (1.3 mm) thick; beveled top and 2 sides.

C. Fasteners: Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine or self-tapping screws.

D. Furnish protection plates sized 1-1/2 inches (38 mm) less than door width on push side and 1/2 inch (13 mm) less than door width on pull side, by height specified in schedule.

## 2.15 PROTECTIVE TRIM UNITS

A. Armor Plates: 36 inches (914 mm) high by door width, with allowance for frame stops.

B. Kick Plates: 12 inches (305 mm) high by door width, with allowance for frame stops.

## 2.16 STOPS AND HOLDERS, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hager Companies.
2. Ives: H. B. Ives.
3. Rockwood Manufacturing Company.
4. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc.
5. Yale Security Inc.; Div. of Williams Holdings.

C. Standards: Comply with the following:

1. Stops and Bumpers: BHMA A156.16.

D. Stops and Bumpers: BHMA Grade 1.

E. Floor Stops: For doors, unless wall or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic.

1. Where floor or wall stops are not appropriate, provide overhead holders.

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

## 2.17 STOPS AND HOLDERS

A. Wall Bumpers: Polished cast brass or aluminum with rubber bumper; 2-1/2-inch (64-mm) diameter, minimum 3/4-inch (19-mm) projection from wall, with backplate for concealed fastener installation; with concave bumper configuration.

B. Dome-Type Floor Stop: Polished cast brass, bronze, or aluminum, with rubber bumper; and as follows:

1. Height: Minimum 1 inch (25 mm) high, for doors without threshold] [1-3/8 inches (35 mm) high, for doors with threshold.
2. Riser: Extruded aluminum for carpet installations.

2.18 DOOR GASKETING, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Door Gasketing and Bottoms:

a. Hager Companies.
b. National Guard Products, Inc.
c. Pemko Manufacturing Co., Inc.
d. Zero International, Inc.

C. Standard: Comply with BHMA A156.22.

D. General: Provide continuous weather-strip gasketing on doors scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

E. 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.

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: Comply with ASTM D 2000 and AAMA 701/702.

2.19 DOOR GASKETING

A. Adhesive-Backed Perimeter Gasketing: Gasket material applied to frame rabbet with self-adhesive.

1. Gasket Material: Neoprene bulb.

B. Door Sweeps: Gasket material held in place by flat metal housing or flange; surface mounted to face of door with screws.

1. Gasket Material: Neoprene.
2. Housing Material: Aluminum.

## 2.20 THRESHOLDS, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hager Companies.
2. National Guard Products, Inc.
3. Pemko Manufacturing Co., Inc.
4. Reese Enterprises, Inc.
5. Zero International, Inc.

C. Standard: Comply with BHMA A156.21.

## 2.21 THRESHOLDS

A. Saddle Thresholds: Type and base metal as follows:

1. Type: Fluted top.
2. Base Metal: Aluminum.

## 2.22 FABRICATION

A. Manufacturer's Nameplate: Do not provide manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise approved by Architect.

1. Manufacturer's identification will be 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 for finishes. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Steel Machine or Wood Screws: For the following fire-rated applications:

    a. Mortise hinges to doors.
    b. Strike plates to frames.
    c. Closers to doors and frames.

3. Steel Through Bolts: For the following fire-rated applications, unless door blocking is provided:

    a. Surface hinges to doors.
    b. Closers to doors and frames.
    c. Surface-mounted exit devices.

4. Spacers or Sex Bolts: For through bolting of hollow metal doors.
5. Fasteners for Wood Doors: Comply with requirements of DHI WDHS.2, "Recommended Fasteners for Wood Doors."

2.23 FINISHES

A. Standard: Comply with BHMA A156.18.

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.

D. BHMA Designations: Comply with base material and finish requirements indicated by the following:
    1. BHMA 619: Satin nickel plated, clear coated, over brass or bronze base metal.
    2. BHMA 626: Satin chromium plated over nickel, over brass or bronze base metal.
    3. BHMA 627: Satin aluminum, clear coated, over aluminum base metal.
    4. BHMA 628: Satin aluminum, clear anodized, over aluminum base metal.
    5. BHMA 630: Satin stainless steel, over stainless-steel base metal.
    6. BHMA 652: Satin chromium plated over nickel, over steel base metal.
    7. BHMA 718: Satin aluminum, uncoated; aluminum base metal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance of door hardware.

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

## 3.2 PREPARATION

A. Steel Doors and Frames: Comply with DHI A115 series.

1. Surface-Applied Door Hardware: Drill and tap doors and frames according to SDI 107.

B. Wood Doors: Comply with DHI A115-W series.

## 3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Key Control System: Place keys on markers and hooks in key control system cabinet, as determined by final keying schedule.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

## 3.4 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. Door Closers: 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. Six-Month Adjustment: Approximately six months after date of Substantial Completion, Installer shall perform the following:

1. Examine and readjust each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.
2. Consult with and instruct Owner's personnel on recommended maintenance procedures.
3. Replace door hardware items that have deteriorated or failed due to faulty design, materials, or installation of door hardware units.

## 3.5 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 door hardware is without damage or deterioration at time of Substantial Completion.

## 3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

## 3.7 DOOR HARDWARE SCHEDULE

Contractor to provide a Door Hardware Shop Drawings indicating Door Hardware Sets for approval. Contractor to coordinate Door Hardware with Access Control System – Section 16708

END OF SECTION 08711

# SECTION 08800 – GLASS AND GLAZING

## PART 1 - SUMMARY

### 1.1 SUMMARY

A. This section includes glass and glazing for the following items:

1. Interior windows
2. Exterior windows
3. Storefronts

B. Related work specified elsewhere:

1. Aluminum storefronts

### 2.1 REFERENCES

A. Applicable standards:

1. American National Standards Institute, Inc. (ANSI):
   a. Z97.1 – Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings.
2. American Society for Testing and Materials (ASTM):
   a. C509 – Cellular Elastomeric Preformed Gasket and Sealing Material.
   b. C542 – Lock Strip-Gaskets.
   c. C864 – Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
   d. C920 – Elastomeric Joint Sealants
   e. C1048 – Heat Treated Flat Glass – Kind HS. Kind FT-Coated and Uncoated Glass.
3. Consumer Product Safety Commission (CPSC):
   a. 16 CFR 1201 – Safety Standard for Architectural Glazing Materials.
4. Flat-Glass Marketing Association (FGMA):
   a. Glazing Manual.

### 2.2 SUBMITTALS

A. Submit as specified in GENERAL CONDITIONS.

B. Include, but not limited to, the following:
   a. Product Data: Technical data for each glazing material and fabricated glass product required, including installation and maintenance instructions.

2.3 QUALITY ASSURANCE

A. Glazing Standards: Comply with recommendations of Flat Glass Marketing Association (FGMA) "Glazing Manual" and "Sealant Manual" except where more stringent requirements are indicated. Refer to those publications for definitions of glass and glazing terms not otherwise defined in this section or other referenced standards.
B. Safety Glazing Standard: Where safety glass is indicated or required by authorities having jurisdiction, provide type of products indicated which comply with ANSI A97.1 and testing requirements of 16 CFR Part 1201 for category II materials.
C. Single Source Responsibility for Glass: To ensure consistent quality of appearance and performance, provide materials produced by a single manufacturer or fabricator for each king and condition of glass indicated or specified.

2.4 DELIVERY, STORAGE AND HANDLING: Protect glass and glazing materials during delivery, storage and handling to comply with manufacturer's directions and as required to prevent edge damage to glass, and damage to glass and glazing materials from effects of moisture including condensation, of temperature changes, of direct exposure to sun, and from other causes.

2.5 PROJECT CONDITIONS:

A. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when joint substrates are wet due to rain, frost, condensation or other causes.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Primary and Heat Treated Glass Products:

1. Cardinal
2. Falconer Glass Industries
3. Ford Glass
4. Guardian Industries Corp.
5. Libby-Owens Ford Company
6. PPG Industries, Inc.

7. Spectrum Glass Products

B. Lock-Strip Gaskets:

1. Cadillac Rubber and Plastics, Inc.
2. The Standard Products Co.

C. Preformed Gaskets:

1. D.S. Brown Co.
2. Tremco

D. Glazing Sealants and Tapes

E.

1. Bostik Construction Products Inc.
2. Dow Corning Corp.
3. General Electric
4. W.R. Meadows, Inc.
5. Pecora Corp.
6. Sonneborn Building Products
7. Tremco Inc.

2.2 GLASS PRODUCTS, GENERAL

A. Primary Glass Standard: Provide glass which complies with FS-DD-G-1403 requirements, including those indicated by reference to type, class, quality and form.

B. Heat-Treated Glass Standard: Provide heat-treated glass which complies with FS DD-G-1403 requirements, including those indicated by reference to grade, style, type, quality, and class.

C. Sizes: Fabricate glass to sizes required for glazing openings indicated, with edge clearances and tolerances complying with recommendations of glass manufacturer. Provide thicknesses indicated or, if not otherwise indicated, as recommended by glass manufacturer for application indicated.

2.3 PRIMARY GLASS PRODUCTS:

A. Tinted Float Glass: Type I, class 2 (heat absorbing and light reducing), quality q3 (glazing select), of tint and with performance characteristics for 1/4" thick glass listed Below:

1. Solar Cool Gray: Manufacturer's standard tint, with visible light transmittance of 56% and shading coefficient of 0.69-0.71.

2.4 HEAT-TREATED GLASS PRODUCTS:

A. Manufacturing Process: Manufacture heat-treated glass as follows:

1. By vertical (tong-held) or horizontal (roller health) process, at manufacturer's option, except provide horizontal process where indicated as "tongless" or "free of tong marks".

2.5 ELASTOMERIC GLAZING SEALANTS AND PREFORMED GLAZING TAPES:

A. General: Provide products of type indicated and complying with the following requirements:

1. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials with which they will come into 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 recommendations of sealant and glass manufacturers for selection of glazing sealants and tapes which have performance characteristics suitable for application indicated and conditions at time of installation.
3. Elastomeric Sealant Standard: Provide chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C920 requirements, including those for Type, Grade, Class and Uses.
4. Colors: Provide color or exposed sealants as selected by County from manufacturer's standard colors.

B. Silicone-Glazing Sealant:

1. Conform to ASTM-C920, Type S, Grade NS, Class 25.
2. One part, nonacid curing type, medium modulus. Color to be selected.
3. General Electric GESIL N.
4. Use in the following locations:
   a. Exterior insulation glass in frames with stops.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. Provide materials with proven record of compatibility with surfaces contacted in installation.
B. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.
C. Setting Blocks: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealants, 80 to 90 Shore A durometer hardness.
D. Spacers: Neoprene, EPDM or silicone blocks, or continuous extrusions, as required for compatibility with glazing sealant, of size, shape and hardness recommended by glass and sealant manufacturers for application indicated.
E. Edge Blocks: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealant, of size and hardness required to limit lateral movement (side-walking) of glass.

PART 3 - EXECUTION

3.1 PREPARATION:

A. Examine framing and glazing channel surfaces, for compliance with manufacturing and installation tolerances, including those for size, squareness, offsets at corners, face or edge clearances, presence and functioning of weep system, for effective sealing of joinery and conditions under which glazing is to be performed.

B. Clean sash and glazing channel, or other framing members to receive glass, immediately before glazing.

C. Remove any coatings not firmly bonded to the substrate, moisture, frost, oil, grease, dust, dirt, and all foreign substances. Remove lacquer from metal surfaces where elastomeric sealants are specified for use.

3.2 PERFORMANCE REQUIREMENTS: Watertight and airtight installation of each piece of glass is required, except as otherwise specified or indicated. All sized to be firerated. Each installation must withstand normal temperature changes, wind loading, and impact loading (for operating sash and doors) without failure including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials and other defects in the work.

3.3 GLAZING - SEALANTS:

A. Cut glass accurately to size from measurements taken at the building, and follow glass bite requirements recommended by the glass manufacturer.

B. Conform to FGMA Glazing Manual, combined printed recommendations of glass manufacturers, glazing sealants, gaskets and other glazing material except as otherwise indicated or specified.

C. Inspect each piece of glass immediately before installation, and eliminate pieces which have observable edge damage or face imperfections.

D. Protect glass from edge damage during handling and installation; 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 with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so that these are located at top of opening. Remove from project and dispose of glass units with edge damage or other imperfections of king that, when installed weakens glass and impairs performance and appearance.

E. Apply primer or sealer to joint surfaces wherever required by glazing material manufacturer.

F. Install setting blocks of proper size in sill rabbet, located one quarter of glass width from each corner, but no closer than 6 inches, unless otherwise required. Set blocks in thin course of sealant which is acceptable for heel bead use.

G. Provide spacers inside and out, of correct size and spacing to preserve required face clearances, for glass sizes larger than 50 united inches, except where gaskets or glazing tapes with continuous spacer rods are used for glazing. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1. Gypsum Base for Veneer Plaster: Stack panels flat to prevent sagging.

## 1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 843 requirements or gypsum veneer plaster manufacturer's written recommendations, whichever are more stringent.

B. Room Temperatures: Maintain not less than 55 deg F (13 deg C) or more than 80 deg F (27 deg C) for 7 days before application of gypsum base and gypsum veneer plaster, continuously during application, and after application until veneer plaster is dry.

C. Avoid conditions that result in gypsum veneer plaster drying too rapidly.

1. Distribute heat evenly; prevent concentrated or uneven heat on veneer plaster.
2. Maintain relative humidity levels for prevailing ambient temperature that produces normal drying conditions.
3. Ventilate building spaces in a manner that prevents drafts of air from contacting surfaces during veneer plaster application and until it is dry.

# PART 2 - PRODUCTS

## 2.1 STEEL FRAMING, GENERAL

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Clark Steel Framing Systems.
2. Consolidated Systems, Inc.
3. Dale Industries, Inc. - Dale/Incor.
4. Dietrich Industries, Inc.
5. Marino Ware; Division of Ware Ind.
6. National Gypsum Company.
7. Scafco Corporation.
8. Unimast, Inc.
9. Western Metal Lath & Steel Framing Systems.

B. Steel Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
2. Protective Coating: manufacturer's standard corrosion-resistant zinc coating, unless otherwise indicated.

## 2.2 STEEL SUSPENDED CEILING AND SOFFIT FRAMING

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- (1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.

B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch (4.12-mm) diameter.

C. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch (1.37 mm) and minimum 1/2-inch- (12.7-mm-) wide flanges.

1. Depth: 1-1/2 inches (38.1 mm).

D. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.0538-inch (1.37-mm) bare steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flanges, 3/4 inch (19.1 mm) deep.

## 2.3 GYPSUM VENEER PLASTER MATERIALS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Two-Component Gypsum Veneer Plaster:

a. National Gypsum Company:

1) Base Coat: Kal-Kote Base Plaster.
2) High-Strength, Smooth Finish Coat: Uni-Kal 3000 Plaster.

b. United States Gypsum Co.:
1) High-Strength Base Coat: IMPERIAL Basecoat Plaster.
2) High-Strength, Smooth Finish Coat: IMPERIAL Finish Plaster.

B. Two-Component Gypsum Veneer Plaster: Separate formulations complying with ASTM C 587; one for base coat and one for finish coat application over substrates indicated.

1. High-Strength Base Coat: Ready-mixed, base-coat plaster containing mill-mixed, fine silica sand; with a compressive strength of 3000 psi (20 MPa) when tested according to ASTM C 472.
2. High-Strength Finish Coat: Ready-mixed, smooth, finish-coat veneer plaster containing mill-mixed, fine silica sand; with a compressive strength of 3000 psi (20 MPa) when tested according to ASTM C 472.

## 2.4 PANEL PRODUCTS

A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

B. Gypsum Base for Veneer Plaster: ASTM C 588 and products of same manufacturer as plaster.

1. Abuse-Resistant Base: With specially reinforced core for increased indentation and penetration resistance and with 5/8-inch- (15.9-mm-) thick, Type X core.

## 2.5 TRIM ACCESSORIES

A. Standard Trim: ASTM C 1047, provided or approved by manufacturer for use in gypsum veneer plaster applications indicated.

1. Material: Plastic.
2. Shapes:

a. Cornerbead: Use at outside corners, unless otherwise indicated.
b. LC-Bead (J-Bead): Use at exposed panel edges.
c. Expansion (Control) Joint: Use where indicated.

## 2.6 JOINT REINFORCING MATERIALS

A. General: Comply with joint strength requirements in ASTM C 587 and with gypsum veneer plaster manufacturer's written recommendations for each application indicated.

B. Joint Tape:

1. Gypsum Base for Veneer Plaster: In material recommended by gypsum veneer plaster manufacturer for applications indicated.

C. Embedding Material for Joint Tape:

1. Gypsum Base for Veneer Plaster: Material produced and recommended by gypsum veneer plaster manufacturer for use with joint tape material and gypsum veneer plaster applications indicated.

## 2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Bonding Compound for Gypsum Veneer Plaster: ASTM C 631.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.

## 2.8 GYPSUM VENEER PLASTER MIXES

A. Mechanically mix gypsum veneer plaster materials to comply with ASTM C 843 and with gypsum veneer plaster manufacturer's written recommendations.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

A. Suspended Ceilings: Coordinate installation of ceiling suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers at spacing required to support ceilings and that hangers will develop their full strength.

B. Masonry Substrates: Prepare for gypsum veneer plastering according to gypsum veneer plaster manufacturer's written recommendations. Clean surfaces to remove dirt, grease, oil, and other foreign matter and deposits that could impair bond with plaster.

## 3.3 INSTALLING STEEL FRAMING, GENERAL

A. Installation Standards: ASTM C 754, and ASTM C 844 requirements that apply to framing installation.

B. Install supplementary framing, blocking, and bracing at terminations in gypsum veneer plaster assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with gypsum veneer plaster manufacturer's written recommendations or, if none available, with United States Gypsum's "Gypsum Construction Handbook."

C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement.

1. Isolate ceiling assemblies where they abut or are penetrated by building structure.
2. Isolate partition framing and wall furring where they abut structure, except at floor. Install slip-type joints at head of assemblies that avoid axial loading of assemblies and laterally support assemblies.

D. Do not bridge building control and expansion joints with steel framing or furring members. Frame both sides of joints independently.

## 3.4 INSTALLING STEEL SUSPENDED CEILING AND SOFFIT FRAMING

A. Suspend ceiling hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers 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
3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel deck tabs.
6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
7. Do not connect or suspend steel framing from ducts, pipes, or conduit.

B. Installation Tolerances: Install steel framing components for suspended ceilings so members for panel attachment are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member and transversely between parallel members.

C. Sway-brace suspended steel framing with hangers used for support.

D. Install suspended steel framing components in sizes and spacings indicated, but not less than those required by referenced steel framing and installation standards.

1. Hangers: 48 inches (1200 mm) o.c.
2. Carrying Channels (Main Runners): 48 inches (1200 mm)o.c.
3. Furring Channels (Furring Members): 24 inches (600 mm) o.c.

## 3.5 APPLYING PANELS, GENERAL

A. Gypsum Base for Veneer Plaster: Apply according to ASTM C 844, unless manufacturer's written recommendations are more stringent.

1. Do not allow gypsum base to fade from exposure to light.
2. Erection Tolerance: No more than 1/16-inch (1.6-mm) offsets between planes of gypsum base faces, and 1/8 inch in 8 feet (3 mm in 2.4 m) for level, plumb, warp, and bow.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Attach panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

F. Attach panels to framing provided at openings and cutouts.

G. Form control and expansion joints with space between edges of adjoining panels.

H. Fastener Spacing: According to referenced gypsum base for gypsum veneer plaster application standard, manufacturer's written recommendations, and fire-resistance-rating requirements.

1. Space screws a maximum of 12 inches (304.8 mm) o.c. for vertical applications.
2. Space fasteners in panels that are tile substrates a maximum of 8 inches (203.2 mm) o.c.

## 3.6 PANEL APPLICATION METHODS

A. Single-Layer Application:

1. On ceilings, apply gypsum base panels before wall/partition panels to the greatest extent possible and at right angles to framing, unless otherwise indicated.

B. Single-Layer Fastening Methods: Apply gypsum base panels to supports with steel drill screws.

## 3.7 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 844 and in specific locations approved by Architect for visual effect.

## 3.8 INSTALLING JOINT REINFORCEMENT

A. Gypsum Base for Veneer Plaster: Reinforce interior angles and flat joints with joint tape and embedding material to comply with ASTM C 843 and gypsum veneer plaster manufacturer's written recommendations.

## 3.9 GYPSUM VENEER PLASTERING

A. Gypsum Veneer Plaster Application: Comply with ASTM C 843 and veneer plaster manufacturer's written recommendations.

1. Where gypsum veneer plaster abuts metal door frames, windows, and other units in veneer plaster, groove finish coat to eliminate spalling.

B. Concealed Surfaces: Omit gypsum veneer plaster in the following areas where veneer plaster will be concealed from view in the completed Work, unless otherwise indicated or required to maintain fire-resistance rating. Do not omit veneer plaster behind cabinets, furniture, furnishings, and similar removable items.

1. Above suspended ceilings.

C. Gypsum Veneer Plaster Finish: Smooth-trowelled finish, unless otherwise indicated.

END OF SECTION 09215

# SECTION 09220 - PORTLAND CEMENT PLASTER (STUCCO)

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Metal lath and accessories.
2. Plastic accessories.
3. Portland cement plaster.
4. Stucco finishes.

### 1.2 SUBMITTALS

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

B. Product Data for each product specified.

### 1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver cementitious materials to Project site in original packages, containers, or bundles, labeled with manufacturer's name, product brand name, and lot number.

B. Store materials inside, under cover, and dry, protected from weather, direct sunlight, surface contamination, aging, corrosion, and damage from construction traffic and other causes.

### 1.4 PROJECT CONDITIONS

A. Environmental Requirements, General: Comply with requirements of referenced plaster application standards and recommendations of plaster manufacturer for environmental conditions before, during, and after plaster application.

B. Warm-Weather Requirements: Protect plaster against uneven and excessive evaporation and from strong flows of dry air, both natural and artificial. Apply and cure plaster as required by climatic and job conditions to prevent dry out during cure period. Provide suitable coverings, moist curing, barriers to deflect sunlight and wind, or combinations of these, as required.

C. Protect contiguous work from soiling and moisture deterioration caused by plastering. Provide temporary covering and other provisions necessary to minimize harmful spattering of plaster on other work.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Expanded-Metal Lath:

   a. Alabama Metal Industries Corp. (AMICO).
   b. Dale//Incor Industries, Inc.
   c. Dietrich Industries, Inc.
   d. National Gypsum Co.
   e. Unimast, Inc.
   f. United States Gypsum Co.

2. Plastic Accessories:

   a. Alabama Metal Industries Corp. (AMICO).
   b. Plastic Components, Inc.
   c. Vinyl Corp.

3. Stucco:

   a. Florida Stucco Corp.
   b. Highland Stucco.
   c. IPA Systems, Inc.
   d. United States Gypsum Co.

### 2.2 LATH

A. Expanded-Metal Lath: Comply with ASTM C 847 for material, type, configuration, and other characteristics indicated below.

1. Material: Fabricate expanded-metal lath from sheet metal conforming to the following:

   a. Galvanized Steel: Structural-quality, zinc-coated (galvanized) steel sheet complying with ASTM A 653, G60 (ASTM A 653M, Z180) minimum coating designation, unless otherwise indicated.

2. Diamond-Mesh Lath: Comply with the following requirements:

   a. Configuration: Self-furring.

      1) Weight: 3.4 lb/sq. yd. (1.8 kg/sq. m).

B. Paper Backing: Provide the following material factory bonded to back of lath. Comply with FS UU-B-790, Type I, grade and style as indicated below:

1. Vapor-Retardant Paper: Grade B, Style 1a.

## 2.3 ACCESSORIES

A. General: Comply with material provisions of ASTM C 1063 and the requirements indicated below; coordinate depth of accessories with thicknesses and number of plaster coats required.

1. Plastic Components: ASTM D 4216, high-impact polyvinyl chloride (PVC) for building products.

B. Cornerbeads: Small nose cornerbeads fabricated from the following metal, with expanded flanges of large-mesh diamond-metal lath allowing full plaster encasement.

1. PVC Plastic: Minimum 0.035 inch (0.89 mm) thick.

C. Casing Beads: Square-edged style, with expanded flanges of the following material:

1. PVC Plastic: Minimum 0.035 inch (0.89 mm) thick.

D. Control Joints: Prefabricated, of material and type indicated below:

1. PVC Plastic: Minimum 0.035 inch (0.89 mm) thick.
2. One-Piece Type: Folded pair of nonperforated screeds in M-shaped configuration, with expanded or perforated flanges.

   a. Provide removable protective tape on plaster face of control joints.

E. Foundation Sill (Weep) Screed: Manufacturer's standard profile designed for use at sill plate line to form plaster stop and prevent plaster from contacting damp earth, fabricated from PVC plastic.

F. Lath Attachment Devices: Material and type required by ASTM C 1063 for installations indicated.

## 2.4 PLASTER MATERIALS

A. Base-Coat Cements: Type as indicated below:

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

B. Ready-Mixed Finish-Coat Plaster: Mill-mixed portland cement, aggregates, coloring agents, and proprietary ingredients.

1. Products:
   a. ChemRex; Thoro Stucco.
   b. Florida Stucco Corp
   c. Highland Stucco & Lime Products, Inc.;
   d. United States Gypsum Co.; Oriental Exterior Finish Stucco.
      1) Color: Grey

C. Lime: Special hydrated lime for finishing purposes, ASTM C 206, Type S; or special hydrated lime for masonry purposes, ASTM C 207, Type S.

D. Sand Aggregate for Base and Finish Coats: ASTM C 897.

1. Manufactured or natural sand.

2.5 MISCELLANEOUS MATERIALS

A. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch (13 mm) long, free of contaminates, manufactured for use in portland cement plaster.

B. Water for Mixing and Finishing Plaster: Potable.

2.6 PLASTER MIXES AND COMPOSITIONS

A. General: Comply with ASTM C 926 for base- and finish-coat mixes as applicable to plaster bases, materials, and other requirements indicated.

B. Base-Coat Mixes and Compositions: Proportion materials for respective base coats in parts by volume per sum of cementitious materials for aggregates to comply with the following requirements for each method of application and plaster base indicated. Adjust mix proportions below within limits specified to attain workability.

C. Fiber Content: Add fiber to following mixes after ingredients have mixed at least 2 minutes. Comply with fiber manufacturer's written instructions but do not exceed 1 lb/cu. ft. (16 kg/cu. m) of cementitious materials. Reduce aggregate quantities accordingly to maintain workability.

D. Three-Coat Work over Metal Lath: Base-coat proportions as indicated below:

1. Scratch Coat: 1 part portland cement, 0 to 3/4 parts lime, 2-1/2 to 4 parts aggregate.
2. Brown Coat: 1 part portland cement, 0 to 3/4 parts lime, 3 to 5 parts aggregate.

E. Portland Cement Job-Mixed Finish-Coat Mixes: For cementitious materials, mix 1 part portland cement and 1-1/2 to 2 parts lime. Use 1-1/2 to 3 parts aggregate per part of cementitious material (sum of separate volumes of each component material)..

2.7 MIXING

A. Mechanically mix cementitious and aggregate materials for plasters to comply with applicable referenced application standard and with recommendations of plaster manufacturer.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF LATH AND FURRING, GENERAL

A. Standards: Comply with ML/SFA 920, "Guide Specifications for Metal Lathing and Furring," and with requirements of ASTM C 1063.

### 3.2 LATHING

A. Install metal lath for the following applications where plaster base coats are required. Provide appropriate type, configuration, and weight of metal lath selected from materials indicated that comply with referenced ML/SFA specifications and ASTM lathing installation standards.

1. Monolithic surfaces using 3.4-lb/sq. yd. (1.8-kg/sq. m) minimum weight, self-furring, diamond-mesh lath.

### 3.3 PREPARATIONS FOR PLASTERING

A. Clean plaster bases and substrates for direct application of plaster, removing loose material and substances that may impair the Work.

B. Install temporary grounds and screeds to ensure accurate rodding of plaster to true surfaces; coordinate with scratch-coat work.

### 3.4 INSTALLATION OF PLASTERING ACCESSORIES

A. General: Comply with referenced lathing and furring installation standards for provision and location of plaster accessories of type indicated. Miter or cope accessories at corners; install with tight joints and in alignment. Attach accessories securely to plaster bases to hold accessories in place and in alignment during plastering. Install accessories of type indicated at following locations:

1. External Corners: Install corner reinforcement at external corners.
2. Terminations of Plaster: Install casing beads, unless otherwise indicated.
3. Control Joints: Install at locations indicated.

### 3.5 PLASTER APPLICATION

A. Plaster Application Standard: Apply plaster materials, composition, and mixes to comply with ASTM C 926.

B. Do not use materials that are frozen, caked, lumpy, dirty, or contaminated by foreign materials.

C. Do not use excessive water in mixing and applying plaster materials.

D. Flat Surface Tolerances: Do not deviate more than plus or minus 1/8 inch in 10 feet (3 mm in 3 m) from a true plane in finished plaster surfaces, as measured by a 10-foot (3-m) straightedge placed at any location on surface.

