

SECTION 02060

DEMOLITION

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Demolition of designated portion of existing structure and removal of materials from site.

1.2 RELATED SECTIONS

- A. Section 01500 - Construction Facilities and Temporary Controls.
- B. Section 01700 - Contract Closeout: Project record documents.
- C. Section 02200 - Excavation.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01300.

1.4 REGULATORY REQUIREMENTS

- A. Conform to applicable local code requirements for demolition of structure, safety of adjacent structures and dust control.
- B. Obtain required permits from authorities.
- C. Notify affected utility companies before starting work and comply with their requirements.
- D. Do not close or obstruct roadways, sidewalks, exits and hydrants without permits.
- E. Conform to procedures applicable when discovering hazardous or contaminated materials and notify Engineer. Do not resume operations until directed.

1.5 SCHEDULING

- A. Schedule Work to avoid interference with other work and on-going operations at the facility.
- B. Describe demolition removal procedures and schedule.

2. PART 3 EXECUTION

2.1 PREPARATION

- A. Provide, erect, and maintain temporary barriers and security devices.

- B. Protect existing structures which are not to be demolished.
- C. Prevent movement or settlement of adjacent structures. Provide bracing and shoring.
- D. Mark location of utilities.

2..2 DEMOLITION REQUIREMENTS

- A. Conduct demolition to minimize interference with adjacent structures.
- B. Cease operations immediately if adjacent structures appear to be in danger. Notify Engineer. Do not resume operations until directed.
- C. Conduct operations with minimum interference to public or private accesses. Maintain protected egress and access at all times.
- D. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon or limit access to their property.
- E. Keep work sprinkled with water to minimize dust. Provide hoses and water connections for this purpose.

2..3 DEMOLITION

- A. Disconnect, protect, and identify designated utilities within demolition areas.
- B. Remove foundation walls and footings complete within area of new building construction.
- C. Remove concrete slabs-on-grade.
- D. Backfill areas excavated caused as a result of demolition.
- E. Rough grade and compact areas affected by demolition to maintain site grades and contours.
- F. Remove demolished materials from site.
- G. Remove materials to be re-installed or retained in manner to prevent damage.
- H. Remove and promptly dispose of contaminated, vermin infested, or dangerous materials encountered.
- I. Do not burn or bury materials on site. Leave site in clean condition.
- J. Remove temporary work.

END OF SECTION

SECTION 02110

SITE CLEARING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Remove surface debris.
- B. Remove paving and curbs where noted.
- C. Clear site of plant life and grass.
- D. Remove trees and shrubs.
- E. Remove root system of trees and shrubs.

1.2 RELATED SECTIONS

- A. Section 02202 - Rock Removal.
- B. Section 02222 - Excavation.

1.3 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for disposal of debris off site.
- B. Notify Utility Companies to locate and identify all underground utilities before starting work.
- C. Coordinate clearing Work with utility companies.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Herbicide.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that existing plant life and features designated to remain are tagged or identified.

3.2. PROTECTION

- A. Protect utilities that exist from damage.
- B. Protect trees, plant growth, and features designated to remain as final landscaping.
- C. Protect bench marks and existing structures from damage or displacement.

3.3 CLEARING

- A. Clear areas required for access to site and execution of Work.
- B. Remove paving and curbs as indicated.
- C. Remove trees and shrubs as indicated. Remove stumps, main root ball, root system.
- D. Clear undergrowth and deadwood without disturbing subsoil.
- E. Apply herbicide to remaining stumps to inhibit growth.

3.4 REMOVAL

- A. Remove debris, rock, and extracted plant life from site.

END OF SECTION

SECTION 02202

ROCK REMOVAL

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Removal of discovered rock during excavation.
- B. Expansive tools and explosives to assist rock removal.

1.2 RELATED SECTIONS

- A. Section 02211 - Rough Grading.
- B. Section 02222 - Excavation: Building excavation.
- C. Section 02223 - Backfilling: Backfill materials.

1.3 UNIT PRICES

- A. Rock Quantity: Assumed quantity of rock is as Follows:
 - 1. Rock Excavation (Footings): Ten (10) cubic yards.
 - 2. Rock Excavation (Trenches): Five (5) cubic yards.
- B. Adjustments in Contract Price will be made due to changes in quantity of rock, based on unit prices established in the Agreement for rock removal.
- C. Determination of Unit Measurements: Identified by site measurements and verified by the Engineer. Measurement to be based on minimum dimensions required to provide specified clearances.