E. Grout hollow-metal frames, bases, and similar work occurring in plastered areas, with base-coat plaster material, and before lathing where necessary. Except where full grouting is indicated or required for fire-resistance rating, grout at least 6 inches (152 mm) at each jamb anchor.

F. Sequence plaster application with installation and protection of other work so that neither will be damaged by installation of other.

G. Plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground, unless otherwise indicated. Where plaster is not terminated at metal frame by casing beads cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.

H. Corners: Make internal corners and angles square; finish external corners flush with cornerbeads on interior work, square and true with plaster faces on exterior work.

I. Number of Coats: Apply plaster of composition indicated, to comply with the following requirements:

1. Three Coats: Over the following plaster base:

a. Metal lath.

J. Finish Coats: Apply finish coats to comply with the following requirements:

1. Trowel-Textured Finish: Apply finish coat with hand-trowelled-textured finish matching Architect's approved sample.

K. Moist-cure plaster base and finish coats to comply with ASTM C 926, including written instructions for time between coats and curing in "Annex A2 Design Considerations."

## 3.6 CUTTING AND PATCHING

A. Cut, patch, replace, repair, and point up plaster as necessary to accommodate other work. Repair cracks and indented surfaces. Point-up finish plaster surfaces around items that are built into or penetrate plaster surfaces. Repair or replace work to eliminate blisters, buckles, check cracking, dry outs, efflorescence, excessive pinholes, and similar defects. Repair or replace work as necessary to comply with required visual effects.

## 3.7 CLEANING AND PROTECTING

A. Remove temporary covering and other provisions made to minimize spattering of plaster on other work. Promptly remove plaster from door frames, windows, and other surfaces not to be plastered. Repair surfaces stained, marred or otherwise damaged during plastering work. When plastering work is completed, remove unused materials, containers, equipment, and plaster debris.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure plaster work is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 09220

# SECTION 09310 - CERAMIC TILE

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Ceramic mosaic tile.
2. Glazed wall tile.
3. Stone thresholds installed as part of tile installations.

### 1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples:

1. Each type, composition, color, and finish of tile and grout.
2. Stone thresholds in 6-inch (150-mm) lengths.

### 1.3 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

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

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

### 2.2 TILE PRODUCTS

A. Available Manufacturers:

1. American Olean; Div. of Dal-Tile International Corp.
2. Daltile; Div. of Dal-Tile International Inc.
3. Florida Tile Industries, Inc.
4. Monarch Tile, Inc.

B. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

C. Unglazed Ceramic Mosaic Tile Floors: Factory-mounted flat tile as follows:

1. Composition: Porcelain.
2. Surface: Smooth, without abrasive admixture.
3. Module Size: 2 by 2 inches (50.8 by 50.8 mm).
4. Nominal Thickness: 1/4 inch (6.35 mm).
5. Face: Plain with cushion edges.
6. Color: As selected by Architect from manufacture's full, American Olean Price Group III as basis of design.

D. Glazed Wall Tile Walls: Flat tile as follows:

1. Module Size: 6 by 6 inches (152 by 152 mm).
2. Thickness: 5/16 inch (8 mm).
3. Face: Plain with modified square edges or cushion edges.
4. Finish: Mat, opaque glaze.
5. Mounting: Factory back-mounted.
6. Color: As selected by Architect from manufacture's full, American Olean Price Group III as basis of design.

E. Glazed Wall Tile Trim Units: Matching characteristics of adjoining flat tile and coordinated with sizes and coursing where applicable.

1. Base: Coved based rounded top, module size 6 by 6 inches (152 by 152 mm).

## 2.3 ACCESSORY MATERIALS

A. Thresholds: Fabricate to provide transition between adjacent floor finishes. Bevel edges at 1:2 slope, limit height of bevel to 1/2 inch (12.7 mm) or less, and finish bevel to match face of threshold.

1. Marble Thresholds: ASTM C 503 with a minimum abrasion resistance of 10 per ASTM C 1353 or ASTM C 241 and with honed finish.

a. Description: Uniform, fine- to medium-grained white stone with gray veining.

## 2.4 SETTING AND GROUTING MATERIALS

A. Manufacturers:

1. Atlas Minerals & Chemicals, Inc.
2. Boiardi Products Corporation.

3. Bonsal, W. R., Company.
4. Bostik.
5. C-Cure.
6. Custom Building Products.
7. DAP, Inc.
8. Jamo Inc.
9. LATICRETE International Inc.
10. MAPEI Corporation.
11. Southern Grouts & Mortars, Inc.
12. Summitville Tiles, Inc.
13. TEC Specialty Products Inc.

B. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

1. Prepackaged dry-mortar mix containing dry additive to which only water must be added.
2. Prepackaged dry-mortar mix combined with liquid-latex additive.
3. For wall applications, provide nonsagging mortar.

C. Standard Unsanded Cement Grout: ANSI A118.6, color as selected.

D. Polymer-Modified Tile Grout: ANSI A118.7, color as selected from manufacturers full range.

1. Polymer Type: Dry, redispersible form, prepackaged with other dry ingredients.
2. Polymer Type: Liquid-latex form for addition to prepackaged dry-grout mix.

## 2.5 MISCELLANEOUS MATERIALS

A. Elastomeric Sealants: Elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 7 Section "Joint Sealants."

1. One-Part, Mildew-Resistant Silicone: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for in-service exposures of high humidity and extreme temperatures.

a. Available Products:

1) Dow Corning Corporation; Dow Corning 786.
2) GE Silicones; Sanitary 1700.
3) Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
4) Tremco, Inc.; Tremsil 600 White.

# PART 3 - EXECUTION

## 3.1 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions.

C. Remove protrusions, bumps, and ridges by sanding or grinding.

D. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing.

## 3.2 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.

C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Grind cut edges of tile abutting trim, finish, or built-in items. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.

F. Grout tile to comply with requirements of ANSI A108.10, unless otherwise indicated.

G. Install tile on floors with the following joint widths:

1. Ceramic Mosaic Tile: 1/16 inch (1.6 mm).

H. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile, unless otherwise indicated.

1. Set thresholds in latex-portland cement mortar for locations where mortar bed would otherwise be exposed above adjacent nontile floor finish.

I. Install tile on walls with the following joint widths:

1. Glazed Wall Tile: 1/16 inch (1.6 mm).

## 3.3 FLOOR TILE INSTALLATION SCHEDULE

A. Interior floor installation on concrete; thin-set mortar; TCA F113.

1. Thin-Set Mortar: Latex portland cement mortar.
2. Grout: Polymer-modified unsanded grout.

## 3.4 WALL TILE INSTALLATION SCHEDULE

A. Interior wall installation; thin-set mortar; over concrete masonry.

1. Thin-Set Mortar: Latex portland cement mortar.
2. Grout: Polymer-modified unsanded grout.

END OF SECTION 09310

# SECTION 09311 – PORCELAIN FLOOR TILE

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Porcelain tiles.
2. Crack-suppression membrane for thin-set tile installations.
3. Metal edge strips installed as part of tile installations.

B. Related Sections include the following:

1. Division 3 Section "Cast-in-Place Concrete" for monolithic slab finishes specified for tile substrates.
2. Division 7 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

### 1.2 DEFINITIONS

A. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.

B. Facial Dimension: Actual tile size (minor facial dimension as measured per ASTM C 499).

C. Facial Dimension: Nominal tile size as defined in ANSI A137.1.

### 1.3 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:

1. Level Surfaces: Minimum 0.6.

### 1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

D. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Sample of grout of type and in color or colors.
3. Metal edge strips in 6-inch (150-mm) lengths.

E. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

F. Product Certificates: For each type of product, signed by product manufacturer.

G. Qualification Data: For Installer.

H. Material Test Reports: For each tile-setting and -grouting product.

## 1.5 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain all tile of same color or finish from one source or producer.

1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:
1. Joint sealants.
2. Metal edge strips.
3. Expansion Joints

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Store emulsion adhesives in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.7 PROJECT CONDITIONS

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

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Basis-of-Design Product: The design for each tile type is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements, unless otherwise indicated.
2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting and Grouting Materials" Article.

C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the indicated requirements. Otherwise colors / patterns will be as selected from full range of manufacturer's products complying with stated requirements.

D. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

E. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by pre-coating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

## 2.3 TILE PRODUCTS

A. Manufacturers:

1. American Olean; Div. of Dal-Tile International Corp.
2. Crossville Ceramics Company, L.P.
3. Daltile; Div. of Dal-Tile International Inc.
4. Florida Tile Industries, Inc.

B. Unglazed Paver Tile; Flat tile as follows:

1. Composition: Porcelain.
2. Facial Dimensions: 11-13/16 by 11-13/16 inches (300 by 300 mm).
3. Thickness: 5/16 inch (8 mm).
4. Face: Plain with square edges
5. For latex-portland cement-mortared and -grouted paver tile, precoat with temporary protective coating.

## 2.4 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, aligning lower edge of bevel with adjacent floor finish. Limit height of bevel to 1/2 inch (12.7 mm) or less, and finish bevel to match face of threshold.

B. Granite Thresholds: ASTM C 615, with polished finish.

1. Description: Uniform, fine grained, black stone without veining.

## 2.5 CRACK-SUPPRESSION MEMBRANE FOR THIN-SET TILE INSTALLATIONS

A. General: Manufacturer's standard product that complies with ANSI A118.10.

B. Corrugated-Polyethylene Product: Corrugated polyethylene with dovetail-shaped corrugations for adhering to latex-portland cement mortar and with anchoring webbing on the underside; 39 inches (1000 mm) wide by 3/16-inch (4-mm) nominal thickness.

1. Product: Schluter Systems L.P.; DITRA.

## 2.6 SETTING AND GROUTING MATERIALS

A. Manufacturers:

1. Bonsal, W. R., Company.
2. C-Cure.
3. LATICRETE International Inc.
4. MAPEI Corporation.

B. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4, consisting of the following:

1. Prepackaged dry-mortar mix combined with acrylic resin liquid-latex additive.

a. For wall applications, provide nonsagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.

C. Polymer-Modified Tile Grout: ANSI A118.7, color as indicated.

1. Polymer Type: Either ethylene vinyl acetate, in dry, redispersible form, prepackaged with other dry ingredients, or acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.

a. Unsanded grout mixture for joints 1/8 inch (3.2 mm) and narrower.

## 2.7 ELASTOMERIC SEALANTS

A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 7 Section "Joint Sealants."

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.

C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

1. Products:

a. Dow Corning Corporation; Dow Corning 786.
b. GE Silicones; Sanitary 1700.
c. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
d. Tremco, Inc.; Tremsil 600 White.

D. Chemical-Resistant Sealants: For chemical-resistant floors, provide chemical-resistant elastomeric sealant of type recommended and produced by chemical-resistant mortar and grout manufacturer for type of application indicated, with proven service record and compatibility with tile and other setting materials, and with chemical resistance equivalent to mortar/grout. Include primer and backer rod recommended by manufacturer.

## 2.8 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness; metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications, anodized aluminum, and stainless steel; ASTM A 666, 300 Series exposed-edge material with satin finish.

1. Edge protecting profile for straight application

   a. Schluter: RENO TK

   b. Schluter: DILEX-BWS

2. Edge protecting profile for curved designs.

   a. Schluter: Schiene - R/E 100 for use with 5/16-inch thick natural stone.

C. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.

1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F (49 to 60 deg C) per ASTM D 87.
2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.

D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

E. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints that does not change color or appearance of grout.

1. Products:

   a. Bonsal, W. R., Company; Grout Sealer.
   b. C-Cure; Penetrating Sealer 978.
   c. Custom Building Products; Grout Sealer.
   d. MAPEI Corporation; KER 003, Silicone Spray Sealer for Cementitious Tile Grout.

## 2.9 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

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

### 3.2 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. Provide concrete substrates for tile floors installed with adhesives or thin-set mortar that comply with flatness tolerances specified in referenced ANSI A108 Series of tile installation standards.

1. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions. Use product specifically recommended by tile-setting material manufacturer.
2. Remove protrusions, bumps, and ridges by sanding or grinding.

C. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

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

## 3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.

C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.

F. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

   1. Locate joints in tile surfaces directly above joints in concrete substrates.
   2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

G. Grout tile to comply with requirements of the following tile installation standards:

   1. For ceramic tile grouts (sand-portland cement; dry-set, commercial portland cement; and latex-portland cement grouts), comply with ANSI A108.10.

## 3.4 CRACK-SUPPRESSION MEMBRANE INSTALLATION

A. Install waterproofing to comply with ANSI A108.13 and waterproofing manufacturer's written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate.

B. Install crack-suppression membrane to comply with manufacturer's written instructions to produce membrane of uniform thickness bonded securely to substrate.

## 3.5 FLOOR TILE INSTALLATION

A. General: Install tile to comply with requirements in the Floor Tile Installation Schedule, including those referencing TCA installation methods and ANSI A108 Series of tile installation standards.

1. For installations indicated below, follow procedures in ANSI A108 Series tile installation standards for providing 95 percent mortar coverage.

   a. Tile floors composed of tiles 8 by 8 inches (200 by 200 mm) or larger.

B. Joint Widths: Install tile on floors with the following joint widths:

   1. Porcelain Paver Tile: 3/8 inch (10 mm)

C. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile, unless otherwise indicated.

   1. Set thresholds in latex-portland cement mortar for locations where mortar bed would otherwise be exposed above adjacent nontile floor finish.

D. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

E. Grout Sealer: Apply grout sealer to cementitious grout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer that has gotten on tile faces by wiping with soft cloth.

## 3.6 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

   1. Remove latex-portland cement grout residue from tile as soon as possible.
   2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
   3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

B. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

## 3.7 FLOOR TILE INSTALLATION SCHEDULE

A. Tile Installation: Interior floor installation on crack-suppression membrane over concrete; thin-set mortar; TCA F122 and ANSI A108.5.

1. Tile Type: Porcelain Paver Tile.
2. Thin-Set Mortar: Latex-portland cement mortar.
3. Grout: Polymer-modified unsanded grout.

END OF SECTION 09311

# SECTION 09402 - RESINOUS MATRIX TERRAZZO FLOORING

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Thin-set epoxy-resin terrazzo flooring and base.
2. Divider and control joint strips.

B. Related Sections:

1. Division 1 Section "LEED Requirements" for additional LEED requirements.
2. Division 7 Section "Joint Sealants" for sealants installed with terrazzo.

### 1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include terrazzo installation requirements. Include plans, elevations, sections, component details, and attachments to other work. Show layout of the following:

1. Divider strips.
2. Control-joint strips.
3. Accessory strips.
4. Abrasive strips.
5. Stair treads, risers, and landings.
6. Precast terrazzo jointing and edge configurations.
7. Terrazzo patterns.

C. Samples for Initial Selection: NTMA color plates showing the full range of colors and patterns available for each terrazzo type indicated.

D. Samples for Verification: For each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Label each terrazzo sample to identify manufacturer's matrix color and aggregate types, sizes, and proportions. Prepare samples of same thickness and from same material to be used for the Work in size indicated below:

1. Terrazzo: 6-inch- (150-mm-) square Samples.
2. Accessories: 6-inch- (150-mm-) long Samples of each exposed strip item required.

E. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.

F. Qualification Data: For qualified Installer.

G. Material Certificates: For each type of terrazzo material or product, from manufacturer.

H. Maintenance Data: For terrazzo to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer (applicator) who is acceptable to terrazzo manufacturer to install manufacturer's products.

1. Engage an installer who is certified in writing by terrazzo manufacturer as qualified to install manufacturer's products.
2. Engage an installer who is a contractor member of NTMA.

B. Source Limitations: Obtain primary terrazzo materials from one source from a single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.

C. Source Limitations for Aggregates: Obtain each color, grade, type, and variety of from one source with resources to provide materials of consistent quality in appearance and physical properties.

D. NTMA Standards: Comply with NTMA's "Terrazzo Specifications and Design Guide" and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.

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

1. Build mockups for terrazzo including accessories.

a. Size: Minimum 100 sq. ft. (9 sq. m) of typical poured-in-place flooring and base condition for each color and pattern in locations directed by Architect on 4' by 8' exterior grade of plywood.

2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

F. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to terrazzo including, but not limited to, the following:

a. Inspect and discuss condition of substrate and other preparatory work performed by other trades.

b. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
c. Review special terrazzo designs and patterns.
d. Review dust-control procedures.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting terrazzo installation.

B. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.

C. Close spaces to traffic during epoxy terrazzo application and for not less than 24 hours after application unless manufacturer recommends a longer period.

D. Control and collect dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.

1. Provide dustproof partitions and temporary enclosures to limit dust migration and to isolate areas from noise.

PART 2 - PRODUCTS

2.1 EPOXY-RESIN TERRAZZO

A. Products: Subject to compliance with requirements, products that may be incorporated into the Work include the following:

1. Crossfield Products Corp., Dex-O-Tex Division; Terrazzo.
2. General Polymers Corporation; Terrazzo .
3. Key Resin Company; Key Epoxy Terrazzo.
4. Terrazzo Technologies LLC; Morricite.
5. Polymerica Incorporated; MasterPiece ETS.
6. Terrazzo & Marble Supply Companies; Terroxy Resin Systems.

B. Thickness: 3/8 inch (9.5 mm).

C. Materials:

1. Flexible Reinforcing Membrane: Manufacturer's resinous membrane for substrate crack preparation and reflective crack reduction.

a. Reinforcement: Fiberglass scrim.

2. Primer: Manufacturer's product recommended for substrate and use indicated.

3. Epoxy-Resin Matrix: Manufacturer's standard recommended for use indicated and in color required for mix indicated.

   a. Physical Properties without Aggregates:

      1) Hardness: 60 to 85 per ASTM D 2240, Shore D.
      2) Minimum Tensile Strength: 3000 psi (20.7 MPa) per ASTM D 638 for a 2-inch (51-mm) specimen made using a "C" die per ASTM D 412.
      3) Minimum Compressive Strength: 10,000 psi (6.9 MPa) per ASTM D 695, Specimen B cylinder.
      4) Chemical Resistance: No deleterious effects by contaminants listed below after seven-day immersion at room temperature per ASTM D 1308.

         a) Distilled water.
         b) Mineral water.
         c) Isopropanol.
         d) Ethanol.
         e) 0.025 percent detergent solution.
         f) 1.0 percent soap solution.
         g) 10 percent sodium hydroxide.
         h) 10 percent hydrochloric acid.
         i) 30 percent sulfuric acid.
         j) 5 percent acetic acid.

   b. Physical Properties with Aggregates: For resin blended with Georgia white marble, ground, grouted, and cured per requirements in NTMA's "Terrazzo Specifications and Design Guide," comply with the following:

      1) Flammability: Self-extinguishing, maximum extent of burning 0.25 inch (6.35 mm) per ASTM D 635.
      2) Thermal Coefficient of Linear Expansion: 0.0025 inch/inch per deg F (0.0025 mm/mm per 0.5556 deg C) for temperature range of minus 12 to plus 140 deg F (minus 24 to plus 60 deg C) per ASTM D 696.

4. Marble Chips: Complying with NTMA gradation standards for mix indicated and containing no deleterious or foreign matter.

   a. Hardness: HA-10 minimum per ASTM C24.
   b. 24-Hour Absorption Rate: Less than 0.75 percent.
   c. Dust Content: Less than 1.0 percent by weight.

5. Finishing Grout: Resin based.
6. Division-Strip Adhesives: Epoxy resin adhesive recommended by adhesive manufacturer for this use.

D. Terrazzo: Comply with NTMA's "Terrazzo Specifications and Design Guide" and manufacturer's written instructions for matrix and marble-chip proportions and mixing.

   1. Formulated Mix Color and Pattern: As selected by Architect from manufacturer's full range.

E. Terrazzo: Comply with NTMA's "Terrazzo Specifications and Design Guide" and manufacturer's written instructions for matrix and aggregate proportions and mixing.

## 2.2 STRIP MATERIALS

A. Thin-Set Divider Strips: L-type angle or T-type, 3/84 inch (9.5 mm) deep.

1. Material: White-zinc alloy.
2. Top Width: 1/8 inch (3.2 mm).

B. Heavy-Top Divider Strips: L-type angle in depth required for topping thickness indicated.

1. Bottom-Section Material: Matching top-section material.
2. Top-Section Material: White-zinc alloy.
3. Top-Section Width: 1/8 inch (3.2 mm) See Architectural Drawings.

C. Control-Joint Strips: Separate, double L-type angles, positioned back to back, that match material, thickness, and color of divider strips and in depth required for topping thickness indicated.

D. Accessory Strips: Match divider strip width, material, and color unless otherwise indicated. Use the following types of accessory strips as required to provide a complete installation:

1. Edge-beads for exposed edges of terrazzo.

## 2.3 MISCELLANEOUS ACCESSORIES

A. Patching and Fill Material: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.

B. Joint Compound: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.

C. Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, and recommended by sealer manufacturer for use on terrazzo type indicated.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Examine substrates and areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions, including levelness tolerances, have been corrected.

E. Research/Evaluation Reports: For each acoustical panel ceiling and components and anchor type.

F. Maintenance Data: For finishes to include in maintenance manuals.

## 1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:

1. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:

   a. Smoke-Developed Index: 450 or less.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

## 1.6 PROJECT CONDITIONS

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

## 1.7 COORDINATION

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

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.
2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

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

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 reflectance, unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface per ASTM E 795.

B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

C. Panel-Based Antimicrobial Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial solution that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria.

2.4 GLASS-FIBER-BASE, ACOUSTICAL PANELS WITH MEMBRANE-FACED OVERLAY FOR ACOUSTICAL PANEL CEILING

A. Product:

1. Armstrong Metalworks, Tartan, 24" wide panel grid.

2. Optima, Open Plan & Radial, Non Standard Sizes.

See Architectural drawings for acoustical panel layout. Products listed are based on a specific manufacturer's product using them as the basis of design. Other manufacturer's matching the exact specifications will be considered.

B. Classification: Provide fire-resistance-rated panels complying with ASTM E 1264 for type, form, and pattern as follows:

1. Type and Form: Type XII, Form 1.
2. Pattern: Fine texture

C. Color: White.

D. LR: Not less than 0.90.

E. NRC: Not less than 1.00.

F. Edge Detail: 9/16" Square Tegular.

G. Thickness: 1-1/2 inch.

H. Size: Non-standard size. (See Reflected Ceiling Plan)

## 2.5 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance".

C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1.Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

D. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

## 2.6 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING.

A. Product:

1. Armstrong Metalworks, Tartan, 24" wide panel grid.

2. Armstrong Interlude XL, 9/16", Non Standard Sizes.

3. Armstrong Axiom, Classic – 8" Curved Perimeter Trim

See Architectural drawings for acoustical panel layout. Products listed are based on a specific manufacturer's product using them as the basis of design. Other manufacturer's matching the exact specifications will be considered.

B. Wide-Faced, Capped, Double-Web, Hot-Dip Galvanized, Steel Suspension System: Main and cross runners formed from cold-rolled steel sheet, hot-dip galvanized according to ASTM A 653/A 653M coating designation, with prefinished, cold rolled, 9/16" wide aluminum caps on flanges.

1. Structural Classification: Intermediate-duty system.
2. Face Design: 24" wide, Tartan Custom Panel grid System.
   9/16" wide, Interlude XL Dimensional Tee grid. (Optima acoustical Panels)
3. Finish: Painted white.
4. Reveal Finish: Painted white.

## 2.7 METAL EDGE MOLDINGS AND TRIM

A. Manufacturers:

1. Armstrong World Industries, Inc.
2. Chicago Metallic Corporation.
3. Fry Reglet Corporation.
4. USG Interiors, Inc.

B. Roll-Formed Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish, and color 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.

## 2.8 ACCENT CANOPIES

A. Manufacturer:

1. Armstrong World Industries, Inc.

B. Channeled Polycarbonate, Infusion – Accent Canopies, 2' x 5', "Indigo Surf".

1. Suspend panels per manufacturer's recommendations. All panels are to be linked to each other with a 6" Linking Kit "E". Contractor to provide Escutcheon Kit "D" at all acoustical ceiling panel penetrations.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

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

### 3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

### 3.3 INSTALLATION, GENERAL

A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
4. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
5. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
6. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and

appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.

7. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
10. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches (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 (3.2 mm in 3.66 m). Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. Arrange directionally patterned acoustical panels as follows:

   a. As indicated on reflected ceiling plans.
   b. Install panels with pattern running in one direction parallel to long axis of space.

2. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
3. For reveal-edged panels on suspension system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension system surfaces and panel faces flush with bottom face of runners.
4. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
5. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated.

6. Install clean-room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.
7. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

## 3.4 CLEANING

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

END OF SECTION 09511

# SECTION 09651 - RESILIENT FLOOR TILE

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Solid vinyl floor tile.

B. Related Sections include the following:

1. Division 9 Section "Resilient Wall Base and Accessories" for resilient wall base, reducer strips, and other accessories installed with resilient floor tile.

### 1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of product indicated.

C. Samples for Verification: Full-size units of each color and pattern of resilient floor tile required.

D. Maintenance Data: For resilient products to include in maintenance manuals.

### 1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide products identical to those tested for fire-exposure behavior per test method indicated by a testing and inspecting agency acceptable to authorities having jurisdiction.

### 1.4 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store tiles on flat surfaces.

### 1.5 PROJECT CONDITIONS

A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After post installation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Close spaces to traffic during floor covering installation.

D. Close spaces to traffic for 48 hours after floor covering installation.

E. Install resilient products after other finishing operations, including painting, have been completed.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed or not less than 5%.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 COLORS AND PATTERNS

A. Colors and Patterns: As selected by Owner / Architect from manufacturer's complete range for specified product.

2.3 SOLID VINYL FLOOR TILE

A. Solid Vinyl Floor Tile: ASTM F 1700.

1. Mannington Commercial Flooring;
2. Armstrong World Industries, Inc.;
3. Azrock Commercial Flooring, DOMCO;
4. Marley Flexco (USA), Inc.;
5. Roppe Corporation.

B. Reference Specification: Meets or exceeds ASTM F 1303-97, Type KK, Grade I.

C. Type: B, Embossed Surface Homogeneous-wear layer containing suspended microscopic aluminum oxide particles.

D. Thickness: 0.080 inch (2.0 mm).

E. Size: 18 by 18 inches (457 by 457 mm).

F. Fire-Test-Response Characteristics:

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm per ASTM E 648.
2. NBS Smoke Density ASTM E 662: 450 or less.

G. Slip Retardant Performance: ASTM D 2047 James Test exceeds the ADA recommended static coefficient of friction for accessible routes.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
3. Moisture Testing:

a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 5 lb of water/1000 sq. ft. in 24 hours.

C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

D. Use trowelable non-shrinking water resistant Portland cement leveling and patching compound to fill cracks, holes, and depressions in substrates.

E. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

1. Do not install resilient products until they are same temperature as space where they are to be installed.

F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.3 TILE INSTALLATION

A. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles square with room axis.

B. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain running in one direction.

C. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.

D. Extend tiles into toe spaces, door reveals, closets, and similar openings.

E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

F. Install tiles on covers for telephone and electrical ducts and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of tile installed on covers. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

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

## 3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

    a. Do not wash surfaces until after time period recommended by manufacturer.

B. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

1. Apply protective floor polish to horizontal surfaces that are free from soil, visible adhesive, and surface blemishes if recommended in writing by manufacturer.

    a. Use commercially available product acceptable to manufacturer.
    b. Coordinate selection of floor polish with Owner's maintenance service.

2. Cover products installed on horizontal surfaces with undyed, untreated building paper until Substantial Completion.
3. Do not move heavy and sharp objects directly over surfaces. Place hardboard or plywood panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION 09651

# SECTION 09653 - RESILIENT WALL BASE AND ACCESSORIES

## PART 1 - GENERAL

1.1 Submittals: In addition to product data submit the following:

A. Samples in manufacturer's standard sizes of each different color and pattern of product specified.

B. Maintenance data for products specified in this Section, to include in Operating and Maintenance Manuals.

1.2 Extra Materials: Deliver to Owner not less than 10 linear feet (3 meters) for each 500 linear feet (150 meters) or fraction thereof, in roll form of each different material, style and color of resilient wall base installed.

## PART 2 - PRODUCTS

2.1 Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to:

A. Armstrong World Industries, Inc.;
B. Azrock Commercial Flooring, DOMCO;
C. Burke Mercer Flooring Products;
D. Johnsonite;
E. Marley Flexco (USA), Inc.; and
F. Roppe Corporation.

2.2 Rubber Wall Base: Products complying with ASTM F1861, Type TP, Group I, and requirements specified in the Rubber Wall Base Product Data at end of this Section.

2.3 Concrete Slab Primer: Nonstaining type as recommended by flooring manufacturer.

2.4 Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.

2.5 Adhesives: Water-resistant type recommended by manufacturer to suit resilient flooring product and substrate conditions indicated.

## PART 3 - EXECUTION

3.1 Examine areas where installation of products specified in this Section will occur, with Installer present, to verify that substrates and conditions are satisfactory for installation and comply with manufacturer's requirements.

A. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 before beginning installation.

3.2 Preparation: Comply with manufacturer's installation specifications to prepare substrates indicated to receive products specified in this Section.

3.3 Installation: Install products specified in this Section using methods indicated according to manufacturer's installation directions.

A. Apply resilient wall base to walls, columns, pilasters, casework, and other permanent fixtures in rooms or areas where base is required. Install wall base in lengths as long as practicable.

B. Tightly adhere wall base to substrate throughout length of each piece, with continuous contact of base with horizontal and vertical substrates.

C. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

D. Place resilient accessories so they are butted to adjacent materials of type indicated and secure with adhesive. Install reducer strips at edges of flooring that otherwise would be exposed.

3.4 Cleaning: Clean products specified in this Section after installation and 4 days prior to date scheduled for inspections intended to establish date of Substantial Completion. Apply protective polish according to resilient accessory manufacturer's directions.

A. Rubber Wall Base Product Data
Style: Cove with top-set toe
Minimum Thickness: 1/8"
Height: 4"
Lengths: Coils in lengths standard with manufacturer but not less than 100 feet
Exterior Corners: Premolded
Interior Corners: Field Cut
Color: As selected by Architect from manufacturers full range of colors.

END OF SECTION 09653

# SECTION 09900 - PAINTING

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes surface preparation and field painting of the following:

1. Exposed exterior items and surfaces.
2. Exposed interior items and surfaces.
3. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.

1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and ironwork, and primed metal surfaces of mechanical and electrical equipment.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Prefinished items include the following factory-finished components:

a. Architectural woodwork and casework.
b. Acoustical wall panels.
c. Metal toilet enclosures.
d. Metal lockers.
e. Unit kitchens.
f. Finished mechanical and electrical equipment.
g. Light fixtures.
h. Distribution cabinets.

2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:

a. Foundation spaces.
b. Furred areas.
c. Ceiling plenums.
d. Utility tunnels.
e. Pipe spaces.
f. Duct shafts.
g. Elevator shafts.

3. Finished metal surfaces include the following:

   a. Anodized aluminum.
   b. Stainless steel.
   c. Chromium plate.
   d. Copper.
   e. Bronze and brass.

4. Operating parts include moving parts of operating equipment and the following:

   a. Valve and damper operators.
   b. Linkages.
   c. Sensing devices.
   d. Motor and fan shafts.

5. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

## 1.2 SUBMITTALS

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

   1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
   2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.

B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.

   1. After color selection, the Architect will furnish color chips for surfaces to be coated.

C. 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 addresses of architects and owners, and other information specified.

## 1.3 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.

B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

C. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample of each type of coating and substrate required on the Project. Comply with procedures specified in PDCA P5. Duplicate finish of approved prepared samples.

1. The Architect will select one room or surface to represent surfaces and conditions for each type of coating and substrate to be painted.

   a. Wall Surfaces: Provide samples on at least 100 sq. ft. (9 sq. m) of wall surface.

2. Final approval of colors will be from job-applied samples.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (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.

1.5 PROJECT CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F (10 and 32 deg C).

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F (7.2 and 35 deg C).

C. Do not apply paint in rain, fog, or mist; or when the relative humidity exceeds 85 percent; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

## 1.6 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to the Owner.

1. Quantity: Furnish the Owner with an additional 5 percent, but not less than 1 gal. (3.785 L) or 1 case, as appropriate, of each material and color applied.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in the paint schedules.

B. Manufacturers Names: The following manufacturers are referred to in the paint schedules by use of shortened versions of their names, which are shown in parentheses:

1. Devoe & Raynolds Co. (Devoe).
2. Fuller-O'Brien Paints (Fuller).
3. Glidden Co. (The) (Glidden).
4. Benjamin Moore & Co. (Moore).
5. PPG Industries, Inc. (PPG).
6. Pratt & Lambert, Inc. (P & L).
7. Sherwin-Williams Co. (S-W).

## 2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: Provide color selections made by the Architect.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.

1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
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.

### 3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.
2. Cementitious Materials: Prepare concrete, 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.

   a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
   b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and

burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.

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.

3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.

   a. Blast steel surfaces clean as recommended by paint system manufacturer and according to requirements of 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 paint manufacturer, and touch up with the same primer as the shop coat.

4. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

## 3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the schedules.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, 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.

5. 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.
6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
9. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
10. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
2. Omit primer on metal surfaces that have been shop primed and touchup painted.
3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, 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.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
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.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.

F. Mechanical items to be painted include, but are not limited to, the following:

1. Piping, pipe hangers, and supports.
2. Heat exchangers.

3. Tanks.
4. Ductwork.
5. Insulation.
6. Motors and mechanical equipment.
7. Accessory items.

G. Electrical items to be painted include, but are not limited to, the following:

1. Conduit and fittings.
2. Switchgear.
3. Panelboards.

H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

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 surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

K. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

## 3.4 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from 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.

## 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 approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

## 3.6 EXTERIOR PAINT SCHEDULE

A. Plywood: Provide the following finish systems over exterior plywood:

B. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.

1. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a rust-inhibitive primer.

a. Primer: Rust-inhibitive metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils (0.033 mm).

1) Devoe: 13101 Mirrolac Rust Penetrating Metal Primer.
2) Fuller: 621-04 Blox-Rust Alkyd Metal Primer.
3) Glidden: 5205 Glid-Guard Tank & Structural Primer, Red.
4) Moore: IronClad Retardo Rust-Inhibitive Paint #163.
5) PPG: 6-208 Speedhide Interior/Exterior Rust Inhibitive Steel Primer.
6) P & L: S/D 1009 Suprime "9" Interior/Exterior Alkyd Metal Primer.

b. First and Second Coats: Semigloss, exterior, acrylic-latex enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils (0.066 mm).

1) Devoe: 17XX Wonder-Shield Semi-Gloss Exterior Acrylic Latex House and Trim Paint.
2) Fuller: 664-XX Weather King II Semi-Gloss House & Trim Paint.
3) Glidden: 6600 Series Spred Ultra Exterior Gloss Latex House & Trim Paint.
4) Moore: MoorGlo Latex House & Trim Paint #096.
5) PPG: 78 Line Sun-Proof Semi-Gloss Acrylic Latex House and Trim Paint.
6) P & L: Z/F 3100 Series Aqua Royal Latex House & Trim Finish.

C. Zinc-Coated Metal: Provide the following finish systems over exterior zinc-coated (galvanized) metal surfaces:

1. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a galvanized metal primer.

a. Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils (0.031 mm).

1) Devoe: 8502/8520 Mirrolac-WB Interior/Exterior Waterborne Flat DTM Primer and Finish.
2) Fuller: 621-05 Blox-Rust Latex Metal Primer.
3) Glidden: 5205 Glid-Guard Tank & Structural Primer, Red.
4) Moore: IronClad Galvanized Metal Latex Primer #155.
5) PPG: 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel.
6) P & L: Z/F 1003 Suprime "3" Interior/Exterior Latex Metal Primer.

b. First and Second Coats: Semigloss, exterior, acrylic-latex enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils (0.066 mm).

1) Devoe: 17XX Wonder-Shield Semi-Gloss Exterior Acrylic Latex House and Trim Paint.
2) Fuller: 664-XX Weather King II Semi-Gloss House & Trim Paint.
3) Glidden: 6600 Series Spred Ultra Exterior Gloss Latex House & Trim Paint.
4) Moore: MoorGlo Latex House & Trim Paint #096.
5) PPG: 78 Line Sun-Proof Semi-Gloss Acrylic Latex House and Trim Paint.
6) P & L: Z/F 3100 Series Aqua Royal Latex House & Trim Finish.

## 3.7 INTERIOR PAINT SCHEDULE

A. Concrete Masonry Units: Provide the following finish systems over interior concrete masonry block units:

1. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a block filler.

a. Block Filler: High-performance, latex-based, block filler applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 5.0 mils (0.13 mm).

1) Devoe: 52902 Bloxfil 200 Interior/Exterior Latex Block Filler.
2) Fuller: 280-00 Interior/Exterior Latex Block Filler.
3) Glidden: 5317 Ultra-Hide Block Filler, Latex Interior-Exterior.
4) Moore: Moorcraft Interior & Exterior Block Filler #173.
5) PPG: 6-7 Speedhide Interior/Exterior Masonry Latex Block Filler.
6) P & L: Z 98 Pro-Hide Plus Latex Block Filler.

b. First and Second Coats: Semigloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils (0.066 mm).

1) Devoe: 39XX Wonder-Tones Semi-Gloss Interior Latex Enamel.
2) Fuller: 214-XX AA Enamel Interior Acrylic Latex Semi-Gloss Enamel.
3) Glidden: 8200 Series Spred Ultra Latex Semi-Gloss Enamel.
4) Moore: Moore's Regal AquaGlo Vinyl-Acrylic Latex Enamel #333.
5) PPG: 88-110 Satinhide Interior Enamel Wall & Trim Lo-Lustre Semi-Gloss Latex.
6) P & L: Z/F 4100 Series Accolade Interior Semi-Gloss.

B. Plaster: Provide the following finish systems over new, interior plaster surfaces:

1. Low-Luster, Acrylic-Enamel Finish: 2 finish coats over a primer.

a. Primer: Alkali-resistant, alkyd- or latex-based, interior primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by

the manufacturer to achieve a total dry film thickness of not less than 1.2 mils (0.031 mm).

1) Devoe: 51701 Wonder-Prime Interior All-Purpose Latex Primer Sealer & Vapor Barrier.
2) Fuller: 220-06 Interior Alkyd Wall Primer Sealer.
3) Glidden: 5111 Spred Ultra Latex Primer-Sealer.
4) Moore: Regal First Coat Interior Latex Primer & Underbody #216.
5) PPG: 6-603 Speedhide Interior/Exterior Acrylic Latex Alkali Resistant Primer.
6) P & L: Z/F 1001 Suprime "1" 100 Percent Acrylic Multi-Purpose Primer.

b. First and Second Coats: Low-luster (eggshell or satin), acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.8 mils (0.071 mm).

1) Devoe: 34XX Wonder-Tones Interior Latex Eggshell Enamel.
2) Fuller: 212-XX AA Enamel Interior Acrylic Latex Eggshell Enamel.
3) Glidden: 4100 Series Spred Ultra Eggshell Latex Wall & Trim Paint.
4) Moore: Moore's Regal AquaVelvet #319.
5) PPG: 89 Line Manor Hall Eggshell Latex Wall and Trim Enamel.
6) P & L: Z/F 4000 Series Accolade Interior Velvet.
7) Acoustical Plaster: Provide the following finish system over interior, acoustical plaster
8) PPG: 89 Line Manor Hall Interior Eggshell Latex Wall and Trim Enamel.
9) P & L: Z/F 4000 Series Accolade Interior Velvet.
10) PPG: 88-110 Satinhide Interior Enamel Wall & Trim Lo-Lustre Semi-Gloss Latex.
11) P & L: Z/F 4100 Series Accolade Interior Semi-Gloss.

C. Ferrous Metal: Provide the following finish systems over ferrous metal:

1. Semigloss, Acrylic-Enamel Finish: One finish coat over an enamel undercoater and a primer.

a. Primer: Quick-drying, rust-inhibitive, alkyd-based or epoxy-metal primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils (0.038 mm).

1) Devoe: 13101 Mirrolac Rust Penetrating Metal Primer.
2) Fuller: 621-04 Blox-Rust Alkyd & Structural Metal Primer.
3) Glidden: 5207 Glid-Guard Tank & Structural Primer, White.
4) Moore: IronClad Retardo Rust-Inhibitive Paint #163.
5) PPG: 6-208 Speedhide Interior/Exterior Rust Inhibitive Steel Primer.
6) P & L: S 4551 Tech-Gard High Performance Rust Inhibitor Primer.

b. Undercoat: Alkyd, interior enamel undercoat or semigloss, acrylic-latex, interior enamel, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils (0.033 mm).

1) Devoe: 39XX Wonder-Tones Semi-Gloss Interior Latex Enamel.
2) Fuller: 220-07 Interior Alkyd Enamel Undercoat.
3) Glidden: 8200 Series Spred Ultra Latex Semi-Gloss Enamel.
4) Moore: Moore's Alkyd Enamel Underbody #217.
5) PPG: 6-6 Speedhide Interior Quick-Drying Enamel Undercoater.
6) P & L: Z/F 4100 Series Accolade Interior Semi-Gloss.

c. Finish Coat: Semigloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils (0.033 mm).

1) Devoe: 39XX Wonder-Tones Semi-Gloss Interior Latex Enamel.
2) Fuller: 214-XX AA Enamel Interior Acrylic Latex Semi-Gloss Enamel.
3) Glidden: 8200 Series Spred Ultra Latex Semi-Gloss Enamel.
4) Moore: Moore's Regal AquaGlo Vinyl-Acrylic Latex Enamel #333.
5) PPG: 88-110 Satinhide Interior Enamel Wall & Trim Lo-Lustre Semi-Gloss Latex.
6) P & L: Z/F 4100 Series Accolade Interior Semi-Gloss.

D. Zinc-Coated Metal: Provide the following finish systems over zinc-coated metal:

1. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a primer.

a. Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils (0.031 mm).

1) Devoe: 13201 Mirrolac Galvanized Metal Primer.
2) Fuller: 621-05 Blox-Rust Latex Metal Primer.
3) Glidden: 5207 Glid-Guard Tank & Structural Primer, White.
4) Moore: IronClad Galvanized Metal Latex Primer #155.
5) PPG: 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel.
6) P & L: Z/F 1003 Suprime "3" Interior/Exterior Latex Metal Primer.

b. First and Second Coats: Semigloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils (0.066 mm).

1) Devoe: 39XX Wonder-Tones Semi-Gloss Interior Latex Enamel.
2) Fuller: 214-XX AA Enamel Interior Acrylic Latex Semi-Gloss Enamel.
3) Glidden: 8200 Series Spred Ultra Latex Semi-Gloss Enamel.
4) Moore: Moore's Regal AquaGlo Vinyl-Acrylic Latex Enamel #333.
5) PPG: 88-110 Satinhide Interior Enamel Wall & Trim Lo-Lustre Semi-Gloss Latex.
6) P & L: Z/F 4100 Series Accolade Interior Semi-Gloss.

E. Cotton or Canvas Covering over Insulation: Provide the following finish system on cotton or canvas insulation covering:

1. Flat Acrylic Finish: 2 finish coats. Add fungicidal agent to render fabric mildewproof.

a. First and Second Coats: Flat, latex-based, interior paint applied at spreading rate recommended by the manufacturer.

1) Devoe: 36XX Wonder-Tones Interior Latex Flat Wall Paint.
2) Fuller: 202-XX Acrylic Latex Wall Paint.
3) Glidden: 4000 Series Spred Ultra Flat Latex Wall and Trim Paint.
4) Moore: Regal Wall Satin #215.
5) PPG: 6-700 Series Speedhide Ultra Interior Wall Flat Latex 100 Percent Acrylic.
6) P & L: Z/F 1005 Suprime "5" Latex Pre-Wallcovering Primer.
7) S-W: Classic 99 Wall and Trim Paint A27W10.

END OF SECTION 09900

# SECTION 09963 - ELASTOMERIC COATINGS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes surface preparation and application of elastomeric coatings to all exterior stucco and scheduled interior exposed concrete masonry surfaces.

### 1.2 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

B. Stucco: A portland cement-based plaster used on exterior surfaces.

### 1.3 PERFORMANCE REQUIREMENTS

A. Provide elastomeric coating systems with the following properties as determined by test methods indicated:

1. Elongation: Not less than 100 percent with a tensile strength of 200 psi (1379 kPa) and not less than 88 percent recovery after 1 hour and 90 percent recovery after 24 hours when tested according to ASTM D 2370 using parameters established by MPI 113.
2. Accelerated Weathering: No cracking, peeling, blistering, chalking, or visual deterioration after 1000 hours when tested according to procedures in ASTM G 155.
3. Low-Temperature Flexibility: No crack formation when tested according to ASTM D 1737.
4. Moisture-Vapor Transmission: Not less than 2.0 perms (115 ng/Pa x s x sq. m) according to ASTM D 1653.
5. Wind-Driven Rain Resistance: No water penetration according to procedures in FS TT-C-555.
6. Minimum Solids Content by Volume: Not less than 45 percent.

### 1.4 SUBMITTALS

A. Product Data: For each elastomeric coating system specified. Include crack fillers, block fillers, and primers.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference the specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Technical information including label analysis and instructions for handling, storing, and applying each coating material.

B. Samples for Initial Selection: For each type of finish-coat material indicated.

1. After color selection, Architect will furnish color chips indicating colors selected.

C. Material Certificates: For each elastomeric coating material, signed by manufacturers.

## 1.5 QUALITY ASSURANCE

A. Applicator Qualifications: A firm or individual experienced in applying elastomeric coating systems similar in material and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Source Limitations: Obtain crack fillers, block fillers and primers from same manufacturer as finish coats.

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Product name or title of material.
2. Manufacturer's stock number and date of manufacture.
3. Contents by volume, for pigment and vehicle constituents.
4. Thinning instructions (if permitted).
5. Application instructions.
6. Color name and number.
7. Handling instructions and precautions.
8. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain storage containers in a clean condition, free of foreign materials and residue.

1. Protect elastomeric coating materials from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

## 1.7 PROJECT CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 90 deg F (10 and 32 deg C), unless otherwise permitted by manufacturer's written instructions.

B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent or to damp or wet surfaces.

1. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before starting or continuing coating operation.

## 1.8 WARRANTY

A. Elastomeric Coating Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace elastomeric coatings that fail within specified warranty period. Failures include, but are not limited to, water penetration through the coating.

B. Warranty Period for Elastomeric Coatings: One year from date of Substantial Completion.

## 1.9 EXTRA MATERIALS

A. Furnish extra elastomeric coating materials from same production run as materials applied and in quantities described below. Package materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to Owner.

1. Quantity: Furnish Owner with an additional 3 percent, but not less than 1 gal. (3.8 L) of each color applied.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

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

B. Manufacturers Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Benjamin Moore & Co. (Benjamin Moore).
2. ICI Dulux Paint Centers, Inc. (ICI Dulux Paint).
3. Modac Products Company (Modac).
4. PPG Industries, Inc.; Pittsburgh Paints (Pittsburgh Paints).
5. Sonneborn, Div. of ChemRex, Inc. (Sonneborn).
6. Sto Concrete Restoration; Sto Finish Systems Division (Sto).
7. Tamms Industries, Inc. (Tamms).
8. Tnemec Company, Inc. (Tnemec).

## 2.2 ELASTOMERIC COATING MATERIALS, GENERAL

A. Material Compatibility: Provide crack fillers, block fillers, primers, elastomeric finish-coat materials, and related materials that are compatible with one another and substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality elastomeric coating materials that are factory formulated, comply with requirements in FS TT-C-555, and are recommended by manufacturer for the application indicated. Material containers not displaying manufacturer's product identification are not acceptable.

C. Colors and Textures: As selected by Architect from manufacturer's full range.

## 2.3 CRACK FILLERS

A. Crack Fillers: Factory-formulated acrylic emulsion crack fillers compatible with substrate and finish-coat materials indicated.

1. Crack Filler for Cracks up to 1/16 Inch (1.5 mm):

   a. ICI Dulux Paint; Decra-Flex Smooth Brush Grade Elastomeric Patching Compound.
   b. Modac; Acra Lastic Brush Grade 115-004.
   c. Pittsburgh Paints; Buttering Grade Vinyl Sealant 236-2414.
   d. Sonneborn; Hydrocide 750 Brush Grade or Knife Grade Patching Compound.
   e. Sto; Flexible Crack Filler.

## 2.4 CONCRETE MASONRY BLOCK FILLERS

A. Concrete Unit Masonry Block Filler: Factory-formulated, high-performance latex block fillers.

1. Benjamin Moore; Moorcraft Super Craft Latex Block Filler #285: Applied at a dry film thickness of not less than 8.1 mils (0.206 mm).
2. ICI Dulux Paint; Bloxfil 4000-1000 Interior/Exterior Heavy Duty Acrylic Block Filler: Applied at a dry film thickness of not less than 7.0 to 14.5 mils (0.178 to 0.368 mm).
3. Modac; 100% Acrylic Block Filler 019-146: Applied at a dry film thickness of not less than 4.0 mils (0.104 mm).
4. Pittsburgh Paints; 16-90 High-Performance Acrylic Block Filler: Applied at a dry film thickness of not less than 6.0 mils (0.152 mm).
5. Sonneborn; Colorflex Block Filler #749: Applied at a dry film thickness of not less than 1.3 mils (0.033 mm).
6. Sto; Flexible Coating CR212 Thinned 1:5 with 1 Gal. (3.8 L) of Water per Each 5 Gal. (19 L) of CR212: Applied at a dry film thickness of not less than 10 mils (0.254 mm).
7. Tamms; H/P Primer: Applied at a dry film thickness of not less than 1.3 mils (0.033 mm).

## 2.5 PRIMERS

A. Stucco Primer: Factory-formulated stucco primer.

1. Benjamin Moore; Moore's Acrylic Masonry Sealer #066: Applied at a dry film thickness of not less than 0.7 mil (0.018 mm).
2. ICI Dulux Paint; Aquacrylic GRIPPER 3210 Acrylic Primer: Applied at a dry film thickness of not less than 1.3 mils (0.033 mm).
3. Modac; Acrylic Latex Surface Conditioner 019-156: Applied at a dry film thickness of not less than 4.0 mils (0.104 mm).
4. Pittsburgh Paints; primer not required.
5. Sonneborn; primer not required.

6. Sto; Flexible Coating CR212 Thinned 1:5 with 1 Gal. (3.8 L) of Water per Each 5 Gal. (19 L) of CR212: Applied at a dry film thickness of not less than 10 mils (0.254 mm).
7. Tamms; H/P Primer: Applied at a dry film thickness of not less than 1.3 mils (0.033 mm).
8. Tnemec; Elasto-Grip Series 151: Applied at a dry film thickness of not less than 3.5 mils (0.090 mm).

## 2.6 ELASTOMERIC FINISH-COAT MATERIALS

A. Smooth Elastomeric Finish: Smooth, factory-formulated, 100 percent acrylic elastomeric coating.

1. Benjamin Moore; Moorlastic Elastomeric Waterproof Coating #055: Applied at a dry film thickness of not less than 10 mils (0.254 mm).
2. ICI Dulux Paint; Decra-Flex 2260-XXXX Smooth Elastomeric Coating System: Applied at a dry film thickness of not less than 6.0 mils (0.15 mm).
3. Modac; Elastomeric Acrylic Coating--Smooth Texture 019-146: Applied at a dry film thickness of not less than 7.0 mils (0.18 mm).
4. Pittsburgh Paints; Pitt-Flex Exterior Masonry Coating 100 Percent Acrylic Elastomeric 4-110: Applied at a dry film thickness of not less than 5.5 mils (0.140 mm).
5. Sonneborn; Sonocoat Colorflex Waterproof Elastomeric Coating: Applied at a dry film thickness of not less than 8.0 mils (0.020 mm).
6. Sto; Flexible Coating CR212: Applied at a dry film thickness of not less than 10 mils (0.254 mm).
7. Tamms; Tammolastic Smooth Elastomeric Decorative and Protective Coating: Applied at a dry film thickness of not less than 10 mils (0.254 mm).
8. Tnemec; Enviro-Crete Series 156 Smooth: Applied at a dry film thickness of not less than 8.0 mils (0.021 mm).

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for coating application. Comply with procedures specified in PDCA P4.

1. Proceed with coating application only after unsatisfactory conditions have been corrected and surfaces are thoroughly dry.
2. Start of coating application will be construed as Applicator's acceptance of surface conditions.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

## 3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, light fixtures, and similar items already installed that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.

1. After completing coating operations, reinstall items removed, using workers skilled in trades involved.

B. Cleaning: Before applying coatings or other surface treatments, clean substrates of substances that could impair bond of coating systems. Remove oil and grease before cleaning.

1. Schedule cleaning and coating application so dust and other contaminants from cleaning process will not fall on wet, newly coated surfaces.

C. Surface Preparation: Clean and prepare surfaces to be coated according to manufacturer's written instructions for particular substrate conditions and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.
2. Cementitious Surfaces: Prepare concrete unit masonry and stucco surfaces to receive elastomeric coatings. Remove efflorescence, chalk, dust, dirt, release agents, grease, oils, and similar impediments to good adhesion by water blasting followed by a clear water rinse.

   a. Remove mildew and neutralize surfaces according to manufacturer's written instructions before patching materials are applied.
   b. Determine alkalinity and moisture content of surfaces to be coated by performing appropriate tests. If surfaces are sufficiently alkaline to cause finish paint to blister and burn, correct this condition before application. Do not apply coatings over surfaces where moisture content exceeds that permitted in manufacturer's written instructions.

3. Crack Repair: Fill cracks according to manufacturer's written instructions before coating surfaces.
4. Deep Hairline Cracks: Remove dust and dirt from around cracks. Remove mildew by sterilizing before filling. Apply manufacturer's recommended primer to cracks before patching. If shrinkage occurs after applying crack filler, apply additional filler material to cracks before initial application of elastomeric coatings.

   a. Cracks up to 1/16 Inch (1.5 mm): Clean surface around cracks. Apply crack filler primer penetrating cracks as deeply as possible, overflowing crack 2 inches (50 mm) on each side. When crack filler primer is dry, apply manufacturer's recommended sealant, forced well into cracks using a brush, putty knife, or trowel. Smooth edges of primed area around cracks. Allow for sealant shrinkage when applying.

D. Material Preparation: Mix and prepare materials according to coating manufacturer's written instructions.

1. Maintain containers used in mixing and applying elastomeric coatings in a clean condition, free of foreign materials and residue.
2. Stir materials before application to produce a mixture of uniform density. Stir as required during application. If surface film forms, do not stir film into material. If necessary, remove film and strain coating material before using.
3. If manufacturer permits thinning, use only thinners recommended by manufacturer, and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match color of finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

## 3.3 APPLICATION

A. General: Apply elastomeric coatings according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Colors, surface treatments, and finishes are indicated in coating schedule.
2. Do not paint over conditions detrimental to formation of a durable coating film, such as dirt, rust, scale, grease, moisture, and scuffed surfaces.
3. Provide finish coats compatible with primers used.

B. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

C. Scheduling Coating: 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. Number of coats and film thickness required are same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.
2. If undercoats or other conditions show through final coat, apply additional coats until coating film is of uniform finish, color, and appearance. Ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.
3. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until coating has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat does not cause undercoat to lift or lose adhesion.

D. Application Procedures: Apply elastomeric coatings by brush, roller, or spray according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for material being applied.
2. Rollers: Use professional-quality quick-release rollers of carpet, velvet back, or high-pile sheep's wool covers with a 1- to 1-1/4-inch (25.4- to 31.8-mm) nap as recommended by manufacturer for material and texture required.

E. Minimum Coating Thickness: Apply each material no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness as recommended by manufacturer.

F. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

G. Prime Coats: If recommended by manufacturer, apply a primer to material being coated before applying finish coats.

H. Brush Application: Brush out and work brush coats into surfaces in an even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Neatly draw glass lines and color breaks.

I. Roller Application: Keep cover wet at all times; do not dry roll. Work in sections. Lay on required amount of material, working material into grooves and rough areas; then level material, working it into surface.

J. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or recoat work not complying with specified requirements.

## 3.4 CLEANING

A. Cleanup: At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. After completing coating work, clean glass and spattered surfaces. Remove spattered coatings by washing, scraping, or other methods, being careful not to scratch or damage adjacent finished surfaces.

## 3.5 PROTECTION

A. Protect work of other trades from damage whether being coated or not. Correct damage by cleaning, repairing, replacing, and recoating as approved by Architect. Leave in an undamaged condition.

B. Provide "Wet Paint" signs to protect newly coated finishes. Remove temporary protective wrappings provided by others to protect their work after completing coating operations.

## 3.6 COATING SCHEDULE

A. Concrete Unit Masonry: Provide the following elastomeric coating systems over interior concrete unit masonry surfaces:

1. Smooth Elastomeric Finish: Two finish coat(s) over a concrete unit masonry block filler if required by manufacturer.

   a. Block Filler: Concrete unit masonry block filler.
   b. Primer: Concrete and masonry primer.
   c. Finish Coats: Smooth elastomeric finish.

B. Stucco (Portland Cement Plaster): Provide the following elastomeric coating systems over exterior stucco surfaces:

1. Smooth Elastomeric Finish: Two finish coat(s) over a primer if required by manufacturer.

   a. Primer: Stucco primer.
   b. Finish Coats: Smooth elastomeric finish.

END OF SECTION 09963

# SECTION 10155 - TOILET COMPARTMENTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes toilet compartments and screens as follows:

1. Type: Solid-plastic, polymer resin.
2. Compartment Style: Overhead braced and floor anchored.
3. Screen Style: Wall hung.

B. Related Sections include the following:

1. Division 10 "Toilet and Bath Accessories" for toilet paper holders, grab bars, purse shelves, and similar accessories.

### 1.2 SUBMITTALS

A. Product Data: For each type and style of toilet compartment and screen specified. Include details of construction relative to materials, fabrication, and installation. Include details of anchors, hardware, and fastenings.

B. Shop Drawings: For fabrication and installation of toilet compartment and screen assemblies. Include plans, elevations, sections, details, and attachments to other work.

1. Show locations of reinforcement and cutouts for compartment-mounted toilet accessories.

C. Samples for Verification: Of each compartment or screen color and finish required, prepared on 6-inch- (150-mm-) square Samples of same thickness and material indicated for Work.