1.4 DEFINITIONS

- A. Site Rock: Rock in open cut areas should be defined as material which cannot be excavated with the ripper of a Caterpillar D-8 Series Dozer or equivalent or any boulder or rock in excess of one and one-half (1½) cubic yards in volume.
- B. Trench Rock: Rock in footing trenches or excavations should be defined as material which cannot be removed with a Caterpillar E240 E240 Series Excavator (trackhoe), or equivalent, with a minimum stick force of 18,740 lbs. and a minimum bucket force of 28,660 lbs. or defined as any rock or boulder in excess of one-half (½) cubic yard.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate intended method for removing rock.

1..6 SCHEDULING

- A. Schedule work under the provisions of Section 01300.
- B. Schedule Work to avoid disruption to occupied buildings nearby.

2. PART 2 PRODUCTS

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions and note subsurface irregularities affecting work of this Section.

3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Conduct survey and document conditions of buildings near locations of rock removal photograph existing conditions identifying existing irregularities.

3.3 ROCK REMOVAL - MECHANICAL METHOD

- A. Excavate and remove rock by the mechanical method. Drill holes and utilize expansive tools and wedges to fracture rock.
- B. Cut away rock to 12" below bottom of footing excavation to form level bearing and 6" minimum clear of side of footings.
- C. Remove shaled layers to provide sound and unshattered base for footings.
- D. In utility trenches, excavate to 12 inches below invert elevation of pipe and 24 inches wider than pipe diameter.
- E. Remove excavated materials from site.
- F. Correct unauthorized rock removal in accordance with backfilling and compaction requirements of Section 02223 or lean concrete fill in accordance with Section 03300.

3.4 ROCK REMOVAL - EXPLOSIVE METHOD

- A. Special permission by Owner and Chambersburg Borough.

3.5 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400.

- B. Provide for visual inspection of foundation bearing surfaces and cavities formed by removed rock.

END OF SECTION

SECTION 02207

AGGREGATE MATERIALS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Aggregate materials.

1.2 RELATED SECTIONS

- A. Section 01400 - Quality Control.
- B. Section 02222 - Backfilling.
- C. Section 02721 - Storm Drainage Systems.

1.3 REFERENCES

- A. AASHTO - M147 - Materials for Aggregate and Soil-Aggregate.
- B. AASHTO T180 - Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-in. (457 mm) Drop.
- C. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- D. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.
- E. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.
- F. ASTM D2167 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
- G. ASTM D2487 - Classification of Soils for Engineering Purposes.
- H. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- I. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.
- J. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.

- B. Samples: Submit, in air-tight containers, 10 lb. sample of each type of fill to testing laboratory.
- C. Materials Source: Submit name of imported materials suppliers. Provide materials from same source throughout the work. Change of source requires Engineer approval.

PART 2 PRODUCTS

2.1 AGGREGATE MATERIALS

- A. Aggregates: Conforming to Pennsylvania Department of Transportation Specifications Form 408.

PART 3 EXECUTION

3.1 STOCKPILING

- A. Stockpile in sufficient quantities to meet project schedule and requirements.
- B. Separate differing materials with dividers or stockpile apart to prevent mixing.
- C. Direct surface water away from stockpile site so as to prevent erosion or deterioration of materials.

3.2 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

SECTION 02211
ROUGH GRADING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Removal of topsoil and subsoil.
- B. Cutting, grading, filling and rough contouring the site.

1.2 RELATED SECTIONS

- A. Section 02110 - Site Clearing.
- B. Section 02202 - Rock Removal.
- C. Section 02218 - Landscape Grading: Finish grading with topsoil to contours.
- D. Section 02222 - Excavation: Building excavation.
- E. Section 02223 - Backfilling: General building area backfilling.

1.3 REFERENCES

- A. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb Rammer and 12 inch Drop.
- B. ANSI/ASTM D2922 - Test Methods for Density Soil and Soil-Aggregate in place by Nuclear Methods (Shallow Depth).
- C. ANSI/ASTM D3017 - Test Method for Water Content of Soil and Rock in place by Nuclear Methods (Shallow Depth).

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300 - Submittals.
- B. Submit 40 lb sample of each type of fill to testing laboratory in air tight containers.