### 1.3 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ampco Products, Inc.
2. Capitol Partitions, Inc.
3. General Partitions Mfg. Corp.
4. Global Steel Products Corp.
5. Santana Products, Inc.

### 2.2 MATERIALS

A. General: Provide materials that have been selected for surface flatness and smoothness. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are unacceptable.

B. Solid-Plastic, Polymer Resin: High-density polyethylene (HDPE) with homogenous color throughout. Provide material not less than 1 inch (25 mm) thick with seamless construction and eased edges in color and pattern as follows:

1. Colors and Patterns: Two colors and patterns in each room as selected by Architect from manufacturer's full range of colors and patterns.

C. Pilaster Shoes and Sleeves (Caps): ASTM A 666, Type 302 or 304 stainless steel, not less than 0.0312 inch (0.8 mm) thick and 3 inches (75 mm) high, finished to match hardware.

D. Stirrup Brackets: Manufacturer's standard ear or U-brackets for attaching panels and screens to walls and pilasters of the following material:

1. Material: Stainless steel.

E. Full-Height (Continuous) Brackets: Manufacturer's standard design for attaching panels and screens to walls and pilasters of the following material:

1. Material: Stainless steel.

F. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories of the following material:

1. Material: Stainless steel.

G. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with anti-grip profile in manufacturer's standard finish.

H. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip in manufacturer's standard finish.

I. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized, protective-coated steel.

## 2.3 FABRICATION

A. General: Provide standard doors, panels, screens, and pilasters fabricated for compartment system. Provide units with cutouts and drilled holes to receive compartment-mounted hardware, accessories, and grab bars, as indicated.

B. Solid-Plastic, Polymer-Resin Compartments and Screens: Provide aluminum heat-sink strips at exposed bottom edges of HDPE units to prevent burning.

C. Overhead-Braced-and-Floor-Anchored Compartments: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.

D. Wall-Hung Screens: Provide units in sizes indicated of same construction and finish as compartment panels, unless otherwise indicated.

E. Doors: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide in-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments indicated to be handicapped accessible.

1. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold door open at any angle up to 90 degrees.
2. Latch and Keeper: Manufacturer's standard surface-mounted latch unit with combination rubber-faced door strike and keeper designed for emergency access. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be handicapped accessible.
3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
4. Door Pull: Manufacturer's standard unit that complies with accessibility requirements of authorities having jurisdiction at out-swinging doors. Provide units on both sides of doors at compartments indicated to be handicapped accessible.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, plumb, and level. Provide clearances of not more than 1/2 inch (13 mm) between pilasters and panels and not more than 1 inch (25 mm) between panels and walls. Secure units in position with manufacturer's recommended anchoring devices.

B. Overhead-Braced-and-Floor-Anchored Compartments: Secure pilasters to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster with not less than 2 fasteners. Hang doors and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Screens: Attach with anchoring devices (continuous) according to manufacturer's written instructions and to suit supporting structure. Set units level and plumb and to resist lateral impact.

## 3.2 ADJUSTING AND CLEANING

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

B. Provide final protection and maintain conditions that ensure toilet compartments and screens are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 10155

# SECTION 10200 - LOUVERS AND VENTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes fixed, extruded-aluminum louvers.

B. Coordinate Louvers specified under this section with framing, wall panels and trim specified in Division 13 Section "Metal Building Systems".

### 1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide louvers capable of withstanding the effects of gravity loads and wind loads based on a uniform pressure of 30.5 lbf/sq. ft. (1436 Pa), acting inward or outward, without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors.

B. Seismic Performance: Provide louvers capable of withstanding the effects of earthquake motions determined according to International Building Code, 2003 Edition.

C. Thermal Movements: Provide louvers that allow for thermal movements resulting from a temperature change (range) of 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces, by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

D. Air-Performance, Water-Penetration, and Wind-Driven Rain Ratings: As demonstrated by testing manufacturer's stock units according to AMCA 500-L.

### 1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.

1. Verify louver openings by field measurements before fabrication and indicate measurements on Shop Drawings.
2. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples: For each type of finish.

B. Exposed Height: 30 feet (9.1 m) for two flanking poles, 35 feet (10.7 m) for one center pole.

C. Aluminum Flagpoles: Provide cone-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/ (B 241M), Alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 mm). Heat treat after fabrication to comply with ASTM B 597, Temper T6.

D. Foundation Tube: Galvanized corrugated-steel foundation tube, 0.064-inch- (1.6-mm-) minimum nominal wall thickness. Provide with 3/16-inch (4.8-mm) steel bottom plate and support plate; 3/4-inch- (19-mm-) diameter, steel ground spike; and steel centering wedges all welded together. Galvanize steel parts, including foundation tube, after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole. Provide flashing collar of same material and finish as flagpole.

## 2.3 FITTINGS

A. Finial Ball: Manufacturer's standard flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter; finished to match flagpole.

B. Internal Halyard, Winch System: Manually operated winch with control stop device and removable handle, stainless-steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door secured with cylinder lock. Finish truck assembly to match flagpole.

C. Halyard Flag Snaps: Provide two swivel snap hooks per halyard.

D. Elastomeric Joint Sealant: Single-component urethane or single-component neutral-curing silicone joint sealant complying with requirements in Division 7 Section "Joint Sealants" for Use NT (nontraffic) and for Use M, G, A, and, as applicable to joint substrates indicated, O joint substrates.

## 2.4 FINISHES

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

1. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

# PART 3 - EXECUTION

## 3.1 FLAGPOLE INSTALLATION

A. General: Install flagpoles where shown and according to manufacturer's written instructions.

B. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.

C. Foundation-Tube Installation: Install flagpole in foundation tube, seated on bottom plate between steel centering wedges. Plumb flagpole and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch (50-mm) layer of elastomeric joint sealant and cover with flashing collar.

D. Baseplate Installation: Install baseplate on washers placed over leveling nuts on anchor bolts and adjust until flagpole is plumb. After flagpole is plumb, tighten retaining nuts and fill space under baseplate solidly with nonshrink, nonmetallic grout. Finish exposed grout surfaces smooth and slope 45 degrees away from edges of baseplate.

END OF SECTION 10350

2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified (see Product Cuts at end of Section).

## 2.2 FABRICATION

A. Preassemble specialties in shop to greatest extent possible to minimize field assembly. Form postal specialties to required shapes and sizes, with true lines and angles, square, rigid, and without warp, with metal faces flat and free of dents or distortion. Make exposed metal edges and corners free of sharp edges and burrs, and safe to touch.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. Install products based on approved shop drawings and manufacturer's instructions

END OF SECTION 10425

# SECTION 10505 - METAL LOCKERS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Knocked-down, standard quiet metal lockers. Initial estimate quantity is a total of 150 compartments in a double tier configuration

### 1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:. Include plans, elevations, sections, details, and attachments to other work.

1. Show base, sloping tops, filler panels, recess trim and other accessories.
2. Include locker identification system.

C. Samples: For each exposed finish.

D. Maintenance data.

### 1.3 QUALITY ASSURANCE

A. Accessibility Requirements:

1. Provide not less than 1 shelf located no higher than 54 inches (1372 mm) above the floor for side reach.
2. Provide 1 shelf located at bottom of locker no lower than 15 inches (381 mm) above the floor for forward reach.
3. Provide hardware that does not require tight grasping, pinching, or twisting of the wrist, and that operates with a force of not more than 5 lbf (22.2 N).

### 1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.
b. Faulty operation of latches and other door hardware.

2. Damage from deliberate destruction and vandalism is excluded.
3. Warranty Period for Knocked-Down Metal Lockers: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

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

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

### 2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS) Type B, suitable for exposed applications.

B. Fasteners: Zinc- or nickel-plated steel, slot less-type exposed bolt heads, and self-locking nuts or lock washers for nuts on moving parts.

C. Anchors: Select material, type, size, and finish required for secure anchorage to each substrate.

1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance.
2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

### 2.3 KNOCKED-DOWN, STANDARD QUIET METAL LOCKERS

A. Available Products:

1. Art Metal Products, Div. of Fort Knox Storage Co.;
2. DeBourgh Mfg. Co.; Worley Lockers.
3. General Storage Systems, Div. of North American Steel; Decor Tri-Lok
4. Hadrian Inc.; Emperor Lockers.
5. List Industries Inc.; Lockers.
6. Lyon Workspace Products; Standard Lockers.
7. Penco Products, Inc., Subsidiary of Vesper Corporation; Lockers.
8. Republic Storage Systems Company; Lockers.
9. Shanahan's Ltd.; Deluxe Series Lockers.
10. Tennsco Corp.; Tennsco Lockers.

B. Locker Arrangement: Double tier.

C. Body and Shelves: Assembled by riveting or bolting body components together. Fabricate from 0.0209-inch- (0.55-mm-) thick, unperforated, cold-rolled steel sheet.

D. Frames: Channel formed; fabricated from 0.0528-inch- (1.35-mm-) thick, cold-rolled steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames.

E. Doors: One-piece; fabricated from 0.0528-inch- (1.35-mm-) thick, cold-rolled steel sheet; formed into channel shape with double bend at vertical edges, and with right-angle single bend at horizontal edges.

1. Doors less than 12 inches (305 mm) wide may be fabricated from 0.0428-inch- (1.1-mm-) thick, cold-rolled steel sheet.
2. Box lockers less than 15 inches (381 mm) wide may be fabricated from 0.0428-inch- (1.1-mm-) thick, cold-rolled steel sheet.
3. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches (381 mm) wide; welded to inner face of doors.
4. Stiffeners: Manufacturer's standard full-height stiffener fabricated from 0.0428-inch- (1.1-mm-) thick, cold-rolled steel sheet; welded to inner face of doors.
5. Sound-Dampening Panels: Manufacturer's standard, designed to stiffen doors and reduce sound levels when doors are closed, of die-formed metal with full perimeter flange and sound-dampening material; welded to inner face of doors.
6. Door Style: Louvered vents at top and bottom of face of door.

F. Hinges: Self-closing; welded to door and attached to door frame with not less than 2 factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.

1. Hinges: Manufacturer's standard, steel continuous or knuckle type.

G. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond face of door; pry resistant.

1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in key locks, or padlocks; positive automatic and prelocking.

   a. Latch Hooks: Equip doors less than 48 inches (1219 mm) high with 2 latch hooks; fabricated from minimum 0.0966-inch- (2.5-mm-) thick steel; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.
   b. Latching Mechanism: Manufacturer's standard rattle-free latching mechanism and moving components isolated with vinyl or nylon to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.

H. Equipment: Equip each metal locker with identification plate and the following, unless otherwise indicated:

1. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
2. Coat Rods: For each compartment of double-tier metal lockers.

I. Accessories:

1. Legs: Fabricated from 0.0528-inch- (1.35-mm-) thick, cold-rolled steel sheet.

   a. Closed Front and End Bases: Fabricated from 0.0329-inch- (0.85-mm-) thick, cold-rolled steel sheet.
2. Continuous Sloping Tops: Fabricated from cold-rolled steel sheet, manufacturer's standard thickness, but not less than 0.0329 inch (0.85 mm) thick.
3. Recess Trim: Fabricated from 0.0428-inch- (1.1-mm-) thick, cold-rolled steel sheet.
4. Filler Panels: Fabricated from cold-rolled steel sheet, manufacturer's standard thickness, but not less than 0.0329 inch (0.85 mm) thick.
5. Boxed End Panels: Fabricated from 0.0528-inch- (1.35-mm-) thick, cold-rolled steel sheet.
6. Finished End Panels: Fabricated from 0.0209-inch- (0.55-mm-) thick, cold-rolled steel sheet.

J. Finish: Baked enamel.

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

## 2.4 FABRICATION

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

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

B. Unit Principle: Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments.

C. Knocked-Down Construction: Fabricate metal lockers for nominal assembly at Project site using nuts, bolts, screws, or rivets. Factory weld frame members together to form a rigid, one-piece assembly.

D. Hooks: Manufacturer's standard ball-pointed type, aluminum or steel; zinc plated.

E. Coat Rods: Fabricated from 1-inch- (25-mm-) diameter steel; chrome finished.

F. Identification Plates: Manufacturer's standard etched, embossed, or stamped aluminum plates; with numbers and letters at least 3/8 inch (9 mm) high.

G. Legs: Formed by extending vertical frame members or by attaching gusset-type legs to locker body; with provision for fastening to floor; finished to match lockers.

1. Closed Front and End bases: Fabricate bases without overlap or exposed fasteners; finished to match lockers.

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

I. Continuous Sloping Tops: Fabricated in lengths as long as practicable, without visible fasteners at splice locations; finished to match lockers.

J. Recess Trim: Fabricated with minimum 2-1/2-inch (64-mm) face width and in lengths as long as practicable; finished to match lockers.

K. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip joint filler angle formed to receive filler panel.

L. Boxed End Panels: Fabricated with 1-inch- (25-mm-) wide edge dimension, and designed for concealing fasteners and holes at exposed ends of nonrecessed metal lockers; finished to match lockers.

M. Finished End Panels: Designed for concealing unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.

## 2.5 STEEL SHEET FINISHES

A. Baked-Enamel Finish: Immediately after cleaning, pretreating, and phosphatizing, apply manufacturer's standard thermosetting baked-enamel finish. Comply with paint manufacturer's written instructions for application, baking, and minimum dry film thickness.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. General: Install level, plumb, and true; shim as required, using concealed shims.

1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches (910 mm) o.c. Install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion, using concealed fasteners.
2. Anchor single rows of metal lockers to walls near top of lockers and to floor.

B. Knocked-Down Metal Lockers: Assemble knocked-down metal lockers with standard fasteners, with no exposed fasteners on door faces or face frames.

C. Equipment and Accessories: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.

1. Attach hooks with at least two fasteners.
2. Identification Plates: Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
3. Attach recess trim to recessed metal lockers with concealed clips.
4. Attach filler panels with concealed fasteners.
5. Attach sloping top units to metal lockers, with closures at exposed ends.

6. Attach boxed end panels with concealed fasteners to conceal exposed ends of nonrecessed metal lockers.
7. Attach finished end panels with fasteners only at perimeter to conceal exposed ends of nonrecessed metal lockers.

D. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding.

END OF SECTION 10505

# SECTION 10520 - FIRE-PROTECTION SPECIALTIES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Portable fire extinguishers.
2. Fire-protection cabinets. (located in MRO office / support area and ARFF kitchen).
3. Mounting brackets for fire extinguishers (located in Hangar floor, shops, and ARFF bay areas).

### 1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Fire Extinguishers: Include rating and classification.
2. Fire-Protection Cabinets: Include door hardware, cabinet type, trim style, panel style, and details of installation.

### 1.3 QUALITY ASSURANCE

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

C. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements of ASTM E 814 for fire-resistance rating of walls where they are installed.

### 1.4 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

### 1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of portable fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:

   1. Sheet: ASTM B 209 (ASTM B 209M).
   2. Extruded Shapes: ASTM B 221 (ASTM B 221M).

C. Stainless-Steel Sheet: ASTM A 666, Type 304.

D. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), 6 mm thick, with Finish 1 (smooth or polished).

2.3 PORTABLE FIRE EXTINGUISHERS

A. Manufacturers:

   1. Fire End & Croker Corporation.
   2. General Fire Extinguisher Corporation.
   3. JL Industries, Inc.
   4. Larsen's Manufacturing Company.
   5. Potter Roemer; Div. of Smith Industries, Inc.

B. General: Provide fire extinguishers of type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

   1. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

C. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:10-B:C, 5-lb (2.3-kg) for all office locations; 6-A:60-B:C, 10-lb (4.5-kg) for general Terminal locations; nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

## 2.4 FIRE-PROTECTION CABINET

A. Manufacturers:

1. Fire End & Croker Corporation.
2. General Accessory Mfg. Co.
3. JL Industries, Inc.
4. Larsen's Manufacturing Company.
5. Potter Roemer; Div. of Smith Industries, Inc.

B. Cabinet Type: Suitable for fire extinguisher.

C. Cabinet Construction: Non-rated.

D. Cabinet Material and Shelf: Enameled-steel sheet.

E. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted on wall; with no trim.

F. Door Material: Stainless-steel sheet.

G. Door Style: Vertical duo panel with frame.

H. Door Glazing: Acrylic sheet.

1. Acrylic Sheet Color: Clear transparent acrylic sheet.

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide projecting door pull and friction latch.
2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

J. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, with plated or baked-enamel finish.
2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

   a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."

      1) Location: Applied to cabinet door.
      2) Application Process: Silk-screened pressure-sensitive vinyl letters.
      3) Lettering Color: Red.
      4) Orientation: Vertical.

K. Finishes:

1. Stainless Steel: Satin, directional polish, No. 6.

## 2.5 MOUNTING BRACKETS

A. Manufacturers:

1. Fire End & Croker Corporation.
2. JL Industries, Inc.
3. Larsen's Manufacturing Company.
4. Potter Roemer; Div. of Smith Industries, Inc.

B. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.

1. Color: Black.

C. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red-letter decals applied to mounting surface.

a. Orientation: Horizontal.

## 2.6 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
2. Miter and weld perimeter door frames.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. Examine fire extinguishers for proper charging and tagging. Remove and replace damaged, defective, or undercharged units.

B. Install fire-protection specialties in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

C. Fire-Protection Cabinets: Fasten fire-protection cabinets to structure, square and plumb.

D. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated or directed.

E. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

F. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair.

END OF SECTION 10520

# SECTION 10671 - METAL STORAGE SHELVING

## 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. Post-and-beam metal storage shelving.

B. Related Sections include the following:

   1. Division 1 Section "Unit Prices" for a list of unit prices.

### 1.3 UNIT PRICES

A. Basis for Bids: Base bids on number and dimensions of metal storage shelving units as follows:
   1. Post-and-Beam Metal Storage Shelving: <Insert number> shelving units.

B. Measurement and Payment:

   1. Post-and-Shelf Metal Storage Shelving: Based on add-on metal storage shelving unit, 36 inches (914 mm) wide by 18 INCHES (455 MM) deep by 84 inches (2135 mm) high, with 4 intermediate shelves.
   2. No payment will be made for rejected metal storage shelving units, including defective units or units damaged during handling or installation.

### 1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance for Post-and-Shelf Metal Storage Shelving: Provide metal storage shelving capable of withstanding the loads indicated when tested according to MH 28.1, "Specification for the Design, Testing, Utilization and Application of Industrial Grade Steel Shelving."

B. Structural Performance for Post-and-Beam Metal Storage Shelving: Provide metal storage shelving capable of withstanding the loads indicated when tested according to MH 28.2, "Specification for the Design and Testing of Metal--Wood Shelving."

C. Seismic Performance: Provide metal storage shelving capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

## 1.5 SUBMITTALS

A. Product Data: Include rated capacities, construction details, material descriptions, dimensions of individual components and profiles, and finishes for metal storage shelving.

B. Shop Drawings: Show fabrication and installation details for metal storage shelving, including upright-to-shelf/arm connections, lateral bracing, and attachments to other work. Include plans, elevations, sections, details, and relationship to other work.

1. Calculations: Include structural analysis data for shelving units, including capacities of shelving sections, compression members (posts), and shelf connectors; signed and sealed by the qualified professional engineer responsible for their preparation.

C. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which metal storage shelving will be attached.
3. Items penetrating finished ceiling, including the following:

   a. Lighting fixtures.
   b. Air outlets and inlets.
   c. Speakers.
   d. Sprinklers.
   e. Access panels.

D. Samples for Initial Selection: For units with factory-applied color finishes. Include similar Samples of accessories involving color selection.

E. Samples for Verification: For the following components, of size indicated below.

1. Posts: 12 inches (305 mm) long.
2. Shelves: Full size, but not more than 24 inches (610 mm) wide by 12 inches (305 mm) deep.
3. Shelf-to-Post Connectors: Full size.
4. Shelf Labels: Full size.

F. Product Schedule: For metal storage shelving. Use same designations indicated on Drawings.

G. Qualification Data: For Installer.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for each type of metal storage shelving.

I. Maintenance Data: For metal storage shelving to include in maintenance manuals.

## 1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

C. Source Limitations: Obtain metal storage shelving through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of metal storage shelving and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

1. Do not modify intended structural performance and aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code--Sheet Steel."

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver metal storage shelving palleted, wrapped, or crated to provide protection during transit and Project-site storage.

## 1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install metal storage shelving until spaces are enclosed and weatherproof, wet work in spaces is completed and dry, and ambient temperature is being maintained at the levels indicated for Project when occupied for its intended use.

## 1.9 COORDINATION

A. Coordinate sizes and locations of blocking and backing required for installation of metal storage shelving attached to [partition] [wall] [and] [ceiling] assemblies.

B. Coordinate locations and installation of metal storage shelving that may interfere with ceiling systems including lighting, HVAC, and sprinklers.

## 1.10 EXTRA MATERIALS

A. Furnish extra materials 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. Shelves: Full-size units equal to 5 percent of amount installed for each type indicated, but no fewer than 10 shelves.

2. Shelf-to-Post Connectors: Full-size units equal to 5 percent of amount installed for each type indicated, but no fewer than 10 connectors.
3. Shelf Labels: Full-size units equal to 5 percent of amount installed for each type indicated, but no fewer than 10 labels.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

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

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
3. Basis-of-Design Product: The design for each type of metal storage shelving is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

### 2.2 MATERIALS

A. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with G60 (Z180) zinc (galvanized) or A60 (ZF180) zinc-iron-alloy (galvannealed) coating.

D. Steel Tubing: ASTM A 513, Type 2.

E. Steel Wire: ASTM A 899.

F. Postinstalled Expansion Anchors in Concrete: With capability to sustain, without failure, a load equal to 4 times the load imposed, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition (mild).
2. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Alloy Group 1 or 4) for nuts and bolts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.
3. Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B 164 for UNS No. N04400 alloy.

G. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for

attaching foot plates for shelving units, and with capability to sustain, without failure, a load equal to [10] <Insert number> times that imposed by shelving systems, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

2.3 POST-AND-BEAM METAL STORAGE SHELVING <Insert drawing designation>

A. General: Factory-formed, field-assembled, freestanding, post-and-beam metal storage shelving system; designed for shelves to be supported by beams that span between and are supported by corner posts, with shelves adjustable over the entire height of shelving unit. Fabricate initial shelving unit with a post at each corner. Fabricate additional shelving units as add-on units, designed to share two corner posts with initial shelving unit. Provide fixed top and bottom shelves, adjustable intermediate shelves, and accessories indicated.

1. Manufacturers:

   a. Borroughs Corporation.
   b. Frick-Gallagher Manufacturing Company (The).
   c. Lyon Metal Products, Inc.
   d. Penco Products, Inc.
   e. Rousseau Metal Inc.
   f. Schaefer Systems International, Inc.
   g. Tennsco Corp.
   h. Western Pacific Storage Systems.

B. Posts: Fabricated from 0.0677-inch- (1.70-mm-) thick, cold-rolled steel; in manufacturer's standard angle or open box shape; with perforations at 1-1/2 inches (38 mm) o.c. to receive shelf-to-post connectors.

1. Add-On Shelf Posts: 0.0677-inch- (1.70-mm-) thick, cold-rolled steel, T-shaped; perforated to match main posts.
2. Post Base: 0.0677-inch- (1.70-mm-) thick, cold-rolled steel foot plate, and drilled for mechanical attachment to floor.

C. Beams: Fabricated from 0.0677-inch- (1.70-mm-) thick, cold-rolled steel; in channel, flanged channel or flanged shape; with projecting tabs at each end designed to engage posts. Provide beam at each side of each shelf, with center supports as required for load-carrying capacity.

1. Provide top, bottom, and intermediate shelf beams with [single] [double] rivets.
2. Provide top and bottom shelf beams with double rivets and intermediate shelf beams with single rivets.

D. Shelves: None required. Provide beams for four (4) shelves.

E. Flat Metal Shelves: Fabricated from 0.0329-inch- (0.85-mm-) thick, steel sheet.

1. Fabricate fronts, backs, and sides of shelves with box-formed edges, with corners lapped and welded.

F. Ribbed Metal Decking Shelves: Fabricated from 0.0329-inch- (0.85-mm-) thick steel..

G. Shelf Capacity: 600 lb (272 kg).

# SECTION 12484 - FLOOR MATS AND FRAMES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:
   1. Cocoa mats.

B. Related Sections include the following:

   1. Division 3 Section "Cast-in-Place Concrete" for concrete work, including forming, placing, and finishing concrete floor slabs, and for concrete materials for grouting and filling around and under recessed mats and frames.

### 1.2 SUBMITTALS

A. Product Data: Include manufacturer's specifications and installation instructions, construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of floor mat and frame specified.

B. Shop Drawings: For floor mats and frames. Show assembly, joint locations, installation details, layout, plans, elevations, sections, details of patterns or designs, accessories, anchors, and attachments to other Work.

   1. Coordinate Shop Drawings showing oversized recess for deferred installation of frames with concrete work.

C. Samples for Initial Selection: For each type of floor mat and frame indicated.

D. Maintenance Data: For cleaning and maintaining floor mats to include in maintenance manuals.

### 1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain floor mats and frames through one source from a single manufacturer.

B. Accessibility Requirements: In addition to requirements of authorities having jurisdiction, provide installed floor mats that comply with Sections 302 and 303 in ICC A117.1.

### 1.4 PROJECT CONDITIONS

A. Field Measurements: Verify blocked-out openings in floors by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating floor mats and frames without field measurements. Coordinate floor construction to ensure that actual opening dimensions correspond to established dimensions.

## 1.5 COORDINATION

A. Coordinate size and location of oversized recesses in concrete work to receive floor mats and frames. Defer frame installations until building enclosure is completed and related interior finish work is in progress. Concrete, reinforcement, and formwork requirements are specified in Division 3.

B. Coordinate integral installation of recessed frames and anchors with placing of concrete slab so frames are positioned accurately.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cocoa Mats:

   a. AFCO-USA.
   b. Mats Incorporated.
   c. Musson, R. C. Rubber Co. (The).
   d. Tennessee Mat Company, Inc.

## 2.2 METAL FRAME MATERIALS

A. Extruded Aluminum: ASTM B 221 (ASTM B 221M), alloy 6061-T6 or alloy 6063-T5, T6, or T52 as standard with manufacturer.

## 2.3 CONCRETE FILL AND GROUT MATERIALS

A. Provide concrete materials complying with Division 3 for grout and fill around and under recessed mats and frames that produce concrete equivalent in strength to cast-in-place concrete slabs. For concrete fill, adjust aggregate size to not exceed one-third fill thickness.

## 2.4 FLOOR MATS

A. General: Provide colors, patterns, and profiles of materials, including metals and metal finishes indicated or specified. If not indicated, provide colors, patterns, and profiles selected by Architect from manufacturer's standards.

B. Cocoa Mats: Constructed from cocoa fiber yarn permanently bonded to PVC backing for dimensional stability and resistance to shedding; 1-inch (25-mm) overall thickness; 2.0-lb/sq. ft (10-kg/sq. m) weight.

## 2.5 FABRICATION

A. General: Where possible, verify sizes by field measurement before shop fabrication.

B. Floor Mats: Shop fabricate units to greatest extent possible in sizes as indicated. If not otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.

C. Recessed Metal Mat Frames: Extruded aluminum, of size and style to fit floor mat type specified, for permanent recessed installation, complete with corner pins or reinforcement and anchorage devices.

1. Fabricate edge-frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.

D. With manufacturer's standard protective coating, coat surfaces of aluminum frames that will contact cementitious material.

## 2.6 FINISHES, GENERAL

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

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

## 2.7 ALUMINUM FINISHES

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

B. Mill Finish: AA-M10 (Mechanical Finish: as fabricated; no other applied finish unless buffing is required to remove scratches, welding, or grinding produced in fabrication process).

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, floor conditions, and floor recesses for compliance with requirements for location, sizes, minimum recess depth, and other conditions affecting installation of floor mats and frames.

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

### 3.2 INSTALLATION

A. Install recessed mat frames to comply with manufacturer's written instructions. Set mat tops at height recommended by manufacturer for most effective cleaning action; coordinate top of mat surfaces with bottom of doors that swing across mats to provide clearance between door and mat.

1. Install necessary shims, spacers, and anchorages for proper location and secure attachment of frames.
2. Install grout and fill around frames and, if required to set mat tops at proper elevations, in recesses under mats. Finish grout and fill smooth and level.

### 3.3 PROTECTION

A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

B. Defer installation of floor mats until Project is near Substantial Completion.

END OF SECTION 12484

# SECTION 12491 - HORIZONTAL LOUVER BLINDS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following blinds with aluminum louver slats:
   1. Miniblinds.

### 1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, details of installation, operational clearances, and relationship to adjoining Work.

   1. Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings.

C. Samples: For each exposed finish and for each color and texture required.

D. Window Treatment Schedule: Use same room designations indicated on Drawings.

E. Maintenance data.

### 1.3 QUALITY ASSURANCE

A. Horizontal Louver Blinds Fire-Test-Response Characteristics: Provide products passing flame-resistance testing according to NFPA 701 by a testing agency acceptable to authorities having jurisdiction.

B. Corded Window Covering Product Standard: Unless otherwise indicated, comply with WCMA A 100.1.

C. Mockups: Install mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.

   1. Install mockups.
   2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

2. Blind Units Installed Outside Jambs: Width and length as indicated, with terminations between blinds of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

D. Installation Brackets: Designed for easy removal and reinstallation of blind, for supporting headrail[, valance,] and operating hardware, and for hardware position and blind mounting method indicated.