1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01700 - Contract Closeout.
- B. Accurately record actual location of utilities remaining, by horizontal dimensions, elevations or inverts and slope gradients.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil: Excavated material, graded, free of roots, rocks larger than 1 inch, subsoil, debris, and large weeds.
- B. Subsoil: Excavated material, graded, free of lumps larger than 6 inches, rocks larger than 3 inches, and debris.
- C. Granular Fill: Type A as specified in Section 02223.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of the General Conditions.
- B. Verify that survey benchmark and intended elevations for the Work are as indicated.

3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Identify known underground, above ground, and aerial utilities. Stake and flag locations.
- C. Notify utility company to remove and relocate utilities where noted.
- D. Protect above and below grade utilities which are to remain.
- E. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.
- F. Protect bench marks, existing structures, trees, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.

3.3 TOPSOIL EXCAVATION

- A. Excavate topsoil from project work areas to be further excavated, re-landscaped, or re-graded.
- B. Stockpile in area designated on site. Remove excess topsoil not being used, from site.
- C. Stockpile topsoil to depth not exceeding 8 feet. Protect from erosion.

3.4 SUBSOIL EXCAVATION

- A. Excavate subsoil from areas to be further excavated, re-landscaped, or re-graded.
- B. Stockpile in area designated on site. Remove excess subsoil not being reused, from site.
- C. Stockpile subsoil to depth not exceeding 8 feet. Cover to protect from erosion.
- D. When excavation through roots is necessary, perform work by hand and cut roots with sharp axe.

3.5 FILLING

- A. Fill areas to contours and elevations with unfrozen materials.
- B. Granular Fill: Place and compact materials in continuous layers not exceeding 8 inches compacted depth, compacted to 100 percent.
- C. Subsoil Fill: Place and compact material in continuous layers not exceeding 8 inches, compacted depth, compacted to 100 percent or more.
- D. Maintain moisture content within 3 percentage points of the material is optimum moisture content to attain required compaction density as noted on drawings.
- E. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise.
- F. Make grade changes gradual. Blend slope into level areas.
- G. Remove surplus fill materials from site.

3.6 TOLERANCES

- A. Top Surface of Subgrade: Plus or minus 1/10 foot.

3.7 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed by Contractor.
- B. Tests and analysis of fill material will be performed in accordance with ANSI/ASTM D1557.
- C. Compaction testing, if required, will be performed in accordance with ANSI/ASTM D1556 at the expense of the Contractor.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.
- E. Frequency of Tests: As required.

END OF SECTION

SECTION 02218

LANDSCAPE GRADING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Finish grade subsoil and proof roll
- B. Place, level, and compact topsoil.

1.2 RELATED WORK

- A. Section 01400 - Quality Control.
- B. Section 02211 - Rough Grading: Subsoil contouring.
- C. Section 02223 - Backfilling: Backfilling and compacting fill.

1.3 PROTECTION

- A. Protect landscaping and other features remaining as final work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil: Reused on-site material and imported from off-site; friable loam; free of subsoil; roots, grass, weeds, stone, and foreign matter; acidity range (pH) of 5.5 to 7.5; containing a minimum of 4 percent and a maximum of 25 percent organic matter.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify site conditions and note irregularities affecting work of this Section.
- B. Beginning work of this Section means acceptance of existing conditions.

3.2 SUBSOIL PREPARATION

- A. Eliminate uneven areas and low spots. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove subsoil contaminated with petroleum products.
- B. Scarify subgrade to depth of 3 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.3 PLACING TOPSOIL

- A. Place topsoil to a compacted depth of 8 inches, in areas where seeding is scheduled and 18 inches below root ball where planting is scheduled.
- B. Use topsoil in relatively dry state. Place during dry weather.
- C. Fine grade topsoil eliminating rough or low areas. Maintain levels, profiles, and contours of subgrade.
- D. Remove stone, roots, grass, weeds, debris, and foreign material while spreading.
- E. Manually spread topsoil around trees, plants, and building to prevent damage.
- F. Roll placed topsoil.
- G. Remove surplus subsoil and topsoil from site.
- H. Leave stockpile area and site clean and raked, ready to receive landscaping.

3.4 TOLERANCES

- A. Top of Topsoil: Plus or minus 1/2 inch.

END OF SECTION

SECTION 02222

EXCAVATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Excavation for building foundations.
- B. Excavation for slabs-on-grade.