E. Installation Fasteners: Not fewer than two fasteners per bracket, fabricated from metal noncorrosive to blind hardware and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Install blinds level and plumb and aligned with adjacent units according to manufacturer's written instructions. Install intermediate support as required to prevent deflection in headrail. Allow clearances between adjacent blinds and for operating glazed opening's operation hardware, if any.

1. Location: Exterior louver edges in any position are not closer than **1 inch (25 mm)** to interior face of glass.

B. Flush Mounted: Install blinds with louver edges flush with finish face of opening if slats are tilted open.

C. Jamb Mounted: Install headrail flush with face of opening jamb and head.

D. Head Mounted: Install headrail on face of opening head.

E. Recessed: Install headrail concealed within blind pocket.

F. Adjusting: Adjust horizontal louver blinds to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

G. Cleaning: Clean blind surfaces after installation, according to manufacturer's written instructions.

END OF SECTION 12491

# SECTION 12615 - PUBLIC SEATING

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes public seating for airport terminals.

B. See Division Section "allowances" for allowances regarding furnishings.

### 1.2 SUBMITTALS

A. Product Data: For each type of seating and accessory indicated.

B. Installation Drawings: Layout plans, and system details showing seating layout, chair widths, accessories, including locations of tables.

C. Samples: Show the full range of color, texture, and pattern variations expected. Prepare Samples from same material to be used for the Work.

1. Upholstery Material: 12-inch- (300-mm-) square section of fabric from dye lot to be used for the Work, with specified treatments applied. Show complete pattern repeat. Mark top and face of material. Provide testing data to include Weizenbeck, fabric content and backing.

D. Maintenance data.

### 1.3 EXTRA MATERIALS

A. Furnish extra materials described below, before installation, along with accessory attachment screws, nut, etc. that match products installed and that are packaged with protective coating for storage and identified with labels describing content.

1. Chair Seats and Backs: Provide five (5) complete full size seats and backs.
2. Seat Arms: Provide six (6) complete full size seat arms and connection material in the amount of 6 arms.
3. Tables: Provide two (2) complete full size tables.

### 1.4 QUALITY ASSURANCE

A. Upholstery Fabric Source Limitations: Obtain fabric of a single dye lot for each color and pattern of fabric required.

## 1.5 WARRANTY

A. General Warranty: Provide manufacturers standard warranty against defects in materials and workmanship for a period as specified below. Any defects or failure, excepting ordinary wear and tear, shall be repaired or replaced by the Manufacturer promptly upon receipt of written notice from the Owner. Warranty shall cover all shipping, taxes, materials, and labor.

1. Warranty Period:

   a. Upholstery: Three (3) years from date of Final Payment.
   b. Frame: Ten (10) years from date of Final Payment.

# PART 2 - PRODUCTS

## 2.1 PUBLIC SEATING

A. Performance requirements:

1. Mounting: Beam.
2. Chairs: Separate, removable vinyl seats and backs.
3. Accessories: Seat arms and tables.

B. Quantities:
1. 18 – 4 seat bank w/ 1 table at end.
2. 20 – 3 seat bank w/ 1 table at end.

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

1. KI; Gate One Series Seating.
2. Herman Miller; Eames Tandem Sling Seating.
3. Airport Seating Alliance, ALA Series
4. Chromcraft Contract; Guardsman Lounge Series Seating

# PART 3 - EXECUTION

## 3.1 INSTALLATION

A. Install seats and tables level and plumb.

B. Repair minor abrasions and imperfections in finishes with coating that matches factory-applied finish.

C. Replace seat and back upholstery fabric damaged during installation. Do not use Owner's extra materials, stock for replacement of damaged fabric during installation.

D. See furnishing installation location plan attached at end of section.

E. Remove all trash, shipping containers, etc. from project site and dispose of property.

F. Vacuum floor, and wipe clean the rooms with seating after installation. Repair floor, wall, or ceiling finishes, if damaged during installation.

END OF SECTION 12615

# SECTION 14540 – INBOUND AND OUTBOUND BAGGAGE CONVEYORS

## PART 1 - GENERAL

### 1.1 SECTION SUMMARY

Furnish all design, materials, labor, equipment, transportation and all other services needed to construct, install and make completely operable baggage handling conveyors as indicated in the Construction Documents. Included are new roll-up security and fire doors, and complete electrical wiring and control systems. See Drawing Q 1.0.

### 1.2 PERFORMANCE AND DEPENDABILITY

A. The system must be capable of continuous operations, 18 hours per day, 7 days per week, with provisions for routine preventive maintenance as specified in the maintenance manual. It must operate reliably and be reasonably free of breakdowns. The system may be shut down for routine or preventative maintenance, when necessary, during off-peak periods (2300 to 0500 hours). Major components of the system shall be pre-tested so that life expectancy under the design operating conditions is known prior to installation. Design of the components and comprising the system shall provide for ease of maintenance and replacement accessibility and service.

### 1.3 COMPATIBILITY AND VERSATILITY

A. All vendors must fully recognize that maintainability and equipment standardization influence the total cost of equipment ownership. The following items shall be taken into consideration in the equipment design.

B. Drive packages, as well as other components, shall be standardized as much as possible to provide maximum interchangeability of components, and to reduce the number of spares that must be carried by the station.

C. The design, construction, and installation of the equipment shall provide maximum accessibility and convenience for all maintenance and operating requirements.

D. The equipment shall provide maximum accessibility for the repair or replacement of parts, or assemblies in lieu of parts, or other removable and replaceable equipment items without having to move, remove, or dismantle associated equipment, other equipment, or structural items in the area.

E. Lubrication fittings and electrical controls shall be located wherever possible with maximum access as a prime objective. In areas where there are catwalks: drives disconnect switches, controls switch, jam detectors, etc., shall be mounted so that they are accessible.

F. Guards, covers, etc., shall be equipped with quick removal ¼ turn fasteners such as or hinges with pull pins in areas where jams may occur or maintenance access is limited.

## 1.4 SAFETY

A. Current Standards

All equipment and installation shall conform to the current standards and interpretations of the Williams-Steiger Occupational Safety and Health Act of 1970, Public Law 91-596, and ANSI Standards Number B20.1-1990.

B. Codes and Regulations: All materials and methods used in the construction and installation of the baggage conveyor system shall meet or exceed the requirements of the following:

1. NFPA National Fire Code.
2. National Electrical Manufacturer's Association (NEMA).
3. National Electrical Code (NEC).
4. Conveyor Equipment Manufacturers Association (CEMA).

C. Switches

In addition, all motors shall be provided with safety disconnect switches to permit shutting off the motor power circuits. Switches shall be equipped with a "locking out" feature in the off position.

D. Additional Features

The following additional safety features shall be incorporated into the system:

1. All control methods, circuitry, mechanical equipment, and operating procedures shall consider the safety of the public in addition to that of operation and maintenance personnel. System design shall also minimize possible damage to equipment and baggage being handled. If a conflict should arise between safety to people or equipment, safety to people shall take precedence.

2. Whenever an unsafe condition could develop from an equipment failure or a procedural error, fail-safe techniques shall be used to prevent the occurrence of the unsafe conditions.

3. Protect unattended control stations in public areas to prevent operation.

4. Systems operations controls shall be convenient, clearly identified simple and safe to use. Possible errors shall be minimized. Emergency stops shall be provided.

## 1.5 DESIGN CRITERIA

### A. Luggage Size

The system is designed to handle baggage sizes as follows:

1. Normal Items, which can be processed by the equipment without special handling.
2. Oversize Items such as animal cages, map cases, golf bags, duffel bags, etc., which cannot be handled by the equipment and must be manually transported. (golf bags and duffle bags with maximum dimensions of 54 inches in length x 18 inches in height and 70 pounds can also be handled as normal baggage.)

3. Fragile/Odd Size

   Items such as garment bags, hat boxes, bowling balls, shopping bags, etc., which when in tote trays can be processed as normal baggage.
   The following defines the physical characteristics of normal baggage to be used in the design of the new system:

| | Maximum | Minimum |
|---|---|---|
| Length | 54 inches | 6 inches |
| Width | 33 inches | 03 inches |
| Height | 36 inches | 03 inches |
| Weight | 120 pounds | 01 pound |

*Note:* For the purposes of rate testing, the average bag length shall be considered to be 30 inches.

### B. Conveyor Loads

Design the conveyors and their supports using the following loading criteria:

1. The live load imposed on the building comprised of the conveyor components, supports and baggage used for designing structural elements, rollers and pulleys shall be 100 pounds per linear foot/150kg per meter, except for merges and conveyors designated as oversize conveyors, in which case it shall be 150 pounds per linear foot/225kg per meter. All conveyor equipment shall be capable of supporting a single concentrated load of 250 pounds/113kg.

2. The live load to be used for sizing drives, belts, bearings, etc., shall be 60 pounds per linear foot/90kg per meter, for load, accumulating conveyors and make-up units, and 40 pounds per linear foot/60kg per meter, at a conveyor speed of 90' per minute (0.46m/sec.) adjusted proportional to speed for all other conveyors.

   a. Size conveyor drives and components for a minimum duty design factor of 1.25 so that starting and stopping may be accomplished under full load conditions.

b. A design factor of 1.25 combined with a friction factor of 0.35 shall be used for determining minimum drive horsepower requirements. A minimum of one horsepower (.75kw) shall be maintained, except where motorized pulleys are used. All motors shall have a minimum nameplate service factor of 1.15.

C. Environment

All components are designed to operate satisfactorily within a temperature range of 20 degree F to 140 degrees F with a relative humidity of 0 to 95%, noncondensing.

D. Noise Levels

1. The Contractor shall design, fabricate and install the baggage handling system to limit combined equipment and controlled ambient noise levels to the following maximum requirements:

   a. 65dB(A) in, or in the ceiling space above, public areas (measured at a number of positions normally occupied by passengers, public and staff).
   b. 75dB(A) in bag room and all other associated non-public areas or unoccupied areas.

2. The ambient noise level shall be determined both before and after the measurement of the components. The ambient noise level shall be determined as follows:

   a. The baggage handling system equipment shall be turned off.
   b. All other equipment (i.e., air-conditioning and heating equipment) shall be on, and outside noise sources (from aircraft and mobile ground equipment) shall be as normal.
   c. Noise level readings shall be taken throughout a zone 3' (1 meter) vertically and 3' (1 meter) horizontally from the BHS equipment using an integrated sound level meter set to the A-weighted network.
   d. After the ambient noise level has been determined, the BHS equipment shall be turned on and the total noise level shall be measured at the same points throughout the zone that the ambient levels were measured. In no case will the conveyor equipment increase the overall noise levels by more than 15 dB(A).

E. Clearances

1. Minimum clearance on all conveyors between the conveyor tops of belts to underside of obstructions shall be 36" (1 meter) unless otherwise noted on the contract drawings. If it should be discovered that these specified clearances cannot be maintained, Contractor shall notify Owner as soon as possible Contractor will conduct a field survey of all conveyor paths prior to the submission of installation drawings.

F. Accessibility

1. Equipment components requiring inspection and servicing shall be readily accessible. Suitable doors or removable enclosures shall be provided for this purpose. Access holes in frames or guards are acceptable but shall be held to a minimum number and size, and shall not create protrusions or discontinuities detrimental to the baggage being conveyed.

G. Periodic Maintenance

1. The systems shall be so designed that no scheduled PM task requires more than two hours of full-system shutdown, or four hours of reduced operation, or any combination of both in excess of four hours. All components and subsystems shall be designed for replacement within this period. All components and assemblies shall be easily disconnected and removed from the equipment without necessity for extensive disassembly.

H. Radio Frequency Interference

1. The equipment provided shall not cause interference with communications within the airport or between the airport and aircraft or ground vehicles. All electrical and electronic equipment, including interconnecting wires and cables, shall be designed to operate without malfunction in the presence of normal electromagnetic emissions generated by other equipment installed or used at the airport. The normal airport environment includes the aircraft communications bands and high-power radar systems. Various electrical motors and controls, power tools (including welders), automotive vehicles, etc., are also considered elements of the airport environment.

I. Vibration Control

1. The Contractor and the Architect shall jointly review any areas of the system design which either believes to be potential sources of unsafe or otherwise severe levels of vibration. The Contractor and the Architect shall mutually determine the need for, and design of, vibration isolation devices. Should such a requirement occur, the addition of such devices shall be by change order.

## 1.6 SUBMITTALS

A. Shop Drawings

1. The Contractor shall submit shop drawings in accordance with Division 1 of the specifications. Such shop drawings shall consist of Contractor's mechanical and electrical installation drawings and shall include the following:

   a. Mechanical: general arrangement and dimensions of all equipment (plan, elevation, and sections); clearances, both horizontal and vertical, as related to the building structure and interferences; dimensions and details of any required building preparations or modifications; location and dimensions of conveyor drives; location and detail of attaching conveyor supports to floors and overhead structures.
   b. Electrical: schematics showing motor control panel and field control wiring; interior and front panel layout of motor control panels; pushbutton station layout, conduit diagrams showing location of all controls, conduit sizes, and wire sizes and numbers.

B. As-Built Drawings

1. Within thirty days following Substantial Completion, Contractor shall provide Owner with one set of full-size, mechanical and electrical drawings showing the 'as-built' condition of the systems. One set of electrical drawings for each MCP cabinet to be placed in the respective MCP door pocket.

## 1.7 OPERATION AND MAINTENANCE MANUALS

A. Operation and Maintenance Manuals

Three Operations and Maintenance Manuals shall be provided per Division 1. Manuals shall be presented to the Owner on the date of the start of the pre-acceptance testing period. The manual shall be updated by supplement to reflect any field changes, equipment changes due to warranty, etc., that are made during the warranty period of the system so that the manuals shall reflect "as-built" information.

The Operations section of the manuals shall include the following:

1. Complete listing of electrical graphic symbols and reference designations per ANSI/IEEE standards for all electrical equipment components contained in the system.

2. Push-button, photo eye, limit switch, etc., summary; location; units controlled; and function.

3. Normal system start-up and shutdown procedures.

4. Detailed description of operation and troubleshooting of the system.

The operation and Maintenance manuals shall fully cover appropriate safety measures, precautions, and instructions to be followed before, during, and after making repairs, adjustments, clearing jams, or performing routine maintenance.

## 1.8 PERFORMANCE TEST

After installation of the compete system, its operating capability shall be demonstrated. All "debugging" shall be completed prior to the start of the system's testing. The Contractor shall provide personnel, baggage, totes, boxes, etc., for testing. The performance test shall be conducted in the presence of the Owner's representative for a minimum of eight (8) hours. The performance test shall include:

A. Performance Test Parameters

1. Checkout of the operational and safety devices of the system using bags, totes, or boxes.

2. Demonstrate the capability to handle the required sizes and weights of baggage through the system without jamming or excessive toppling of baggage.

3. Demonstrate the capability of all conveyors being able to start under full load.

4. Measure all conveyor speeds using a standard device. These measurements shall be taken with the system in a "no-load" condition, i.e., all conveyors running, but without product. Any component not operating within five (5) percent of design speed shall be reworked to bring it to proper speed.

B. Correction of Unsatisfactory Operation

During the test period, any deficiencies or variations in the design, fabrication, or operation causing unsatisfactory performance shall be corrected to provide satisfactory performance. Manufacturer shall have appropriate service personnel on site during the test period to service or adjust the system's equipment as required.

C. Test Program

A test program for compliance with the above demonstration requirements shall be submitted to the Owner's representative for review and approval prior to operations start-up date for the system.

D. Failure Defined

A failure during any test period shall be defined as any design characteristic or malfunction of the furnished equipment or materials that damage baggage or reduce any operating rate below those specified. Conditions resulting from improper loading of baggage or loading baggage of sizes not included in the specification requirements shall not be considered as failures.

## 1.9 ACCEPTANCE

A. After completion of the system performance tests, the Owner's representative and a representative of the manufacturer shall make an acceptance inspection. The purpose of this inspection shall be to determine that the conveyor system has been furnished and installed as specified. If the system is non-acceptable for reasons of noncompliance to the drawings and specifications, the Owner shall receive immediate corrective action within the construction schedule. A final acceptance inspection shall be done to determine all corrections have been made.

B. Even though the equipment shall be inspected and accepted for warranty purposes, the acceptance date shall not occur before all contractual obligations are completed, including delivery of all "as-built" drawings, maintenance, operations and spare parts manuals, and all punch list items have been completed.

C. The Owner and Contractor at conclusion of this acceptance will execute a system acceptance form.

## 1.10 OPERATION AND MAINTENANCE TRAINING

A. It is understood that the times and durations of the classes may involve irregular hours in order to provide training of operation and maintenance personnel on different shifts.

B. The training classes shall be provided prior to the operations start-up of the system.

C. Operations training sessions shall cover the operational functions of the system and all related sections of the operations manual.

D. Maintenance training sessions shall include "classroom" and "hands-on" type programs. "Hands-on" type training shall include actual troubleshooting adjustments of equipment, component removal, etc.

E. The duration of the above training sessions may vary with the proficiency of the personnel being trained, but the prime objective of all classes shall be to thoroughly acquaint the necessary personnel with the operation and maintenance of the equipment.

## 1.11 WARRANTY

A. Special Project Warranty: Provide written warranty signed by the manufacturer, the Contractor, and the installer, guaranteeing to correct failures in materials and workmanship which occur within the warranty period, including those attributable to abnormal aging, without reducing or otherwise limiting any other rights to correction which the Owner may have under the contract documents.

1. The warranty shall include responsibility for removing and replacing other work as necessary to accomplish repairs or replacement of materials covered by the warranty.

Warranty period: 1 year after date of Substantial Completion.

## 1.12 MAINTENANCE

A. Spare Parts: The Conveyor Contractor shall provide, to the Owner, a recommended spare parts list along with an item-by-item price list based upon the conveyor equipment provided under this contract. This spare parts list, if implemented, is not intended to be a subsidy to be used by the Conveyor Contractor for warranty parts replacement. If the Owner approves, spare parts may be used during the warranty period to save equipment downtime only if the Conveyor Contractor replaces the spare parts with duplicates without additional cost to the Owner.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

Provide products complying with requirements of the contract documents and made by one of the following:

| | | |
|---|---|---|
| BAE Automated Systems Inc. | Carrollton, Texas | 972-389-9411 |
| G&S Mechanical USA, Inc. | Wichita, Kansas | 403-230-1140 |
| G&T Conveyor Co., Inc. | Tavares, Florida | 352-343-1500 |
| Jervis B. Webb Co. of Georgia | Marietta, Georgia | 770-426-3900 |
| Rapistan Systems | Grand Rapids, Michigan | 877-725-7500 |
| FKI Logistex | Grand Prairie, Texas | 800-433-2911 |

## 2.2 GENERAL

A. Structural plates shall conform to ASTM A-36. Hot rolled sheets and coils shall conform to ASTM A-569. Structural steel shapes shall conform to ASTM A-36.

B. All welding electrodes shall conform to AWS A-5.18-69. The standard code for arc and gas welding in building construction will be used as a guide to general procedure and qualification of welders.

C. Fasteners will conform to ASTM A-307 Class 2A thread fit for bolts, and Class 2B thread for nuts. All fasteners are to be zinc plated or equivalent. All fasteners will be locked with lock nuts or lockwashers.

D. Steel used in the fabrication of the equipment will be clean and free from rust, rust pits, kinks, and sharp bends. The forming of material will be accomplished by methods that will not fracture or otherwise damage the metal. Burrs, sharp edges, and sharp corners will be removed. All parts will be formed and cut properly to assure uniformity. All joints will be smooth and all corners rounded. Holes for photocell beams will be punched, not burned, in metal side guards and will be free of any sharp edges or burrs.

E. Unguarded, exposed sharp corners and edges of items; such as, but not limited to, support legs, braces, and trim; shall be well rounded, or removed to prevent injury to employees or damage to their clothing.

## 2.3 CRESCENT-PLATE DEVICES (INBOUND SYSTEMS)

Crescent-plate devices shall be constructed of articulating, crescent-shaped flights forming a continuous, rotating, flat surface. They shall be arranged to receive baggage by manual loading. These conveyor units shall meet or exceed the following design data and standards:

| | |
|---|---|
| Overall Conveyor Width . . . . . | 38" minimum to 42" maximum |
| Usable Width . . . . . | 32" minimum to 36" maximum |
| Centerline Radius . . . . . | 36" minimum to 44" maximum |
| Standard Conveyor Operational Velocity . . | 90 feet per minute (adjustable) |
| Static Load Capacity of Frame . . . . . | 200 lbs. per linear foot |
| Electrical Service . . . . . | 3 Phase, 480 VAC, 60 Hz. |
| Pallet Material . . . . . | 1/4" steel (or equivalent strength composite core) |
| Pallet Surface . . . . . | Black molded polyurethane or urethane |
| Conveyor Height . . . . . | 12" (+/- 1") |
| Center Infill Height . . . . . | 30" height (+/- 3") |

| | |
|---|---|
| Overall Conveyor Width . . . . . | 38" minimum to 42" maximum |
| Rolling Doors and Draft Curtains . . . . . | Wall openings for conveyors shall be protected by steel roll-up doors. Provide a strip-type draft curtain on public side of each opening |
| Motors . . . . . | 4 pole, 3-phase, motors sized to meet design criteria, totally enclosed units located on non-public side of conveyor assembly to minimize noise in public areas |
| Controls . . . . . | Controls as specified, control panel shall interconnect with roll-up security and fire doors at conveyor openings in walls |

Frame and Track: The frame shall consist of standard modular assemblies bolted together to form a support structure and guide for the carrier assemblies. The track shall be assembled to form an integral part of the support structure. Leveling of the assembled structure shall be accomplished by leveling screws at the base of each module.

Drive: The drive shall consist of a heavy-duty roller chain driven by a motor through a gear reducer. The roller chain shall engage at least two carrier assemblies at all times. The drive assembly shall be equipped with an appropriately sized electrical, electronic, or mechanical soft-start control unit. The drive shall be designed for operation from a 480 VAC, 3 phase, 60 Hz power source. The drive shall be sized to permit start-up under full-load conditions.

## 2.4 BELTING

A. Belting for all level conveyors in public view shall meet the following specifications:

| | | |
|---|---|---|
| 1. | Overall thickness | 5/32-inch |
| 2. | Covers | 1/32-inch x bare surface |
| 3. | Color | Black |
| 4. | Carcass | Polyester |
| 5. | Recommended workload | 150 pounds per inch of width |
| 6. | Breaking point | 1500 pounds per inch of width |

B. Belting for all level conveyors not in the public view shall meet the following specifications:

| | | |
|---|---|---|
| 1. | Overall thickness | 9/64-inch |
| 2. | Covers | Bare x bare |
| 3. | Color | Tan or black |
| 4. | Carcass | Polyester |
| 5. | Recommended workload | 120 pounds per inch of width |
| 6. | Breaking point | 1200 pounds per inch of width |

C. Belt lacing shall be of appropriate size for the application and as manufactured by Clipper or Anchor.

## 2.5 SLIDER BED SECTIONS

A. Conveyor bed sections shall be a minimum of 12-gauge (2.7mm) hot-rolled steel, formed in one piece and reinforced to be strong and well-braced with 1-1/4" x 1-1/4" x 3/16" (or equivalent metric) angle stiffeners on a maximum of 3'-4" (1016mm) centers on transport conveyors and 2'-6" (762mm) centers on load conveyors. Butt coupling joints shall be provided. Return belt shall be routed and supported so that it does not contact any stiffening members. Conveyor beds shall be provided with the following between-guard width dimensions:

| | | |
|---|---|---|
| 1. | Ticket counter load | 33"/762mm |
| 2. | Curbside load | 33"/762mm |
| 3. | Transfer load | 33"/762mm |
| 4. | Transport | 33"/914mm |

## 2.6 SIDE GUARDS

A. Vertical side guards for conveyors not in public view shall be 12-gauge HRS extending 21 inches above the bed and extending 8 inches below the slider bed with upright bracing (1-1/4-inches x 1-1/4-inches x 3/16-inch vertical angle stiffeners) on a maximum of 2 foot, 6 inch centers. Guards for conveyors in public view shall be formed, 21 inches high x 12-gauge type 304 stainless steel with a horizontal number 4 brushed finish. Guards are to be supported directly by the conveyor frame and braced with 10 gauge formed channels at 5'-0" on center typical. Unless otherwise noted, guards will be required on both sides except where baggage is being loaded or unloaded in non-public areas at which point only one guard shall be required.

B. Distance between side guards will be 3 inches greater than the belt width. Side guard joints will be bolted.

C. Guards adjacent to power turns shall be in alignment with the effective inside side guard of the turn to prevent interference with baggage movement. The side guards of power turns shall not be welded to adjacent straight conveyor side guards. No mechanical or electrical equipment will be mounted on the outside radius side guard of power turns. Side guards will provide a continuous uninterrupted surface the entire length and height of the joints.

## 2.7 SHROUDING

A. Shrouding shall be provided for outbound conveyor equipment located in public areas (ATO ticket counters) where the conveyors are exposed for loading. The shrouding shall be formed stainless steel, minimum 12-gauge (2.7mm), Type 304 with #4 brushed finish. All connections shall be smooth and flush without openings or projections on which bags or tags may catch. Fasteners shall be hidden from public view wherever practical to do so.

B. The visible side of the ticket counter conveyor shall be equipped with 12-gauge (2.7mm), Type 304 removable stainless steel kick plate and back guard. These parts shall also have a #4 finish as previously outlined and shall be provided for the overall length of the conveyor with removable sections for maintenance and repair of components. Removable sections on all conveyors shaft not exceed 10' (3048mm) in length. These sections are to be designed to be removed for maintenance and repair of conveyor components and electrical controls.

2.8 SUPPORTS

A. All floor supports for transportation conveyors shall be located on a maximum of 10'-0" (3048mm) centers. Load conveyors shall be supported on 5'-0" (1524mm) centers. All floor supports shall be of a standard "H" type design with vertical adjustment. Floor support vertical members shall be constructed of 10-gauge (3.4mm) hot-rolled formed-steel channel with 10-gauge (3.4mm), hot-rolled galvanized universal foot and head plates.

2.9 CONVEYOR GUARDRAILS

A. Provide guardrails at inbound and outbound conveyors at locations shown on the drawings. Guardrails shall be 4" diameter schedule 40 steel pipe on steel posts at 4'-0" on center anchored to the floor slab with 3/8" steel base plate and (4) ¾" x 6" anchor bolts at each plate.

2.10 GENERAL DRIVE REQUIREMENTS

A. All drive units shall be equipped with a suitable guard of "clamshell" design with quick-release fasteners, and fabricated from a minimum of 16-gauge (1.6mm) steel. All guards shall comply with applicable OSHA standards and have an expanded or slotted metal viewing port to allow belt inspection without removal of the guard.

B. All drive sprockets and/or V-belt sheaves shall have a taper-lock type hub construction, with keyways. Sprockets shall be steel with a minimum of thirteen Type B form teeth.

C. Driving and driven sheaves shall be minimum two-groove A-section pulleys with taper-lock type hubs.

D. Roller chain, if used, shall be compatible with the torque and horsepower requirements of the application but not less than RC-60 in size. The roller chain ends shall be connected with a removable connecting link.

2.11 CONVEYOR DRIVES

A. The conveyors shall be driven by motors that conform to AIEE and NEMA standards. These drives should be shaft-mounted, single reduction speed reducers or an approved equal. Reducers shall be sized for AGMA Class II application minimum. Motors shall be sized for maximum load and belt speed requirements under continuous operations (minimum 1 horsepower) and capable of withstanding shock caused by frequent starting and stopping under load where applicable. Motors shall be of the constant speed (1725 revolutions per minute), continuous service, ball bearing type with Class "B" insulation. All motors will be NEMA "B", TEFC, "C-Face" and provided with thermal overload protection. All motors shall be Bald or, Reliance, or

equal, and of the high-efficiency, low-energy type. Service factor on all motor/reducers shall be a minimum of 1.0.

B. For low profile application where shaft-mounted reducers are not practical (i.e., ticket counter conveyors and load conveyors) right angle or parallel C-face may be substituted for the above mentioned motor and reducers.

C. Electric brakes shall be provided on all incline and decline conveyors to prevent coasting. (Electric brakes shall not be required on decline conveyors feeding an inclined plate device.) On all belts with frequent Start/Stop operation, such as indexing belts, motors shall be continuous-running NEMA "B" design, coupled with a Electro-magnetic clutch and/or clutch/brake arrangement.

D. Drip pans shall be provided on all drives. Drip pans shall be constructed out of minimum 14-gauge steel, and appropriately mounted for the actual application. Such mounting shall not impact maintenance access.

## 2.12 PULLEYS/SHAFTS

A. The maximum shaft run-out of all assembled (non welded) pulleys, shafts, and bearings under a no-load condition, measured from the centerline of the bearing to the end of the shaft farthest from the conveyor shall not exceed .0075 inch per inch. Maximum pulley shell run-out shall not exceed .060 inch.

B. All pulleys/shafts shall meet CEMA Standard No. B105.1-1990.

## 2.13 STATUS BALANCE

A. All pulleys are statically balanced when operating speeds exceed 200 rpm, and dynamically balanced when speeds exceed 500 rpm. Rollers of eccentric material such as standard pipe, are statically balanced when operating speeds exceed 200 rpm, and dynamically balanced when speeds exceed 400 rpm. Rollers made of seamless tubing are balanced when speeds exceed 600 rpm. Rollers made of welded steel tubing may be used without balancing at speeds up to 1000 rpm, if straightness is held to close limits and excessive welding flash is not present; for speeds in excess of 1000 rpm, dynamic balancing is provided.

## 2.14 POWER PULLEYS

A. All power pulleys for intermediate-type drives shall be lagged with a minimum 3/8" (9.5mm) thick vulcanized lagging of 55-70 durometer and be crown-faced and equipped with taper-lock hubs and 1-7/16" (36mm) minimum diameter AISI 1018 C.R.S. shafts mounted in precision-and-ground flange-type ball bearing units. Pulleys and shaft sizes are determined by maximum belt pull as follows:

1. Light-duty (300 pounds (136 kg) maximum belt pull) consists of a 63/4"(171mm)minimum diameter drive pulley with a 1-7/16" (36mm) minimum diameter shaft. Where used, roller chain shall be RC-60.

2. Normal-duty (500 pounds (227 kg) maximum belt pull) consists of an 8-3/4" (222mm) minimum diameter drive pulley with a 1-11/16" (43mm) minimum diameter shaft. Where used, roller chain shall be RC-60 or larger.
3. Intermediate-duty (1,000 pounds (455 kg) maximum belt pull) consists of a 10-3/4" (273mm) minimum diameter drive pulley with a 1-15/16" (49mm) minimum diameter shaft. Where used, roller chain shall be RC-80 or larger.

4. Heavy-duty (1,500 pounds (682 kg) maximum belt pull) consists of a 12-3/4" (324mm) minimum diameter drive pulley with a 2-3/16" (56mm) minimum diameter shaft. Where used, roller chain shall be RC-80 or larger.

B. Power pulleys for end-type drives or power take-offs shall be lagged with a minimum 3/8" thick (9.5mm) vulcanized lagging of 55-70 durometer, and shall be 6" (152mm} in diameter (minimum) crown-faced and equipped with taper-lock type hubs and 1-7/16" (36mm) minimum diameter AISI 1018 C.R.S. shafts mounted in precision-and-ground flange-type ball-bearing units. End-type drive units may be used for conveyors 25' (7.6 m) or less in length.

## 2.15 HEAD AND TAIL PULLEYS

A. Head and tail pulleys shall be steel, crown faced, equipped with compression type hubs and l-7/16-inch minimum diameter AISI 1018 C.R.S. shafts mounted in eccentric locking type precision ground flange type ball bearing units. All head and tail pulleys will be 6-inch diameter minimum x 10-gauge wall. Pulleys shall be of a single piece electric weld steel construction and have steel end discs attached to the rim by continuous welding. Slider beds shall be arranged to keep the gap between the end section and the end pulley to a minimum. Gap between adjacent end pulleys will not exceed 1 inch, with 1/2-inch as the design objective. All head and tail pulleys used for belt tracking will be equipped with jacking bolts to provide a total combined adjustment of l-1/2-inches per conveyor. Jacking bolts shall be equipped with jam nuts to prevent loosening.

## 2.16 TAKE-UPS

A. All take-up pulleys shall be a minimum of 4" (102mm) in diameter, steel, crown-faced and equipped with taper-lock type hubs and 1-7/16" (36mm) minimum diameter AISI 1018 C.R.S. shafts mounted in precision-and-ground flange-type ball bearing units. Pulleys shall be mounted on threaded take-up devices with steel guides. All conveyors shall be provided with take-ups for field adjustment of at least 4" (102mm) or 2% of the conveyor bed length, which ever is greater. Take-ups shall be an integral part of the drive frames on all intermediate-drive conveyors.

B. The Contractor shall adjust the position of all take-up pulley devices after system testing prior to substantial completion of the system so that no more than 50% of the take-up device adjustment has been used.

## 2.17 SNUB PULLEYS

A. All snub pulleys shall be a minimum of 4" (102mm) in diameter equipped with taper-lock type hubs and 1-7/16" (36mm) minimum diameter AISI 1018 C.R.S. shafts mounted in precision-and-ground flange-type ball bearing units. All snub pulleys used for belt tracking shall be equipped with jacking bolts to facilitate adjustment.

## 2.18 RETURN IDLER ROLLERS

A. The return idler rollers shall be a minimum of 2-1/2" (63.5mm) diameter, 12-gauge (2.7mm) steel equipped with an 11/16" (17.5mm) hex axle for belt speeds up to 150 fpm (0.76 m/sec) and a minimum of 3-1/2" (89mm} diameter with an 11/16" (17.5mm) hex axle for belt speeds from 150 to 300 fpm (0.76 to 1.52 m/sec).

B. All hex shaft return idler rollers shall be equipped with sealed, permanently lubricated, caged, semi-precision type ball bearings. Return idler rollers shall be located on centers not to exceed 10' (3048mm), with spacing being reduced in areas where belting may drag against the floor or conveyor structure. The shafts shall be mounted to the conveyor bed with adjustable retainers for proper belt tracking.

## 2.19 BEARINGS

A. All bearings shall be greaseable, self-aligning, anti-friction, ball bearing type, pre-lubricated and sealed with synthetic lip seals, and equipped with eccentric locking collars. Bearings shall be mounted on the outside of the conveyor frames unless clearance restrictions prohibit. All bearings will be provided with alemite lubrication fittings.

B. Bearings shall have a minimum B-10 life of 30,000 hours based on service and loading of conveyors, and on the manufacturer's published data showing the load rating of each bearing.

## 2.20 REDUCERS

A. Reducers shall be shaft-mounted Dodge "TXT" Series or Morse XM, equipped with tapered bushings. The reducer input shafts shall be equipped with two-groove minimum, taper-lock type hubs, V-belt sheaves for "A" section cogged belts.

B. In applications such as ticket counter conveyors or queue conveyors where physical space is limited, Dodge APG or Morse Powerline right-angle worm gear reducers with C-faced motors or JOKI (Interroll) or equal motorized pulleys may be used.

C. All reducers shall be sized for Class II application.

D. Reducers used on inclines or declines where roll-back would be critical shall be equipped with brake motors.

## 2.21 FINISHES

A. Painting

1. All surfaces to be painted shall be thoroughly cleaned of rust, scale, oil, grease, grit, welding flash and other forms of dirt. All structural parts, except those surfaces coated with a galvanized coating, and those that would normally be unpainted (such as rollers, shafts, sprockets, bearings, chains, nameplates, etc.), will be painted with one shop coat of standard machinery rust-inhibitive paint, including all floor support structures. Structural steel required for ceiling hangers above drop points to be painted with rust-inhibitive primer.

B. Stainless Steel

1. All flat head screws used to attach the stainless steel shrouding, such as the horizontal portions attached to the conveyor bed, will be completely countersunk so that no portion of the screw head is above the adjacent surface. Grinding or filing of the screw heads shall not be done.

2. Field welding of any stainless steel trim element shall not be done. Blemishes of the stainless steel trim elements shall not be accepted. This includes those caused by poor manufacturing practices, as well as those caused in the field, plus those caused by field attempts to remove any blemish.

## 2.22 CONVEYOR IDENTIFICATION

A. Each conveyor section shall be permanently and indelibly marked with its respective number. Each conveyor number shall be carefully and neatly painted or stenciled in a contrasting color, nominally 4" (100mm) high, in a conspicuous location adjacent to the conveyor drive. In public areas, such identification shall be 2" (50mm) high numbers in a conspicuous location on the conveyor drive. Temporary markings on the conveyors or other equipment shall be made with a medium which is readily removable with water or a readily available commercial solvent, such that they may be removed without requiring *any* refinishing of the surface on which they appear.

## 2.23 POWER TURNS

A. All powered turns shall be as manufactured by Transnorm Systems or Portec. Unless otherwise noted, "B" radius curves will be used at ticket counters, and "C" radius elsewhere. The belt speed as measured on the centerline of the belt width shall match the speeds of the adjacent conveyors within 10%, except in certain cases where conveyor speeds must be progressively in creased to meet bag travel time requirements. Side guards for turns shall be in alignment with the adjacent straight conveyor side guards. The angle iron frame supporting the outside guard shall be fabricated in two sections on turns greater than 90 degrees for quick removal for repairs and maintenance. Belting and drive components for power turns will be as supplied by Transnorm System or Portec.

## 2.24 FIRE AND/OR SECURITY DOORS

A. Where fire and/or security doors are shown on the drawings, they shall be provided and in stalled by the Contractor. Fire doors shall be rolling shutter, slat-type, interior-face, mounted doors with electric operators, UL labeled for three-hour rating with Class A firewalls. Fire doors shall be Atlas Door Corp. Part No. L41 (ST) (stainless steel) or equal products of Overhead Door Corp., Cookson, or Raynor.

## 2.25 DRAFT CURTAINS

A. Draft curtains shall be provided at all conveyor wall penetrations and shall be flexible strip doors with two staggered layers of 8 inch x 1/16-inch strips-color "black"-as manufactured by the Necor Corporation, or type DBD flexible strip door-color "black"-as manufactured by Metalglas Products.

## 2.27 ELECTRICAL SPECIFICATIONS

A. Related Standards & Codes

1. All components and materials shall conform to applicable NEMA (National Electrical Manufacturer's Association) and JIC (Joint Industrial Council) standards. The requirements of the NEC (National Electrical Code), NPFA-70 and the American National Standards Institute Safety Code B20.1 shall be met as well as those of any other government or local authorities having jurisdiction. All components shall be designed for continuous duty service.

B. System Power Provisions

1. 480/220 VAC, 3-phase, 60 Hz power shall be furnished to a disconnect located within 10' (3050mm) of each Motor Control Panel (MCP) disconnect. Contractor shall be required to supply each BHS system from this point. The Contractor shall furnish all 110 VAC, single-phase control power required for his installation. Contractor shall show on his shop drawings the electrical power requirements (amperage) of each MCP. Beyond each service disconnect, the Contractor shall furnish and install all services, feeder, and fused disconnects for branch circuits to each MCP as specified and shall provide and install all panel boxes, wireways, conduits, conductors, transformers, fuses, equipment and materials required to complete the electrical power distribution for the operation of the system.

C. Electrical Power Conditioning

1. The Contractor shall provide and install, as required, the appropriate number and size of power regulation to ensure that the power for the respective programmable controllers, computers, baggage tag readers, etc., is properly conditioned. Power regulators, if required, are to be of the type manufactured by the Sola Corporation or approved equal.

D. Standardization of Equipment

1. Where there is more than one item of equipment required under this contract, the Contractor should furnish equipment of the same type and from the same manufacturer as much as possible. All components shall be Allen Bradley, Cutler Hammer, or equivalent.

E. Color Coding and Wire Marketing

1. All electric wire and cable shall be color-coded and shall have the wire numbers as shown on the electrical drawing affixed to both ends of each wire. Coding shall be as follows:

(a) Power Wiring – Line Side:

This code applies to all power wiring from source to line side of fuses in control cabinets. The neutral, if applicable, shall terminate at the terminal board.

| **Phase** | **120/208** | **277/408** |
|---|---|---|
| A | Black | Brown |
| B | Red | Orange |
| C | Blue | Yellow |
| Neutral | White | Gray |
| Mechanical Ground | Green | Green |

(b) Power Wiring - Load Side:

The code for power and control wiring from the load side of fuses in control cabinets to all other devices shall be as follows:

| | |
|---|---|
| Power | Black |
| A/C Control | Red |
| D/C Control | Blue |
| Neutral | White |
| Mechanical Ground | Green |

F. Controls

1. Controls shall operate on a maximum of 120 volts. Control components shall not be subjected to operation under loads exceeding the manufacturer's recommended rating.

G. Equipment

1. Enclosures

All electrical enclosures shall be NEMA type 12, except those, which may be, exposed to the elements, which shall be NEMA type 3 or 4 weatherproof.

2. Motor Starters

Magnetic motor starters with manual reset thermal overloads shall be used. Minimum starter size shall be NEMA size "0". Pulleys and shaft sizes shall be determined by maximum belt pull.

3. Push Button Starters

Push-button stations shall be equivalent to Allen Bradley 800T. All push-button stations in the public view shall be flush mounted with a stainless steel cover plate. Emergency stop push-buttons shall be of the maintained contact, push to stop, pull to reset, illuminated mushroom head type, equivalent to Allen Bradley 800T.

4. Switches

Limit switches shall be of the precision, oil-tight Allen Bradley "C" or approved equal. Contacts shall have a minimum rating of 10 amperes, 120 volts for continuous duty. Selector switches shall be of the multiple, rotary, heavy-duty, industrial type generally known as instrument, control auxiliary or transfer switches, Allen Bradley 800T or approved equal.

5. Pilot Lights

Pilot lights shall be equivalent to Allen Bradley 800T, push-to-test, transformer type. Lens colors as required for the application.

6. Photo Electric Controls

The sensors shall be mounted on structural members attached to the machinery structure so that a minimum of vibration is transmitted to these units. No more than one penetration per sensor, a maximum of 1-1/2 inch (38.1 mm) in diameter, shall be permitted in metal parts (conveyor guards). Sensors for tall bag detection, if required, shall be mounted 32 inches (81.3 cm) above the conveyor surface. All other sensors shall be mounted to detect an object 1-1/2 inch (38.1-mm) above the conveyor surface. Photo controls shall be LED type, Photo Switch 42MRU, series 5000, or equal.

7. Relays and Timers

Wherever practical to do so, programmable controllers shall be used in preference to discreet relays and timers. Where relays are used, they shall be Allen Bradley 700 Type NP or approved equal. All relays shall be rated at the required voltage for the application. Where the time-delay feature is required, relays shall be furnished with time-delay range as required for each application. All timers shall be Allen Bradley 700 PT or 849 Series, Eagle Cycl-Flex Series, or approved equal.

8. Programmable Controllers

Programmable logic controllers shall be Allen Bradley series or approved equal.

9. Interlocks

Provide and install all equipment required to interlock the motor control units of the systems operated in series.

H. Panels and Control Stations

1. Control Panel

a. The main control panel shall be designed to provide the following described functions at a minimum:

(i) System Start
(ii) Emergency Stop
(iii) Hold in Circuit
(iv) Jam Detection

2. System Status Panel

A. A system status panel shall be furnished and installed in the control panel door when required by system complexity. A graphic representation of the system shall be portrayed on the face of the panel. Indicator lights shall be appropriately located on the map to identify sensing devices and emergency stop devices. Emergency stop indicator lights shall be red; jam indicator lights shall be amber; and a green run light shall be provided for each individual sub-system.

B. An audible alarm shall be mounted on the panel along with a silence button. This audible alarm shall operate whenever a jam or emergency stop condition exists.

C. If a make-up sortation loop is used, a start button shall be provided on the panel door. This button will not start the related feed conveyors.

3. Control Stations

A. Control Stations shall contain the following:

1. Ticket Counters and Baggage Claim

(i) System start button (to start respective system only)
(ii) Emergency stop button (to stop respective system only)
(iii) Key operated "ON-OFF" selector switch (one station only)

2. Make-up Area

(i) Emergency stop button (to stop the entire system)
(ii) Start station

3. Jam Control

(i) Jam reset button (to reset the jam control circuitry and restart the conveyors that have been shut down)

I. Control Functions - Outbound Conveyor Systems

1. System Start

A. Control stations incorporating a green momentary START pushbutton and a red illuminated mushroom-head maintained-contact E-STOP pushbutton shall be provided at 25 foot (7600mm) intervals along each load belt. One of these control stations shall incorporate a two-position maintained-contact keylock selector switch which will enable/disable all START pushbuttons associated with the load belt. The keylock switch shall use the Allen Bradley D-18 key (unless otherwise specified by Owner) with key removable in both "Enable" and "Disable" positions. Activation of any START button shall activate an alarm in the baggage make-up room and, after a predetermined time delay, the system shall automatically start, causing the alarm to deactivate.

2. System Stop (Auto)

A. Automatic stopping of each conveyor subsystem shall be accomplished through circuitry utilizing a photosensor located at the discharge end of each load conveyor. Interruption of the photosensor beam shall reset the related circuit timing function. If, after an adjustable time period sufficient for the last bag to completely traverse the system, the photosensor has not sensed a bag, the timing function will automatically shut down the related subsystem conveyors.

B. The auto-stop circuitry shall be so designed that any activation of a related emergency-stop switch, motor overload, or a jam condition as detected by the subsystem jam-detection circuitry, will inhibit the auto-stop timing function until the noted condition has been corrected and the subsystem conveyors ere restarted.

3. System Stop (Emergency)

A. The system may be stopped anytime during the normal operation by depressing any one of the red illuminated mushroom-head maintained-contact emergency-stop (E-STOP) buttons which shall be located adjacent to the following belts:

a. Ticket counter, curbside, and transfer loading belts
b. Bag room sortation conveyors
c. Merge devices

B. When an E-STOP button is depressed, the entire associated system shall be stopped, including all upstream belts feeding the affected section. The E-STOP button which is depressed shall be illuminated. After clearing the emergency, the system may be restarted either by resetting the actuated emergency pushbutton at a bag room or merge station, or by resetting the E-STOP button and then depressing

the START button at loading belt stations. The system may only be restarted from the station that actuated the emergency-stop button.

D. At Owner option and where operationally desirable, multiple E-STOP locations may be replaced with one or more E-STOP lanyards. When E-STOP lanyards are used, they shall illuminate a red light at the location of the E-STOP lanyard switch. This switch shall be of the specified type and shall be manually resettable.

J. Control Functions - Inbound Control Systems

1. Start System: Depressing the "Start" push button (green inset) starts the conveyor device and associated equipment. An adjustable time delay (0.1-20 seconds) is incorporated into the circuitry such that if the "Start" push button is depressed, an audible alarm and warning light will be activated in the immediate vicinity of the claim device before the unit begins motion.

2. System Stop (Automatic): Automatic stopping the system is accomplished through a photoelectric sensor located at the discharge shutter. Each time the system is started and an interruption of the photoelectric sensor beam occurs, a timing device is reset. After a time interval (0-30 minutes adjustable) suitable to ensure the last bag of a load has time to complete a full revolution on the conveyor after detection by the photoelectric sensor, the timing device will time-out and the conveyor will stop.

3. System Stop (Manual): Depressing the "Stop" push button (red extended) stops the conveyor device and associated equipment. Security and/or fire doors will shut once the conveyor device is stopped.

4. System Stop Emergency (Illuminated Mushroom Head Push Button E-Stop): The system and associated equipment will stop any time an "E-Stop" push button is depressed. A minimum of three (3) "E-Stop" push buttons are required for the system: two (2) are located in the lobby near the claim device out of the reach of children (one at each wall penetration), and the third is located in the same unit as the system "Start" and "Stop" push buttons. Depressing the "E-Stop" push stops the claim device and associated equipment; however, the fire/security doors remain in the open position.

5. After clearing the emergency, with the exception of "E-Stop" push buttons in public areas, the system may only be restarted by resetting the actuated "E-Stop" push button and then depressing a system "Start" push button. "E-Stop" push buttons in public areas operate as herein described with the exception that if reset, the system will automatically restart after completing a normal system start (warning) sequence.

K. Security Door Controls

1. If a system is equipped with an automatic security door, expiration of the start-up warning shall cause the door to raise. After the door has reached the full open position, the conveyors shall automatically start.

2. If a system is equipped with a manually operated security door, an interlock feature shall be provided which will prevent operation of the system unless the security door is in the full open position.

3. Normal System Stop (Automatic): When the system stops automatically, the associated doors shall then close. If the safety edge switch located on the bottom of the door encounters an obstruction, the door shall automatically return to the open position and illuminate a white indicator lamp. After the obstruction is removed, an obstruction reset pushbutton must be depressed to lower the door. The white indicator lamp and reset pushbutton shall be located near the security door. The conveyors shall remain inoperative when a door obstruction occurs.

L. Additional Controls

1. Cascade Stop

A. Photocells shall be located at the discharge end of all conveyors to signal the operation of cascade stops. A conveyor will stop when the cascade photocells are interrupted and the conveyor immediately downstream is stopped. The cascade stopped conveyor will automatically restart if the photocells are unblocked or the downstream conveyor restarts.

2. Jam Detection

A. Photocells to signal a jam shall be located at the discharge end of all conveyor feeding onto power turns, tapered rollers, incline conveyors, merges, opposite pushers and diverts, and at any other potential jam areas.

B. When the photocells detect a jam, the conveyor detecting the jam and the conveyor immediately downstream are stopped. If the conveyor immediately downstream is a power turn, then the conveyor immediately downstream of the power turn is also stopped.

C. If the conveyor is stopped for any reason, the jam detection timer will be reset and held until the conveyor is restarted. The jam detection function will only operate when the conveyor is running; if the conveyor is stopped and the jam detection photocell is blocked, then a false jam will not be reported.

3. Overheight Detection

A. Photocells shall be located at every input to detect bags that are too high to clear the lowest downstream stream obstruction for all possible routes. The conveyor will stop when the overheight photocell is interrupted and the oversized indicator lamp at the control station will be lit. The operator must reposition or remove the overheight bag and press the rest/start pushbutton. The stopped conveyor will restart and the oversized indicator lamp at the control station will be turned off.

4. Overlength Detection

A. Photocells shall be located at every input to detect bags that are longer than a preset bag length. The conveyor will stop if the bag is too long and the oversized indicator lamp at the control station will be lit. The operator must remove the overlength bag and press the rest/start pushbutton. The stopped conveyor will restart and the oversized indicator lamp at the control station will be turned off.

5. Auto Stop

   A. Photocells shall be located upstream of sections of transport conveyors not specifically controlled by START/STOP switches. The conveyors will stop if the auto stop photocell does not sense a bag for an adjustable time period. If a conveyor stops for any reason, the auto stop timer is reset and held until the conveyor restarts.

5. Indexing Control

   A. Photocells shall be located at the discharge end of each conveyor feed and indexing conveyor. The conveyor will run when the photocell is blocked and stop when it is clear. A time delay will be included such that the conveyor will continue to run for a preset interval after a bag clears the photocell and is completely on the indexing conveyor.

   B. Advance control pushbuttons shall be located in public areas and advance control lanyards will be located in the bag room. The advance control will cause the conveyor to run as long as the control is activated, or until the respective sort pier full photocell is blocked.

M. Motor Overloads

1. If any subsystem motor draws excess current, motor overload indicators on the affected MCP panels shall be lit. The fault shall also be displayed on the status monitoring system. Following correction of the overload cause and resetting of the overload protection device, the system may be restarted with the start pushbutton, after which the motor overload indicator will be turned off and normal operation will resume. If an individual conveyor motor overloads, all upstream conveyors will cascade stop and all downstream conveyors will continue to run as normal.

N. Jam Indication/Reset

1. A jam indicator light, emergency stop pushbutton, and a reset/start pushbutton shall be located in a control station near each jam detection photocell. The jam indicator light will be lit when the jam detection photocell senses a jam condition.

2. To restart the conveyor and extinguish the lamp the operator shall perform the following; push the emergency stop pushbutton, clear the jam, reset emergency stop pushbutton, and press reset/start push-button, after which the jam indicator light will be turned off.

3. Where possible the control stations shall be located adjacent to the jam photocell and will only be accessible to the personnel clearing the jam. The control stations will be located on the catwalk side of conveyors equipped with catwalks.

O. Startup Warning

1. Before startup of the conveyor system, an alarm horn shall sound and a beacon shall be lit for a period of time (adjustable). Alarm horns shall be provided at the ticket counter, curbside, and rechecked baggage inputs.

P. Alarm Silence

1. An alarm silence pushbutton on the door of the MCP shall silence the alarm horn. Multiple faults shall sound the associated alarm horn multiple times. For example, if a jam condition has caused the alarm horn to sound and the alarm has been silenced by the alarm silence pushbutton but the jam has not been cleared, then a second fault occurring after the alarm has been silenced will again cause the alarm horn to sound. The alarm silence pushbutton will not turn off any fault indicator lamps.

Q. Field Wiring

1. Disconnects

a. The Contractor shall furnish and install a non-fusible, manual disconnect switch, with provision for padlocking, in the circuit of each motor in the conveyor sub-systems in compliance with ANSI B20.1.

2. Circuit Wiring

a. All connections shall be made with wire of current-carrying capacity consistent with the load and duty cycle. Wires shall be run continuously from one piece of apparatus to another without splices in conduit. Power wiring may be spliced in junction boxes as required. Control connections shall be made on terminals or with compression-type splices enclosed in junction boxes. Power and low-level (less than 90 volts) electronic control wiring shall be in separate conduits. All circuit wiring shall comply with the most current version of the National Electrical Code and all State and local codes.

3. Conduit

a. Unless otherwise specified, all electric wiring shall be enclosed in E.M.T. conduit. Except in public areas, conduit shall be installed exposed on walls, ceilings, beams, columns, and on the conveyor structure. Locations of exposed conduit shall be selected in order to minimize or prevent damage to conduit from vehicles or equipment. In public areas, conduit runs shall be inconspicuous by running under cover plates, behind conveyors concealed from public view.

b. Flexible conduit may be used for final connections to motors and all other devices requiring adjustments. All fittings for flexible conduit shall be of the liquid-tight type. Installation shall be in accordance with Article 351 of NEC-78.

c. Outlet, junction and pull boxes, and cover plates shall be suitable for use with E.M.T. conduit and shall conform to the National Electric Code for minimum wiring space requirements and material thickness. All boxes shall have screw-fastened covers.

4. Wireways

   a. Wireways may be used where protection is adequate in accordance with Article 362 of NEC-78. Any Wireways used shall have hinge type covers.

5. Wire and Cable Conductors

   a. All power conductors shall be a minimum of No. 12 AWG, 600 volt, type THWN/THHN or THHN insulated stranded copper wire. All external control wire shall be a minimum of No. 14 AWG, type THWN/THHN or THHN stranded copper conductor, rated at 600 volts. All wires inside the control panel shall be sized for current carrying capacity. Control wires to be a minimum of No. 16 AWG, MTW, rated at 600 volts.

R. Control Device Identification

1. MCP component identification shall be provided so that all relays, timers, starters, overloads, fuses, etc., can be readily identified when the MCP door is opened. In addition to all prime manufacturer's nameplates, all electrical and mechanical control items mounted in or on panels or pushbutton stations shall be further identified in the system by permanently attached corrosion-proof, etched, engraved, or stamped identification plates. Dymo-type labels are not acceptable.

S. Conveyor Identification

1. Each conveyor section is permanently and indelibly marked with its respective number as illustrated by the Equipment Description list. Each conveyor number is carefully and neatly stenciled in a contrasting color 4" high, in a conspicuous location on the conveyor drive.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Inspect substrates and conditions under which the work of this section will be performed, and verify that installation properly may commence. Do not proceed with the work until unsatisfactory conditions have been resolved fully.

3.2 INSTALLATION

A. General: The conveyors shall be laid out as shown on the drawings and in no case shall interfere or encroach on adjacent space or functions. Required components of the system shall include but not be limited to straight sections and 90 degree turns. Installation and attachment of frame, trim, drive assembly, motor, controls, and other equipment may be based on manufacturer's standard methods.

B. Install baggage conveyors plumb and level. Coordinate location and layout with security doors.

C. Coordinate location of disconnect(s), alarms, lights, switches, access control devices etc. with other trades.

D. Mechanical Installation

1. Mechanical installation includes all necessary conveyor support steel and fire stops and fire doors supplied with the conveyor systems.

E. Electrical Installation

1. Electrical installation includes wiring and conduit for all conveyor power and control. All conveyor electrical equipment connections are included.

## 3.3 TESTING AND TRAINING

A. The Conveyor Contractor shall satisfy the Owner and the Architect that the equipment performs safely and in accordance with these specifications and manufacturer's published data as required by testing and training per Part 1 of this section.

## 3.4 ADJUSTING

A. Final Adjustments: Upon achieving substantial completion of the work, adjust all operable components to ensure that they are properly installed and functioning smoothly. Replace any component which cannot be adjusted for proper operation or within 10 percent of design requirements, at no additional cost.

## 3.5 CLEANING

A. During progress of the work, remove from the project site all discarded materials, rubbish, and debris resulting from the work.

B. Upon completion, clean all surfaces which have become soiled or coated as a result of work of this section, using proper methods which will not scratch or otherwise damage finished surfaces. All surfaces enclosed within the conveyor or center infill area shall be free from debris and broom clean for final acceptance.

1. For cleaning, use only products and techniques acceptable to manufacturer of products being cleaned.

## 3.6.1 PROTECTION

A. General: Institute protective procedures and install protective materials as required to ensure that work of this section will be without damage or deterioration at Substantial Completion and commissioning of the facility.

END OF SECTION 14540

# SECTION 16708 – ACCESS CONTROL SYSTEM

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Documents affecting work of the Contract, including General and Supplementary Conditions and Division 1 Specification section, apply to this section.

### 1.2 SUMMARY

A. Scope: Work of this section includes all labor, materials, and software required for systems operation, detailed technical design, installation, data entry and importation, graphic entry and importation, testing, and documentation of a complete and operating Integrated Access Control and Badging System (ACS) as shown on the drawings and specified herein.