1.2 RELATED SECTIONS

- A. Bid Document: Unit prices for special excavation work.
- B. Section 01400 - Quality Control: Inspection of bearing surfaces.
- C. Section 01500 - Construction Facilities and Temporary Controls: Dewatering excavation and water control.
- D. Section 02202 - Rock removal: Removal of Rock during excavation.
- E. Section 02211 - Rough Grading.
- F. Section 02218 - Landscape Grading.
- G. Section 02223 - Backfilling.

1.3 FIELD MEASUREMENTS

- A. Verify that survey benchmark and intended elevations for the Work are as indicated.

PART 2 - PRODUCTS

- 2.1 Not Used.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Identify known underground, above ground, and aerial utilities. Stake and flag locations.
- C. Notify utility company to remove and relocate utilities where noted.
- D. Protect above and below grade utilities which are to remain.

- E. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.
- F. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.

3.2 EXCAVATION

- A. Underpin adjacent structures which may be damaged by excavation work, including utilities and pipe chases.
- B. Excavate subsoil required to accommodate building foundations, slabs-on-grade, paving, site structures, and construction operations.
- C. Excavate to working elevations.
- A. Over-excavate to remove unsuitable soil as required by Engineer or designated consultant.
- E. Excavation cut not to interfere with normal 45 degree bearing splay of foundation.
- F. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- G. Hand trim excavation. Remove loose matter. Compact excavation surface.
- H. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume. Larger material will be removed under Section 02202.
- I. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- J. Correct unauthorized excavation at no extra cost to Owner.
- K. Correct areas over-excavated by error at direction of Owner by enlarging footings or installing properly placed backfill at no extra cost to Owner.
- L. Stockpile excavated material in area designated on site and remove excess material not being reused, from site.
- M. Backfill over-excavated areas with Type A granular fill and compact in accordance with Section 02223.

3.3 FIELD QUALITY CONTROL

- A. Field testing will be performed under provisions of Section 01400 by Contractor.
- B. Provide for visual inspection of bearing surfaces.
- C. Dewater excavation as required to provide suitable dry surface for subsequent

construction.

3.4 PROTECTION

- A. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation, from freezing.

END OF SECTION

SECTION 02223

BACKFILLING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Building perimeter and site structure backfilling to subgrade elevations.
- B. Site filling and backfilling.
- C. Granular stone base under slabs-on-grade.
- D. Consolidation and compaction.
- E. Fill for over-excavation.

1.2 RELATED SECTIONS

- A. Section 01400 - Quality Control.
- B. Section 02218 - Landscape Grading: Filling of topsoil to finish grade elevation.
- C. Section 02222 - Excavation.
- D. Section 03300 - Cast-in-Place Concrete: Concrete materials.

1.3 REFERENCES

- A. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- B. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb Rammer and 12 inch Drop.
- C. ANSI/ASTM D2922 - Test Methods for Density Soil and Soil-Aggregate in place by Nuclear Methods (Shallow Depth).
- D. ANSI/ASTM D3017 - Test Method for Water Content of Soil and Rock in place by Nuclear Methods (Shallow Depth).
- E. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb Rammer and 18 inch Drop.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01300.

- B. Samples: Submit 10 lb. sample of each type of fill to testing laboratory, in air-tight containers.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

- A. Type A & B - Coarse Crushed Stone: Pit run, Angular, washed natural stone; free of shale, clay, friable material, sand, debris; graded in accordance with ANSI/ASTM C136 within the following limits:

<u>Sieve Size</u>	<u>Type A Percent Passing</u>	<u>Type B Percent Passing</u>
2 inches	100	---
1½ inches	---	100
One inch	---	95 to 100
¾ inch	52 to 100	---
½ inch	---	25 to 60
⅜ inch	36 to 70	---
No. 4	24 to 50	0 to 10
No. 8	---	0 to 5
No. 16	10 to 30	---
No. 200	0 to 10	---

- B. Type C - Stone Gravel: Natural stone; washed, free of clay, shale, organic matter; graded in accordance with ANSI/ASTM C136, to the following:

1. Minimum Size: ¼ inch.
2. Maximum Size: 5/8 inch.

- C. Type D - Sand: Natural river or bank sand; washed: free of silt, clay, loam, friable or soluble materials, or organic matter; graded in accordance with ANSI/ASTM C136, within the following limits:

<u>Sieve Size</u>	<u>Percent Passing</u>
No. 4	100
No. 14	10 to 100
No. 50	5 to 90
No. 100	4 to 30
No. 200	0

- D. Subsoil: Reusable on-site material and off-site imported, free of gravel larger than 3 inch size, and debris.
- E. Type F - Structural Fill: Type A Stone.
- F. Concrete: Structural concrete conforming to Section 03300 with a compressive strength of 2,000 psi.