### 1.3 RELATED SECTIONS

1. Division 16 Electrical Specifications"

### 1.4 RELATED WORK

### 1.5 SYSTEM DESCRIPTION

A. General: The Access Control System (ACS) shall consist of redundant real-time servers, alarm and badging workstations, and a hierarchy of intelligent field panels and door interface boxes which interface with specified card readers, portal input devices, portal output devices, monitoring, and control devices. The system shall be capable of routing individual alarms to selected workstations.

B. The system architecture shall support multiple-site system connections using local area network or wide area network. The user interface shall be Windows compatible, operate within a standardized pull down menu shell, and provide complete mouse input device capabilities. The ACS software shall operate simultaneously with other Windows compatible applications and shall preempt system operations upon a change of alarm state. During an alarm condition, the alarm status and acknowledgment windows shall move to the screen foreground.

## 1.6 HARDWARE ARRANGEMENTS

A. Host CPU: A redundant, cold backup, Central Processing Unit (CPU) capable of supporting 32-bit architecture and providing LAN connectivity for system workstations and RS-485 or LAN data connectivity for the intelligent field panels.

B. Access Control Workstations: A LAN connected personal computer (PC) operating as the user interface to the ACS system.

C. Badging Workstations: A LAN connected personal computer (PC) operating as the user interface for photo I.D. badging, cardholder database, future biometric enrollment, smart card programming, card printing, and key database management functions.

D. Intelligent Field Panels: A distributed intelligence processor that stores the cardholder database to grant or deny access, monitors system activity, and provides data communications interface between Input/Output Panels and the ACS System Host CPUs.

E. Input/Output Panels: An interface panel that provides for input and output device connection to the ACS System.

F. Card Reader: A portal device to read encoded portable cards information for the purpose of determining access rights.

G. Electric Locks: A device to secure the portal and allow passage through the portal by means of remote control.

H. Door Position Switch: A Balance Magnetic Switch (BMS) or other device used to monitor the open/closed status of the portal.

I. Lock Status Switch: A device used to monitor secured/unsecured status of the portal.

J. Request to Exit Device: A device used to allow egress through a secured portal without creating an alarm condition.

K. Duress Alarm: A device used to manually generate an immediate alarm condition at the alarm monitoring workstation.

L. Audio/Visual Alarm: A device used to indicate a breached security condition locally at the portal.

M. Key Switch: A key controlled device used to arm, disarm or reset certain portions of the ACS system.

N. Card Printer: Ancillary device used to print photo ID and card holder information directly onto access cards.

## 1.7 SYSTEM ARCHITECTURE

A. General: The ACS's primary function shall be to regulate access through specific portals to secured areas and provide ID badge creation. The ACS must utilize a single seamlessly integrated database for both its access control and badging functionality. This integration shall be provided under one operating environment.

B. Integrated Access Control and Badging System shall provide the following system functions:

1. Access Control
2. Alarm Monitoring
3. Cardholder Management
4. Signature Capture
5. Badge Creation and Printing
6. System Administration
7. Badge Layout Creation
8. Screen/Forms Creation
9. Graphical Map Creation
10. Data Import
11. Database and Alarm Reporting

C. Access Control: The systems primary purpose shall be to provide access control. The system shall be able to make access granted or denied decisions, define access levels, and set time zones and holidays. An input/output linkage feature will allow linking of monitor zone points to output control points within Intelligent Field Panels (IFP). The system shall provide features such as area control (two-man control, hard, soft and time anti-passback) and time zone/holiday overrides.

D. Alarm Monitoring: The system shall be used for graphical alarm monitoring. Map Configuration software must allow a User to create and import customized maps of their facility and to attach icons to those maps. Alarms are to be prioritized The alarm monitoring screen shall provide information about the time and location of the alarm, along with its priority. The alarm monitoring screen must be able to sort pending and/or insert new alarms based on any of the following attributes: priority, date/time, IFP, card reader, or card holder. Date/time sorts must be user selectable to be either ascending or descending and must have the option of displaying the seconds of the minute in which the alarm arrived into the system.

E. Badge Creation: The ACS shall include a state-of-the-art, 32-bit, ID badge creation and production system integrated with the cardholder management system. This shall allow for the creation of different badge types based on a database field, the linking of that field to a badge type to automate the process of credential production, and the use of security colors to allow officers to quickly identify personnel access authority by the badge design.

## 1.8 REFERENCES

A. General: The publications listed below form a part of this specification.

1. NFPA 70 National Electrical Code (NEC)
2. INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)
3. International Building Code 2003

## 1.9 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division #1 Specifications Sections:
   1. Product Data
   2. Shop Drawings

B. Provide assembly drawings.

C. Provide wiring diagrams

D. Testing: Prepare and submit Test Plans, Test Procedures and Test Reports as indicated in Part 3, Execution.

E. Provide detailed transition plan for implementing new ACS system.

## 1.10 OPERATION AND MAINTENANCE MANUALS

## 1.11 WARRANTY

A. Period: The Contractor shall guarantee all labor, workmanship, and materials for a period of one year from the date of substantial completion at the end of the last phase of construction. Should a failure occur within the first year to the system, the Contractor shall provide all labor and materials necessary to restore the system to the condition required for the final test and acceptance for this contract, at no cost to the Owner. During this period, the Contractor shall provide, free of charge, all software upgrades and patches. The contractor shall provide all materials, labor and equipment necessary to correct any defects that may develop due to faulty materials, or workmanship. Contractor shall fix or replace defects within 8 hours of the initial call for services. Tie-ins: During the warranty period, additional card readers and components may be connected and their use entered in database. New devices will be connected in the same manner as shown on the drawings for this contract and the existence of te new connections shall not void this warranty.

## 1.12 INTEGRATION/INTERFACE WITH OTHER SYSTEMS

A. Interface with the Fire Alarm System

B. Interface with the CCTV

# PART 2 - PRODUCTS

## 2.1 GENERAL

A. Power: All ACS equipment shall operate on 120 VAC. Any special power treatment required, such as filtering or spike elimination that may be required for proper operation and protection of the ACS system shall be provided with the system.

B. Backup Power: Provide integral battery back-up for all ACS devices including, but not limited to, ACS field panels, and lock power supplies.

C. Hardware: Provide a distributed access control system as required for a complete operating system as described herein and shown on the drawings.

## 2.2 MANUFACTURERS

A. General: Subject to compliance with requirements provide the following products by one of the stated approved manufacturers.

B. Software, Intelligent field panels, reader modules, and other input/output/active ACS modules:

C. Servers and Personal Computers (workstations):

D. Smart Card Readers:

E. Smart Card Readers with internal keypad:

F. Door Position Switches:

G. Audible/visual Alarm units:

H. Duress Alarm Pushbutton:

I. Power Supplies:

J. Proximity Cards:

K. Card Printer:

## 2.3 PROCESSING DEVICES

A. Host Processor/Server: The host CPU shall support Ethernet LAN communication using TCP/IP protocol between clients and servers.

B. Redundant Processor/Server

C. Workstations:

Intelligent Field Panels: The intelligent field panel shall be a distributed intelligence processor with multi-door portal interface functionality.

## 2.4 BADGING SYSTEMS DEVICES

A. The system shall b ea complete personnel imaging and data management system.

## 2.5 DOOR DEVICES

1. Smart card reader:
2. Smart card reader with Keypad:
3. Door Position Switches
4. Audible/Visual Alarm Units:
5. Duress Alarm Pushbutton:
6. Power Supplies
7. ElectroMagnetic Locks
8. Electrified Panic Bars: Provided and installed by Division 8 supplier and wired by this Contractor. Reference Door Hardware Section 08710 for more information.
9. Power Supplies for magnetic locks: Provided by Division 8 supplies, installed and wired by this Contractor.
10. I.D. Badge Printer.

## 2.6 SMART CARDS

A. The smart card and ID badge shall be one card. The smart card shall be capable of being imprinted with photo identification and text.

## 2.7 CABLE AND CONDUCTORS

A. Provide per manufacturers' written instructions and as indicated on the drawings.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. The Contractor shall investigate the site and become thoroughly familiar with the existing badging system, Airport security and airport operations.

B. Install security system in accordance with equipment manufacturer's written instructions and complying with applicable portions of NEC and NECA's "Standard of Installation".

## 3.2 INSTALLATION OF CONDUCTORS

A. General: Installation of conductors shall comply with manufacturer's recommendations, local, provincial and national codes.

3.3 GROUNDING

A. Cable Shields: All twisted pair shields shall be grounded at one point only cables that originate from equipment in systems/electrical rooms and serve field devices shall be grounded to the signal ground terminal in the system/electrical room.

3.4 FINAL TESTING AND ACCEPTANCE

3.5 SYSTEM AVAILABILITY TEST

3.6 TRAINING

3.7 ACCEPTANCE

END OF SECTION 16708

# SECTION 16742 – STRUCTURED CABLING SYSTEM

## 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. All general Division 16 electrical specifications.

B. Specific reference in Specifications to codes, rules, regulations, standards, manufacturer's instructions or requirements of regulatory agencies shall mean the latest printed edition of each in effect at Date of contract unless the Document is shown dated.

C. Conflicts:
1. Between Referenced Requirements: Comply with the one (1) establishing the more stringent requirements.
2. Between Referenced Requirements and Contract Documents: Comply with the one (1) establishing the more stringent requirements.

D. References: Installation and testing shall comply with the following codes, standards, and design guidelines:
1. National Fire Protection Association (NFPA).
2. NFPA 70 (2002); National Electrical Code (NEC).
3. Telecommunications Distribution Methods Manual (TDMM).
4. Telecommunications Industry Association and Electronic Industry Alliance (TIA/EIA).
5. International Civil Aviation Organization Annex 9-Facilitation
6. International Air Transport Association Airport Development Reference Manual
7. International Building Code 2003
8. Local codes and ordinances, as applicable.

### 1.2 SUMMARY

A. Design Criteria: The structured cabling system provides a consolidated communications infrastructure to be used by network systems and is comprised of copper and fiber optic cables routed throughout the Facility. This system shall provide transmission media for all voice, data, and video signals. The Contractor shall provide structured cabling transmission media, components, and testing as specified herein or shown on the Drawings and in conformance with manufacturers' requirements and recommendations.

B. This Section includes the racks, patch panels, connectors, patch cords, outlets, terminal blocks, etc. as required to provide a complete structured system. This Section specifies the following types of control and signal transmission media:
   1. UTP Copper: AnSI/TIA/EIA-568B.2-1 Compliant, 4-Pair Category 6.
   2. UTP Copper: Category 3 Backbone Cable.
   3. Fiber Optic Cable: AnSI/TIA/EIA-568B.3 and ISO/IEC 11801 Compliant.
   4. Coaxial Cable.
   5. Multi Conductor and Paired Cable

C. Unless agreed to in writing, the system shall be documented as specified herein or shown on the Drawings.

## 1.3 SUBMITTALS

A. Shop Drawings:

1. Proposed Products Data Sheets: The Contractor shall submit catalogue cut-sheets for approval that include manufacturer, trade name, and complete model number for each product specified. Model number shall be hand written and/or hi-lighted to indicate exact selection. Identify applicable specification section reference for each product.

## 1.4 QUALITY ASSURANCE

## 1.5 WARRANTY

A. Period: The contractor shall guarantee all labor, workmanship, and materials for a period of one year from the date of substantial completion at the end of the last phase of construction. Should a failure occur within the first year to the system, the Contractor shall provide all labor and materials necessary to restore the system to the condition required for the final test and acceptance for this contract, at no cost to the Owner. During this period, the Contractor shall provide, free of charge, all software upgrades and patches. The contractor shall provide all materials, labor and equipment necessary to correct any defects that may develop due to faulty materials, or workmanship. Contractor shall fix or replace defects within 8 hours of the initial call for services.

# PART 2 - PRODUCTS

## 2.1 CABLE

A. Category 6 Cable
B. Category 3 Backbone Riser Cable
C. Fiber Optic Cable
   1. Multi mode cable
   2. Singe mode cable
D. Coaxial Cable.

## 2.2 CONNECTORS

A. Category 6 Connectors/Jacks/Outlets:
B. Fiber Optic Connectors:

## 2.3 PATCH PANELS

A. Category 6 patch panels
B. Riser & Voice Punchdown Blocks
C. Fiber Optic

## 2.4 PATCH CORDS

A. Patch Cords fiber optic or CAT 6 copper, shall meet all conventions and specifications conforming to the structured cabling arrangement described above and shall be factory manufactured.

## 2.5 RACKS AND CABINETS

A. Freestanding Cabinets

B. Freestanding Equipment Racks

C. Wallmount Equipment Racks

## 2.6 TELECOMMUNICATIONS ROOM CABLE TRAY.

## 2.7 UNINTERRUPTIBLE POWER SUPPLIES (UPS)

## 2.8 NONMETALLIC FLEXIBLE OPTICAL FIBER RACEWAY

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. General: The contractor shall ensure that all Work performed under these Specifications is in accordance with the requirements and standards defined and referenced in these Specifications. Any Work performed in deviation of these Specifications, any of the referenced material, or any applicable standards or requirements, shall immediately be corrected by the Contractor without additional charges, regardless of the stage of completion. The Contractor shall record all inspection observations. As a minimum, the record shall include the name(s) of personnel conducting the inspection, a brief description of the inspection and the observations. These records shall be available for the Owner to review at any time. Also, these records shall be delivered to the Owner before Final Acceptance.

## 3.2 INSTALLATION

A. Standards: All installation activities shall be performed in a neat and professional manner in accordance with all applicable local and national codes.

## 3.3 DOCUMENTATION

## 3.4 IDENTIFICATION

A. Cabling: All installed cables shall be labeled using a pre-printed stick-on self-adhering labeling system. The label must be applied on both ends of the cable, and shall remain clearly visible after completion of the installation.

## 3.5 FIELD QUALITY CONTROL

A. The test procedures shall contain at a minimum the following elements:

1. Statements of purpose identifying the goals of the test.

2. The methods used for testing.

3. Duration and schedule of tests.

4. Examples of all graphs, tables, and charts necessary for display of testing results.

5. Certifications and qualifications of all persons conducting the testing.

6. Calibration certificate of test equipment.

## 3.6 MAINTENANCE AND SUPPORT

A. General

1. The contractor shall provide maintenance and support of all components associated with this system at no additional charge during the Warranty period.

## 3.7 CLEANING

A. Upon completion of system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

## 3.8 ACCEPTANCE

A. Acceptance will be withheld until the following have been completed successfully:

1. Acceptance of all submittals
2. Delivery of final documentation
3. Successful testing
4. Successful demonstration, including operation of systems using the cables, training and manual review.

END OF SECTION 16742

# SECTION 16770 – PUBLIC ADDRESS SYSTEM

## 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 Paging Systems. It includes requirements for Paging System componenets including, but not limited to, the following:

1. Audio Distribution Amplifiers
2. Audio Mixer Amplifiers
3. Digital Signal Processors
4. Noise Leveling Computer
5. Racks and Accessories
6. Wiring
7. Microphone Paging Stations
8. Routing Controller
9. Paging Interface
10. Surge Suppression
11. Grounding
12. Recording and Playback Equipment
13. Speakers and Accessories

### 1.3 PUBLIC ADDRESS SYSTEM DESCRIPTION

A. General: Provide a complete Public Address System based on the Specifications given and the information shown on the Drawings. Contractor shall provide all labor, materials, tools, equipment, and documentation, and the performance of all operations necessary for engineering, detailing, fabricating, inspecting, documenting, delivering, installing, and testing for a complete functioning Public Address System.

### 1.4 SOFTWARE GENERAL

A. All software that the operators interact with shall be user friendly, menu or graphical user interface driven and have the characteristics of an application program. All operating features specified here shall be available without requiring knowledge of the underlying programming language. All features shall be available by answering prompts and responding to menus. All

menus shall be subdivided into logical groups. All operator input shall be checked to insure that no input error can render the system, or a portion thereof, inoperable.

B. System software required for the complete operation of this system shall be provided, installed on the system hard disk and tested, including software to build and maintain the required databases.

## 1.5 SUBMITTALS

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

B. Shop Drawings detailing public address system including, but not limited to the following:
   1. Product Data: Submit manufacturer's data on the Public Address System components, including, but not limited to electrical Specifications, mechanical Specifications, rough-in diagrams and instructions for installation, operation and maintenance, suitable for inclusion in maintenance manuals.

## 1.6 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who is a factory-authorized sales and service representative to perform the Work of this Section.

B. Electrical Component Standard: Provide work complying with applicable requirements of NFPA 70 "National Electrical Code."

C. EIA Compliance

## 1.7 WARRANTY

A. Guarantee all labor, workmanship, and materials for a period of one (1) year from the date of substantial completion of the last phase of construction. All system failures during this period shall be repaired at no cost to Owner.

# PART 2 - PRODUCTS

## 2.1 SYSTEM REQUIREMENTS

A. General: Provide complete and fully functional Paging Systems using materials and equipment of types, sizes, ratings, and performances as indicated. Use materials and equipment that comply with referenced standards and manufacturers' standard design and construction in accordance with published product information. Coordinate the features of materials and equipment so they form an integrated system with components and interconnections matched for optimum performance of specified functions.

## 2.2 EQUIPMENT AND MATERIALS

A. General: Provide equipment using all solid-state components fully rated for continuous duty at the ratings indicated or specified. Select equipment for normal operation on input power supplied at 108-132 V. 60 Hz. All amplification, routing control and signal processing equipment is to be configurable from the local paging controller or remote paging operator workstation.

B. Distribution Amplifier

C. Routing controller

D. DSP Equalization

E. Paging Material Distribution

F. Digital Interface and Monitor/Test System

G. Digital Recording Capabilities

H. Digital Audio Library

I. Power Amplifiers

J. Ambient Noise Microphone

K. Desktop Paging Station

L. Wall Mount Paging Stations

M. Volume Controller

N. Speakers

O. Speaker Mounting Hardware

P. Electronic Microphone Cable

Q. Speaker Cable: UL listed Article 725 (UL 444 for plenum applications)-min. 12 AWG, tinned copper, PVC insulated, with PVC riser rated jacket.

R. Ambient Noise Sensor Cable: One (1) shielded twisted pair 20 AWG tinned copper conductors; color coded, low loss polyethylene insulation; with 20 AWG stranded tinned copper drain wire shield.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. Examine conditions, with the Installer present, for compliance with requirements and other conditions affecting the performance of the Public Address system work.

## 3.2 INSTALLATION

A. General: Install system in accordance with NFPA 70 and other applicable codes. Install equipment in accordance with manufacturer's written instructions.
B. Wiring Methods: Install wiring in raceway except within consoles, desks, and counters. Conceal wiring within desks and counters. Use UL-listed plenum cable in environmental air spaces, including plenum ceilings.

## 3.3 GROUNDING

A. Ground equipment, conductor, and cable shields to eliminate shock hazard and to minimize to the greatest extent possible, ground loops, common mode returns, noise pickup, cross talk, and other impairments. Provide 5-ohm ground at main equipment location. Measure, record, and report ground resistance.

## 3.4 TESTING AND ACCEPTANCE

A. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.

B. Pretesting: Upon completing installation of the system, align, adjust, and balance the system and perform complete pretesting. Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new, and retest until materials satisfactory performance and conditions are achieved.

## 3.5 MAINTENANCE AND OPERATIONS MANUALS

## 3.6 CLEANING AND PROTECTION

A. Prior to final acceptance, clean system components and protect from damage deterioration.

## 3.7 TRAINING

A. Train maintenance and operation personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventative maintenance of the system Provide a minimum of sixteen (16) hours training.

END OF SECTION 16770

# SECTION 16780 – CLOSED CIRCUIT TELEVISION

## 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 Sections:
   1. All Division 16 Specification Sections.

### 1.2 SUMMARY

A. This Section includes all labor and materials including, but not limited to: Closed Circuit Television (CCTV) cameras, lenses, mounting hardware, power supplies, signal transmission equipment, CCTV monitors ad Digital Video Recording and Surveillance System (DVRS) required to forma fully functional CCTV surveillance system.

### 1.3 FUNCTIONAL DESCRIPTION

A. All user control of the system shall be through the DVERS keyboard and mouse.

B. The CCTV system shall support NTSC video signals from any source that provides a composite 1v p-p video signal.

C. The system shall provide for the sequencing for full screen video images on a CCTV monitor that can include selecting multiple pre-selected positions for PTZ cameras.

D. The system shall provide for four images to be simultaneously displayed on one CCTV monitor. The images in each quadrant shall be capable of sequencing through multiple inputs.

E. The system shall general user configurable on-screen displays for camera title, time and date.

### 1.4 INTEGRATION

A. The CCTV system shall be integrated with the Access Control System.

B. The CCTV system shall also interface with and the Digital Video Recording (DVR) System.

### 1.5 SUBMITTALS

A. Product Data
   1. Dimensions
   2. Product identification
   3. Fabrication and installation Drawings
   4. Rough-in diagrams
   5. Wiring diagrams showing field-installed wiring
   6. Schedules and Tables
   7. Design calculations and methods
   8. Compliance with specified standards
   9. If rack mounted equipment is used, provide an assembly Drawing of every equipment rack with locations, quantities, model numbers of individual components contained in the rack, and dimensions shown on the Drawing.

## 1.6 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of CCTV systems, components and accessories, of types, capacities and characteristics required, whose products have been in satisfactory use in similar service for not less than five (5) years.

## 1.7 INTELLECTUAL PROPERTY

## 1.8 WARRANTY

A. Period: The Contractor shall guarantee all labor, workmanship, and materials for a period of two (2) years from the date of final acceptance. Should a failure occur within the first two years to the system, the Contractor shall provide all labor and materials necessary to restore the system to the condition required for the final test and acceptance for this contract, at no cost to the Owner. During this warranty period, any maintenance required for keeping the warranty valid, including but not limited to periodic cleaning and adjusting of equipment, shall e provided by the contractor at no additional charge under this contract.

# PART 2 - PRODUCTS

## 2.1 FIELD DEVICES

A. General: Provide material of types, sizes, capacities and electrical characteristics indicated. Except as otherwise indicated, provide manufacturer's standard Closed Circuit Television system components as indicated by their published product information, designed and constructed as recommended by manufacturer.

B. Camera Equipment

1. Interior Fixed Position Type
2. Exterior Fixed Position Type Cameras
3. Interior PTZ Style Cameras
4. Exterior PTZ Style Cameras.

C. Fiber-Optic Video Transceiver

D. High Resolution Color Monitors

E. Rack Mount CCTV Camera Supply

PART 3 – EXECUTION

3.1 INSTALLATION

A. Manufacturer's Instructions: Install Closed Circuit Television systems and components where indicated, in accordance with equipment manufacturer's written instructions, in compliance with National Electrical Code, and with recognized industry practices, to ensure that television system complies with requirements and serves intended purposes.

3.2 OPERATION AND MAINTENANCE MANUAL

3.3 ACCEPTANCE

A. Acceptance will be withheld until the successful completion of the following:

1. Acceptance of all submittals
2. Delivery of manuals and training material
3. Delivery of as-built/installed drawings
4. Camera aiming
5. Successful testing
6. Successful demonstration, including camera operation, training and documentation review.

END OF SECTION 16780

# SECTION 16781 – DIGITAL VIDEO RECORDING SYSTEM

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes all materials and labor required for the installation, testing, commissioning, and documentation of a fully functional Digital Video Recording System (DVRS) and review stations as provided by the Contractor and shown on the drawings and specified herein.

### 1.3 RELATED SECTIONS

A. Division 16708 – "Access Control System"

B. Division 16742 – "Structured Cabling System"

C. Division 16780 – "CCTV System"

### 1.4 REFERENCED STANDARDS

A. The following standards and requirements shall apply to the signal processing anc communications features of the unit:
   1. NTSC standard documents
   2. EIA Recommended Standards RS-170 and RS-170A.
   3. NFPA 70 National Electrical Code
   4. International Building Code 2003

### 1.5 SUBMITTALS

A. Product Data: Submit manufacturer's data on digital video recording system components as follows:
   1. Electrical specifications
   2. Mechanical specifications
   3. Instructions for installation, operation
   4. Maintenance manuals

5. On data sheets that illustrate multiple models, the particular model proposed for the application shall be highlighted, encircled or otherwise identified. Individual copies shall be included for each proposed model number indicating areas of application.
6. Deviations from specifications shall be highlighted, encircled or identified on the documents and be marked as deviations.

1.6 OPERATION AND MAINTENANCE MANUALS

1.7 INTELLECTUAL PROPERTY

1.8 WARRANTY

A. Period: The contractor shall Warranty all labor, workmanship, and materials for a period of two (2) years from the date of Final Acceptance. Should a failure occur within the first two (2) years of the system, the Contractor shall provide all labor and materials necessary to restore the system to the condition required for the Final test and Acceptance for this Contract, at no cost to the Airport.

1.9 DELIVERY, STORAGE, AND HANDLING

1.10 SEQUENCING AND SCHEDULING

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide material of types, sizes, capacities and electrical characteristics indicated. Except as otherwise indicated, provide manufacturer's standard DVRS system components as indicated by published product information, designed and constructed as recommended by manufacturer.

B. Power Supply: All devices in the DVRS system shall operate on 120 VAC supply, except where noted. Any special power treatment required such as filtering or spike elimination that may be required for proper operation for the DVRS system shall be provided with the system.

2.2 DESCRIPTION

A. The digital video management system shall be a PC-based video processor and recorder. Video shall be displayed on LCD displays, and configuration shall be performed with a standard mouse and keyboard. The digital video management system shall have the ability to display full-frame, real-time video VGA and analog video monitors.

B. The digital video management system shall be configured using an interface application and shall record video continuously, only during alarm events, or only while video motion activity is detected.

C. Each camera shall be able to record in different modes and on different schedules or using the same schedule and configuration.

D. Local and remote interfaces shall allow easy search and retrieval of video. User-defined parameters shall allow searches based on the time and date the video was captured; whether alarm, motion, or scene loss events occurred; and which camera captured the video.

E. The interfaces shall also permit full video storage management, hardware control, alarm configuration, and export of video and individual frames.

F. Remote connections are available over standard TCP/IP network.

2.3 OPERATOR CONTROLS

A. The application interface shall function on a Windows operating system. It shall run automatically when the digital video management system is powered up.

2.4 DISPLAY OUTPUTS

A. Up to four analog video outputs shall be assigned in one of the following ways:
   1. Camera inputs assigned to each output
   2. A user-defined tour cycle of cameras assigned to each output
   3. Tour cycle of all camera inputs recording alarm or activity events

2.5 DIGITAL VIDEO RECORDER WORKSTATION

PART 3 – EXECUTION

3.1 GENERAL

A. The Contractor shall investigate the site and become thoroughly familiar with the facility. The Contractor shall plan the DVRS system installation such that the DVRS is installed and tested for proper operation in coordination with the CDTV system.

B. Install DVRS system in accordance with equipment manufacturer's written instructions and complying with applicable industry standards for Installation.

3.2 TESTING

A. Problem Correction: Any problems encountered including damage to airport owned equipment and DVRS elements during this test shall be documented and brought to eh attention of the Airport and corrected at Contractor's expense. The Contractor shall promptly correct all problems encountered, providing field service personnel appropriately trained for the types of problems encountered.
B. Test Documentation: The Contractor shall supply forms to be used during these tests for authorization and initialing by the Airport or designated representative and the Contractor. This form shall clearly define the items tested, leaving room for the date, DVRS component designation, confirmation of camera view, and initials. All DVRS functions shall be demonstrated to ensure operation as required by these Specifications and Drawings.

## 3.3 ACCEPTANCE

A. Acceptance will be withheld until the successful completion of the following:

1. Acceptance of all submittals.
2. Delivery of final documentation (including As-Built Documents).
3. Successful testing.
4. Successful demonstration of recording ability, operator and administrator training and documentation review by the engineer.

END OF SECTION 16781

# SECTION 16790 – DATA COMMUNICATIONS NETWORK EQUIPMENT

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This section contains the technical specifications for the data communications network system for the Entebbe International Airport. The system shall include all hardware, software configuration and accessories required to provide a fully functioning network system. The data network system shall support airfield operations, Common Use Terminal equipment (Cute) System, building systems, administrative local area network, master clock system, Electronic Flight Information Display System by using the airport Premise Distribution System (PDS). The associated Drawing Set, including the General notes, further specifies the Data Network System and is part of the technical specifications.

### 1.2 DEFINITIONS

A. LAN: Local Area Network

B. WAN: Wide Area Network

### 1.3 SUBMITTALS

A. The Contractor shall not perform any portion of the work requiring submittal and review of record drawings, shop drawings, product data, or samples until the Designer has approved the respective submittal. All work shall be in accordance with approved submittals.

B. Qualifications: The Contractor shall submit qualification data sheets for firms and persons as specified in the "Quality Assurance" article of this Section to demonstrate their capabilities and experience.

C. Proposed product data sheets: The Contractor shall submit catalogue cut-sheets that include manufacturer, trade name, and complete model number for each product specified. Model number shall be handwritten and/or highlighted to indicate exact selection. Identify applicable specification section reference for each product. Product data sheets shall be bound in a three ring binder and shall include a product index listing the model number and description of product.

D. Record Drawings: Furnish CAD drawings of completed work including labeling, where applicable. Refer to the "Identification" article in this Section for labeling conventions.

E. System test plans: The Contractor shall provide a typical example of their test plans.

F. System Block Diagram: The contractor shall supply a block diagram that depicts the final system, including locations, IP addresses and other specific attributes for each network device.

The Contractor shall update the network management system as well as the Cabling infrastructure management system with the LAN As-built information.

G. Installation schedule.

H. Parts List: Submit a complete list of major components showing a description and location for each component provided under this specification.

I. Submit technical and operations manuals. Manuals shall describe function, operation, and programmable parameters for each card and port for each device to be installed. Manuals shall include required maintenance to be performed.
   1. Manuals shall describe function, operation, and programmable parameters for each card and port for each device to be installed. Manuals shall include required maintenance to be performed.
   2. Manuals shall be suitable for the training of future personnel, and for use as a reference by currently employed personnel in performing work assignments.

## 1.4 QUALITY ASSURANCE

A. Contractor Qualifications: Submit written proof that the following experience requirements are being met:

   1. The contractor shall be certified by the manufacturer of the products, adhere to the engineering, installation and testing procedures and utilize the authorized manufacturer components and distribution channels in provisioning this Project.

   2. All members of the installation team shall be certified by the manufacturer as having completed the necessary training to complete their part of the installation. Resumes of the entire team shall be provided along with documentation of completed training course.

   3. The contractor shall provide five references for projects of equivalent scope, type and complexity of work completed within the last five years.

B. All hardware, software, firmware, and/or operating system requirements given are the minimum requirements. The Contractor's product shall meet or exceed these performance requirements specified herein. Additionally, due to the rapid advancement and antiquation of technology related products, the supplied product shall be the "contemporary technical equivalent" of that specified. "Contemporary technical equivalent" shall be based on a comparison of technology at the time of publication of specification to the technology at the time of the first product submittal. Final product approval is at the sole discretion of Entebbe International Airport.

C. Equipment and materials supplied for the LAN shall be a standard product of manufacturers regularly engaged in the manufacture and installation of information backbone technologies and

shall be the manufacturer's latest standard design. Items of the same classification shall be identical. This requirement includes equipment, modules, assemblies, parts, and components. Electrically powered equipment shall be UL approved. Electronic equipment shall meet the requirements of CFR 47 Part 15.

D. All components of each kind shall be covered by a single warranty program with a single point of contact.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Equipment delivered to the job site shall be opened and inspected immediately upon arriving and compared to the approved shop drawing submittal and checked for defects. If the equipment is not correct, the equipment shall be returned to the manufacturer immediately and a new order for the approved equipment shall be placed at no cost to the owner.

B. Equipment shall be delivered in original packages with labels intact and identification clearly marked.

C. Equipment shall not be damaged in any way and shall comply with manufacturer's operating specifications.

D. Equipment and components shall be protected from the weather, humidity, temperature variations, dirt, dust, or other contaminants. Equipment damaged prior o system acceptance shall be replaced at no cost to owner.

## 1.6 REFERENCES

A. The publications listed below form a part of this specification. The publications are referred to in the text by basic designation only.

B. Specific reference in specifications to codes, rules, regulations, standards, manufacturer's instructions, or requirements of regulatory agencies shall mean the latest printed edition of each in effect at the date of contract unless the document is shown dated.

C. Conflicts:

1. Between referenced requirements: Comply with the one establishing the more stringent requirements.
2. Between referenced requirements and contract documents: Comply with the one establishing the more stringent requirements.

D. References:

1. International Organization for Standardization (ISO)
   a. ISO 8802/3; Information Exchange between Systems, CSMA/CD
2. Institute of Electrical an d Electronics Engineers
   a. IEEE 802.3ae 10 Gigabit Specification
   b. IEEE 802.3ab 1000 Base-T Specification
   c. IEEE 8023u 100 Base-T Specification

d. IEEE 802.3 10 Base-T Specification
e. IEEE 802.1Q VLAN
f. IEEE 802.1P Prioritization
g. IEEE 802.11gWLAN MAC and PHY specifications--Amendment
h. IEEE 802.3af Power-over-Ethernet

3. Underwriters Laboratory (UL)
4. National Electrical Code (NEC)
5. National Fire Protection Agency (NFPA)
6. Building Industry Consulting Services International (BICSI)
7. International Organization for Standardization (ISO)
8. Internet Engineering Task Force (IETF)
9. American Society for Testing Materials (ASTM)
10. Local regulations and codes in effect as of date of purchase shall be complied with.
11. Telecommunications Distribution Methods Manual (TDMM).
12. Telecommunications Industry Association and Electronic Industry Alliance (TIA/EIA).
13. International Civil Aviation Organization Annex 9-Facilitation
14. International Air Transport Association Airport Development Reference Manual
15. Local codes and ordinances, as applicable.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. LAN Equipment: Cisco Systems or submitted and owner approved equivalent.

B. Wireless Access Point: Cisco Systems or submitted and owner approved equivalent.

C. Wireless Access Point Enclosure: Oberon, Inc. or submitted and owner approved equivalent.

D. 1 Rack Unit (1RU) Servers: Dell, Inc. or submitted and owner approved equivalent.

E. IP addressable KVM with 19" LCD: Rose Electronics or submitted and owner approved equivalent.

### 2.2 LAN HARDWARE REQUIREMENTS

A. All equipment shall be rack mountable in standard 19-inch racks. Contractor is responsible for providing fans, shelves, drawers, special power wiring, ground connections, and adapters of any kind necessary to accommodate the system installation, operation, testing, or maintenance. Contractor shall provide the appropriate factory or custom rack mount adapters for all equipment installed in the equipment rack, whether specifically itemized or not. Contractor shall cover unused slots using blank panels.

B. Fiber and Copper Patch Cords—Adequately sized fiber and copper patch cords shall e provided for each installed port in the LAN.

C. Core Networking Equipment

1. The Core networking equipment shall be located in the XXX data room as shown in the contract drawings.

D. Distribution Networking Equipment
   1. The Distribution networking equipment shall be located in the XXXX telecommunication room as shown in the contract drawings.

E. Access Networking Equipment
   1. The Access networking equipment shall be located in the XXXX telecommunication room as shown in the contract drawings.

F. 1 Rack Unit (1RU) Servers
   1. 1RU Server: The 1RU Server will be used for the following systems
      a. d
      b. d
   2. The servers shall be

G. IP addressable KVM with 17" LCD
   1. d

2.3 LAN PERFORMANCE REQUIREMENTS

A.

PART 3 – EXECUTION

3.1 EXAMINATION

A.

3.2 INSTALLATION

A. Install components in accordance with contract drawings, manufacturer's instructions and approved submittal data.

3.3 DOCUMENTATION

A. This Section requires complete documentation of the LAN for the purpose of system operation and maintenance during and after the Warranty period. It is intended that the operation and maintenance manuals be exhaustive in the coverage of the system to the extent that they may be used as the sole guide to the troubleshooting, identification, and repair of defective parts. All documentation, as described herein shall be submitted to the Owner for approval sixty (60) days prior to final submission.

B. Scope;

3.4 IDENTIFICATION

A.

3.5 FIELD QUALITY CONTROL

A. The contractor shall develop and execute an onsite acceptance-testing program.

3.6 MAINTENANCE AND SUPPORT

A. System Certification

B. Support Availability

3.7 WARRANTY

A. In addition to warranty requirements listed in section ????, the Contractor shall provide a joint written warranty of the manufacturer(s) and the installer(s), on a single document. The document shall warrant complete installation of the equipment, system, and software to be free from defects in materials and workmanship for a period no less than two (2) years, starting with the date of Final System Acceptance.

B. The Contractor shall warrant that the proposed merchandise will conform to its description and any applicable specifications, and shall e of good quality for the know purpose for which it is intended.

C. The product warranty shall cover the replacement or repair of defective products and labor for the replacement or repair of such defective products.

D. Software License

1. Required software licenses shall be identified and supplied by the Contractor. Licenses shall be "Site Licenses" which shall cover all equipment installed now or in the future.

2. All software licenses and warranties shall be registered in the name of Entebbe International Airport.

## 3.8 CLEANING

A. Upon completion of system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions and leave the project areas broom-clean.

## 3.9 ACCEPTANCE

A.

END OF SECTION 16790

# SECTION 16860 – MULTI-USER FLIGHT INFORMATION DISPLAY SYSTEM

## 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 Sections:
1. 16742 – Structured Cabling System
2. 16790 – Local Area Network
3. All general Division 16 electrical specifications

### 1.2 SUMMARY

A. This Section specifies the requirements for the Multi-User Flight Information Display System (MUFIDS) and the following related sub-systems:
1. Flight Information Display System (FIDS).
2. Baggage Information Display System (BIDS).
3. Gate Information Display System (GIDS).
4. Visual Paging system (VPS).
5. Video Advertising Capability

B. References: Installation and testing shall comply with the following codes, standards, and design guidelines:
1. National Fire Protection Association (NFPA).
2. NFPA 70 (2002); National Electrical Code (NEC)>
3. Telecommunications Distribution Methods Manual (TDMM).
4. Telecommunications Industry Association and Electronic Industry Alliance (TIA/EIA).
5. International Civil Aviation Organization Annex 9-Facilitation
6. International Air Transport Association Airport Development Reference Manual
7. Local codes and ordinances, as applicable.

### 1.3 SUBMITTALS

A. Proposed Products Data Sheets: The Contractor shall supply a catalogue cut-sheet for approval that includes manufacturer, trade name, model number, and related section number, and specification paragraph numbers for each listed product.

### 1.4 QUALITY ASSURANCE

A. The Contractor must currently be and have been in the business of selling, installing, and maintaining similar systems at airports for a minimum of three (3) years.

## 1.5 WARRANTY

A. General:
   1. The Contractor shall provide a joint written warranty of the manufacturer(s) and the installer(s), on a single document. The document shall warrant complete installation of the equipment, system, and software to be free from defects in materials and workmanship for a period of no less than twelve (12) months.

# PART 2 - PRODUCTS

## 2.1 SYSTEM REQUIREMENTS

A. Performance Requirements:
   1. Overview: The software shall be designed using a modular approach, in a commonly available development environment. Software code and functionality shall be well documented in order to facilitate maintenance by personnel other than the original programmer. A single user license of the development system and any tools/utilities used during development shall be included as a deliverable item.
   2. Capacity: The system as supplied shall be configured to support the operational, functional, and performance requirements, specified herein, for a minimum of 50 users simultaneously logged into the system.
   3. Peak Capacity Rate: The systems shall be designed to support the operational, functional, and performance requirements, specified herein, for a minimum of twenty-five (25) additional users (for a total of 75 users) logged in simultaneously using the MUFIDS application.

B. Distribution:
   1. The MUFIDS shall be designed to operate in a client/server environment. The digital data converter (DDC) shall act as a client to the Host Computers, which shall act as the server.
   2. All information shall be passed within the system using the Local Area Network via the Structured Cabling System.

## 2.2 SOFTWARE REQUIREMENTS

A. The software shall be designed using a modular approach, in a commonly available development environment. Software code and functionality shall be well documented in order to facilitate maintenance by personnel other than the original programmer. A single User license of the development system and any tools/utilities used during development shall be included as a deliverable item. Custom assembly language routines are not allowed.

## 2.3 SYSTEM MAINTENANCE AND COMPATIBILITY

A. Database Management

1. User Interface: Database shall allow a means for a user, dependent on user access rights, to manually add/modify/delete field contents of flight schedules.
2. Flight Schedule Databases: Database shall contain a minimum of three flight schedules. These include:
   a. Master Flight Database (MFD): Designated in the following table with an "M". This database shall contain all scheduled flights with associated start and end (9if scheduled) of operation. Also referred to as the Seasonal Flight Schedule.
   b. Active Flight Database (AFD): Designated in the following table with an "A." This database shall contain the current day's flight schedule and is constructed from the MFD.
   c. Historic Flight Database (HFD): Designated in the following table with an "H." This database shall contain a log of actual flight operational components.
3. Flight Schedule Fields: The MUFIDS data within the Host Computers shall consist of a minimum of the fields shown in the following table. In the rightmost column, there is a designation of the usage of that field; "M" would indicate that the field is used in the Master Flight Database, sometimes also known as the "seasonal" database; the "A" indicates that the field is to be used within the current day's flight database or "Active" database; the "H" indicates that the field is to be used within the Historical database.

B. External Connectivity

1. Data Formats: MUFIDS shall support connectivity with a minimum of three types of data formats. These include:
   a. TCP/IP Socket Connection
   b. Flat File
   c. SQL Database

C. Primary and Hot Backup Server:

1. Description: The MUFIDS shall utilize a multi-layer client-server system architecture. The central server shall operate on the highest hierarchy level of the MUFIDS and shall extract information from the database and prepare the information for display on display devices. The central server shall work independently and without attendance of any personnel. The functions available on the central server shall be accessible from system user workstations.
2. Resiliency: The central server shall consist of parallel servers. One server shall act as the main server the other as a hot standby. The standby server shall take over responsibilities of the main server automatically and without personnel intervention.
3. Scalability: The central server shall allow for additional servers to be added to initial configuration to either run in parallel with or as a replacement for a main or standby server.

D. User Workstation (MUW): The workstations shall be used to communicate with the MUFIDS system via the Local Area Network.

E. Digital data converter (DDC):

1. The digital data converter (DDC) shall be used by the MUFIDS to control the display output of video monitors. Each DDC shall have a unique TCP/IP address and shall communicate via the LAN. DDCs shall work independently and without attendance of any personnel.

## 2.4 LED DISPLAYS

## 2.5 LCD DISPLAYS

## 2.6 MOUNTING ASSEMBLIES

## 2.7 PAGE FORMAT REQUIREMENTS

A. LCD Flight Information (Arrivals/Departures)

1. Orientation: Portrait
2. Extent of Coverage: All LCD screens will contain airport-wide flight information.
3. Content: Provide split screens, half arriving flights and half departing flights. The quantity of displayed flights should be representative of flight activity sorted alphabetically by city of origin/destination and should maximize the screen display area. Provide only the current day's flight activity; do not provide flight activity for the following day. Provide visual paging messages in a scrolling manner at the bottom of the screen. Provide appropriate header and footer content. Coordinate layout and content with Airport during development. Include the following types of information:
   a. Arriving From/Departing To
   b. Airline
   c. Flight #
   d. Gate
   e. Scheduled Time
   f. Status (actual time, boarding, delayed, cancelled, etc.)
   g. Baggage claim number (arrivals only)

B. LCD Gate Information

1. Extent of Coverage: Each gate LCD sign will only contain information pertaining to that gate.
2. Content: Coordinate layout and content with Airport during system development. Include the following types of information:
   a. Departure City
   b. Airline
   c. Gate #
   d. Flight #
   e. Scheduled Time
   f. Status (actual time, boarding, delayed, cancelled, etc.)

C. LED Baggage Information

1. Extent of Coverage: Each baggage claim LED sign will only contain information pertaining to that baggage claim belt.
2. Content: Coordinate layout and content with Airport during system development. Include the following types of information:
   a. Arrival city
   b. Airline
   c. Flight #
   d. Baggage Belt #

## PART 3 – EXECUTION

### 3.1 EXAMINATION

A. General: The Contractor shall ensure that all Work performed under thee Specifications is in accordance with the requirements and standards defined and referenced in these Specifications. Any Work performed in deviation of these Specifications, any of the referenced material, or any applicable standards or requirements, shall immediately be corrected by the Contractor without additional charges, regardless of the stage of completion. The Contractor shall record all inspection observations. As a minimum, the record shall include the name(s) of personnel conducting the inspection, a brief description of the inspection and the observations. These records shall be available for the Owner to review at any time. Also, these records shall be delivered to the Owner before Final Acceptance.

### 3.2 INSTALLATION

A. Standards: All installation activities shall be performed in a neat and professional manner in accordance with all applicable local and national codes.
B. The Contractor shall install and inspect all hardware required in this Specification in accordance with the manufacturer's installation instructions.

### 3.3 DOCUMENTATION

### 3.4 IDENTIFICATION

A. Equipment: Each piece of equipment shall be tagged with information regarding date of installation, date of last service or maintenance, network ID, and connection point. The Contractor shall provide a log listing all such equipment and associated tags as part of the final System Acceptance.

### 3.5 FIELD QUALITY CONTROL

### 3.6 FACTORY ACCEPTANCE TEST

A. The purpose of this test is to validate that all specified interfacing features are met. All requirements of the specifications shall be tested including connectivity, networking, interaction, interface, format, transformation, and data flow requirements.

B. The MUFIDS Vendor shall ensure that development of the system is complete, required approvals of submittals have been obtained, and sufficient equipment has been procured to

completely demonstrate and test the MUFIDS solution. The Contractor shall provide the engineer a minimum of thirty (30) days notice prior to the start of the Factory Acceptance Test.

## 3.7 ON-SITE ACCEPTANCE TEST

A. The purpose of this test is to validate that the MUFIDS solution meets the performance and recovery requirements and to validate operational assumptions using partial/full load testing.

## 3.8 MAINTENANCE AND SUPPORT

A. General
   1. The Contractor shall provide maintenance and support of all components associated with this system at no additional charge during the Warranty period.
   2. The Contractor shall supply a list of special tools, test equipment, and outside inventory required for this Project.

B. Definitions

## 3.9 CLEANING

A. Upon completion of system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

## 3.10 ACCEPTANCE

A. Acceptance will be withheld until the following have been completed successfully:
   1. Acceptance of all submittals.
   2. Delivery of final documentation.
   3. Successful testing.
   4. Successful demonstration, including operation of systems using the cables, training and manual review.

END OF SECTION 16860

# SECTION 16865 – COMMON USE TERMINAL EQUIPMENT (CUTE)

## PART 1 - GENERAL

### 1.1 SUMMARY

A. A Common Use Terminal Equipment system shall be installed in the Entebbe International Airport. The system shall comprise the various aspects of passenger check-in and boarding including agent check-in and passenger self check-in. The CUTE system includes the following related subsystems:
   1. Common Use Terminal Equipment (CUTE)
   2. Local Boarding Application (LBA)
   3. Local Departure Control System *LDCS)
   4. Common Use Self-Service (CUSS)

B. The system includes software and hardware components such as Gateways, computer workstations, application servers, databases, and interfaces to other systems.

C. The system shall utilize the Airport Structured Cabling System (SCS) infrastructure and Local Area Network (LAN) equipment to communicate between the field devices and the servers.

### 1.2 REFERENCES

A. The Contractor shall design, install and test all CUTE equipment and applications per manufacturer's requirements and in accordance with internationally recognized standards as well as local codes and requirements of authorities having jurisdiction, and particularly the most recent pertinent publication of the following organizations:
   1. International Civil Aviation Organization (ICAO)
   2. International Air Transport Association (IATA)
      a. IATA RP 1797; Common Use Terminal Equipment (CUTE) Systems.
      b. IATA RP 1745; Baggage Service Messages.
      c. IATA RP 1722e, 722c, 722d, 722e; ATB related resolutions.
      d. IATA RP 740, 740a; BTP related resolutions.
      e. IATA RP 1706c; Common Use Self Service
   3. Underwriters Laboratory (UL)
   4. National Electrical Code (NEC)
   5. National Fire Protection Agency (NFPA)
   6. National Electrical Manufacturers Association (NEMA)
   7. Building Industry Consulting Services International (BICSI)
   8. International Organization for Standardization (ISO)
   9. International Building Code 2003

## 1.3 RELATED DOCUMENTS

A. Section 16742 – Structured Cabling System

B. Section 16790 – Local Area Network

C. Section 16860 – Multi User Flight Information Display System

## 1.4 SCOPE OF WORK

A. The Contractor shall provide all equipment, material, labor and services required to construct and install the CUTE including, but not limited to:
   1. All design services, drawing and specifications, equipment, materials, labor and services, not specifically mentioned or shown, which may be necessary to complete the design and installation of the CUTE.
   2. Hardware including servers, computers, gateways and rack accessories as specified for the system and any hardware that is specific to the Contractor system.
   3. Software application including CUTE, CUSS, LBA, LDCS and any other software that may be required to make the system fully operational as specified including the provision of Databases, interfaces and any other required configuration.
   4. Installation and setup of the system hardware and software.
   5. Final connection of hardware to power, infrastructure termination and patch cords connecting system equipment to the data outlets and/or LAN equipment.
   6. Specifications and As-built documentation for all CUTE hardware and software components.
   7. Test plans, system testing and commissioning.
   8. System warranty as specified herein.
   9. Training as specified herein.
   10. Maintenance and support as specified herein.

## 1.5 QUALIFICATIONS

A. Project Qualifications:
   1. The Contractor must currently be and have been in the business of designing, selling, installing, and maintaining similar systems at international airports for a minimum of five (5) year4s. The Contractor must have been actively engaged in installing, maintaining and operating similar systems and services as outlined in this document.
   2. A same or similar system shall satisfy the following conditions:
      a. An international airport serving ten (10) airlines at a minimum
      b. The CUTE system is utilized by at least six (6) international carriers
      c. Local Departure Control System is utilized by at least two non host-based operators
      d. The CUTE system operates on a standard Windows 2000 or XP environment utilizing TCP/IP Ethernet network

## 1.6 SUBMITTALS

A. Proposed Submittals:
   1. In addition to all required proposal submittals listed in the appropriate Division, the Contractor shall provide the following submittals:
      a. Proposed Products and Equipment: Submit to the Owner a catalogue cut-sheet for approval that includes manufacturer, trade name, model number, and related section number, specification paragraph numbers, and reference standards for each listed product as required by these specifications. All major second tier Sub-Contractors shall also be noted on the list.

## 1.7 INTELLECTUAL PROPERTY

## 1.8 WARRANTY

A. General:

   1. The Contractor shall warrant complete installation of the equipment, system, and software to be free from defects in materials and workmanship for a period of no less than twelve (12) months, starting with the date of Final System Acceptance. As an option, the Contractor shall supply pricing for an extended Warranty of the system. This option shall be renewable on a yearly basis, and pricing shall be supplied for a minimum of five (5) years from the expiration of the initial Warranty.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

A. CUTE Software
B. CUTE ATB, BGR and BTP Equipment:
C. CUTE Keyboard:
D. Multiform Dot-Matrix Document Printer:
E. Servers:
F. Desktop Computers:
G. Terminal Servers:
H. Keyboard, Video, Monitor (KVM) Switches:

## 2.2 GENERAL REQUIREMENTS

A. Common Use Terminal Equipment (CUTE): The CUTE system shall allow administration functions, ticketing functions, check-in functions and gate hardware to be used by multiple airlines. The CUTE system shall emulate each airlines host systems. At the CUTE workstation, the screen and keyboard interface shall be no different than a direct host connection. The CUTE connection to the host shall ensure that any applications that are available on the host

system shall be accessible through the CUTE. Workstations shall e connected via the Airport Telecommunications Distribution System (SCS) infrastructure and Local Area Network (LAN) to the communication rooms. The equipment in these rooms shall provide gateways to the host systems. Each workstation shall have various common use hardware connected depending on the location. The Automatic Ticket and boarding Pass Printers and the Bag Tag Printers shall use common stock, however, each airline shall be able to load their stock when utilizing a position. The Contractor shall insure that the airlines' PECTAB are cleared at he end of each session and the default PECTAB is restored for other airlines use.

B. Local Boarding Control System (LBA): The Local Boarding control System (LBA) shall allow each airline to perform automated passenger boarding reconciliation through the comparison of the Passenger Name List (PNL) and data from the passenger's boarding pass obtained via a Boarding Gate Reader (BGR). The LBA shall be capable of obtaining the PNL from each airline host system. Passenger reconciliation shall be done automatically as the passenger passes the encoded boarding pass through a Boarding Pas Reader and the LBA reconciles the data against the current PNL. The boarded passenger data shall also be transmitted dynamically to the Host. The LBA application may be offered as a subsystem of the Local Departure Control System application..

C. Local Departure Control System (LDCS): The Local Departure Control System (LDCS) shall provide computerized passenger check-in and boarding services for airlines that lack a host-based Carrier Reservation System (CRS). The LDCS shall include a database to store the passenger reservation information for each participating airline and flight. Each participating airline shall have the ability to load reservation information into the LDCS database by one of several methods. Agents shall be able to check-in passengers and issue boarding passes and bag tags as if using a host-based system. Agents shall be able to compare the PNL against government issued "no-fly" or "extra screening required" passenger list. Agents shall use the common equipment (CUTE workstations, etc.) to access the LDCS and perform check-in and boarding processes.

D. Common Use Self-Service (CUSS): Common Use Self-Service (CUSS) devices shall provide automatic ticketing service to multiple airlines. These devices shall be configured and implemented in accordance with the IATA RP 1716c standard.

## 2.3 SOFTWARE

Software provided shall be at least 32-bit based applications at a minimum. Software shall be built around a compliant operating system as defined in this Specification. Software shall not be built for a DOS operating environment or urn in a DOS shell in a Windows™ environment.

## 2.4 USER INTERFACE

A. All system applications shall have a graphical user interface to facilitate human interaction with the application and easy management of data.

## 2.4 OPERATING SYSTEM

## 2.6 SYSTEM ARCHITECTURE

## 2.7 SECURITY

A. Authorized users shall log into the system using a unique user name and password. Depending on assigned user access privileges, the user shall be either granted or denied access to individual applications, screens, or data.

## 2.8 DATABASE

## 2.9 PERFORMANCE REQUIREMENTS

## 2.10 SYSTEM MANAGEMENT

## 2.11 CUTE REQUIREMENTS

A. The CUTE system shall comply with the latest revision of IATA RP 1797.
B. The system shall provide access to the specified airline host computer system applications. From any CUTE workstation any authorized User shall be able to access host applications. Typical host applications which the system shall have the capability of supporting are (but are not limited to):
   1. Departure Control
   2. Reservations
   3. Ticketing
   4. Local Boarding Application
   5. Baggage Tracing
   6. Self-Service Ticketing and Check-In
   7. Flight Operations Control
   8. Message Switching
   9. Aircraft Maintenance Systems
   10. Cargo Systems
   11. Weights and Balances

C. From any CUTE workstation any authorized User shall be able to access other applications such as EVIDS (to initiate new display messages).
D. CUTE workstation shall have the capability of initiating a session are (but are not limited to):
   1. Local Boarding Application (LBA)
   2. Local Departure Control System (LDCS)
   3. Baggage Reconciliation System (BRS)

## 2.12 LOCAL DEPARTURE CONTROL SYSTEM (LDCS) REQUIREMENTS

A. The LDCS shall maintain passenger status (e.g. boarded, not boarded) for each departing flight and update it as passengers board.

## 2.13 LOCAL BOARDING APPLICATION (LBA) REQUIREMENTS

A. The LBA shall interface with each airline host in order to obtain passenger information (e.g., Passenger Name List-PNL). The interface should be a real-time interface. The LBA shall utilize the CUTE systems host link to obtain the passenger information.
B. The LBA shall interface with Boarding Gate Readers (BGR). The BGR shall red the encoded boarding pass. The BGR shall transmit the boarding pass information to the LBA.

## 2.14 COMMON USE SELF SERVICE (CUSS) REQUIREMENTS

## 2.15 EXTERNAL INTERFACES

## 2.16 NETWORK REQUIREMENTS

A. The system shall utilize the Airport LAN to provide services to all devices and workstations.

## 2.17 HARDWARE REQUIREMENTS

A. Server Requirements:
   a. CUTE, CUSS, LDCS and LBA Servers

B. CUTE Workstations:
   1. General: CUTE Workstations shall provide graphical user interface capabilities for all functions and all levels of the system.

C. Peripheral Devices
   1. The CUTE devices shall emulate the respective native devices of the various hosts. All peripheral devices shall be supplied with the necessary interface cabling.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. The Owner assumes no responsibility or liability for transportation from country of origin, storage fees, drayage, import taxes, duty taxes, or other costs associated with the delivery and storage of system components.

## 3.2 INSTALLATION

A. Standards: All installation activities shall be performed in a neat and professional manner in accordance with all applicable3 local and national codes. Additionally, the Contractor and all subsequent Sub-Contractors employed to satisfy the requirements of these specifications shall obtain, or satisfy, the following prior to installation:
   1. All licenses and permits
   2. All insurance and bonding as required
   3. All other standards or requirements specified in this document

## 3.3 DOCUMENTATION

A. This Section requires complete documentation of the Common Use Terminal Equipment (CUTE) for the purpose of system operation and maintenance during and after the Warranty period. It is intended that the operation and maintenance manuals be exhaustive in the coverage of the system to the extent that they may be used as the sole guide to the troubleshooting, identification, and repair of defective parts. All documentation, as described herein shall be submitted to the Owner for approval sixty (60) days prior to final submission.

## 3.4 GENERAL TESTING REQUIREMENTS

A. Phases of Testing:

1. Factory Acceptance Testing
2. Integration Testing
3. On-Site Performance Testing
4. On-Site Endurance Testing

## 3.5 FACTORY ACCEPTANCE TESTING

A. The purpose of this test is to validate that the CUTE function as a standalone system and all specified features are met.

## 3.6 INTEGRATION TESTING

## 3.7 PERFORMANCE TESTING

## 3.8 ENDURANCE TESTING

## 3.9 MAINTENANCE AND SUPPORT

## 3.10 CLEANING

A. Upon completion of system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

## 3.11 TRAINING

5. ACCEPTANCE
6. Completed Training as per the specifications as well as successful demonstration of the operation of the entire system
7. Escrow of all source code as defined under Intellectual Property

END OF SECTION 16865