2.2 ACCESSORIES

- A. Geotextile Fabric
- B. Vapor Retardant: 10 Mil thick, polyethylene.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify fill materials to be reused are acceptable.
- B. Verify foundation perimeter drainage installation has been inspected.

3.2 PREPARATION

- A. Generally, compact subgrade to density requirements for subsequent backfill materials.
- B. Cut out soft areas of subgrade not capable of insitu compaction. Backfill with Type A or subsoil fill and compact to density equal to or greater than requirements for subsequent backfill material.
- C. Prior to placement of aggregate base course material at gravel paved areas, compact subsoil to 100 percent of its maximum dry density and at moisture within three (3) percentage points of the material's optimum moisture content in accordance with ANSI/ASTM D698.

3.3 BACKFILLING

- A. Backfill areas to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- C. Granular Fill: Place and compact materials in continuous layers not exceeding 8 inches compacted depth.
- D. Soil Fill: Place and compact material in continuous layers not exceeding 8 inches compacted depth.
- E. Maintain optimum moisture content of backfill materials to attain required compaction density.
- F. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.
- G. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.

- H. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise.
- I. Make grade changes gradual. Blend slope into level areas.
- J. Remove surplus backfill materials from site.
- K. Leave fill material stockpile areas completely free of excess fill materials.

3.4 TOLERANCES

- A. Top Surface of Backfilling: Plus 0.5 inch or minus one inch from required elevations.

3.5 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed by Contractor under provisions of Section 01410.
- B. Tests and analysis of fill material will be performed in accordance with ANSI/ASTM D698.
- C. Compaction testing will be performed in accordance with ANSI/ASTM D2922 AND D3017.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.
- E. Frequency of Tests: as required.
- F. Proof roll compacted fill surfaces under slabs-on-grade, paving and sidewalk areas.

3.6 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Section 01500.
- B. Re-compact fills subjected to vehicular traffic.

3.7 SCHEDULE

- A. Interior Crawl Spaces:
 - 1. Subsoil or Type A fill, 8 minimum inches thick each lift as required, compacted to 100 percent.
 - 2. Cover with Type B fill, 6 inches thick, compacted to 95 percent.
- B. Interior Slab-On-Grade:
 - 1. Subsoil or Type A fill, 8 minimum inches thick each lift as required, compacted to 100 percent.
 - 2. Cover with Type B fill, 6 inches thick, compacted to 95 percent.
- C. Exterior Side of Foundation Walls and Over Granular Filter Material and Foundation

Perimeter Drainage:

1. Subsoil or Type A fill to subgrade elevation, 8 inch thick each lift as required, compacted to 95%.

D. Fill Under Grass Areas:

1. Subsoil fill to within 8 inches below finish grade, compacted to 90 percent.

E. Fill Under Landscaped Areas:

1. Subsoil fill to within 3'-0" inches below compacted to 90 percent.

F. Fill for French Drains:

1. Type B fill to encase pipe, compacted to 90 percent.

G. Fill to Correct Over-excavation:

1. Lean concrete to minimum compressive strength of 2,000 psi.
2. Type A structural fill, flush to required elevation, compacted to 100 percent.

H. Fill Over Drainage Piping Gravel Cover:

1. Subsoil or Type A fill, to finish subgrade, compacted to 95%.

I. Moisture Condition:

1. Moisture condition all fill and backfill materials to within three (3) percentage points of the respective material's optimum moisture content as determined by the ASTM D698 Test Method.

END OF SECTION

SECTION 02225

TRENCHING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Excavate trenches for utilities from outside building to municipal utilities.
- B. Compacted bedding under fill over utilities.
- C. Backfilling and compaction.

1.2 RELATED SECTIONS

- A. Section 01400- Quality Control: Testing fill compaction.
- B. Section 02222 - Excavation: General building excavation.
- C. Section 02732: Sewer piping from building to municipal sewer.
- D. Section 02721: Storm drainage from building to municipal storm water system.
- E. Section 03300 - Cast-in-Place Concrete: Concrete materials.

1.3 REFERENCES

- A. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- B. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 kg) Rammer and 12 inch (304.8 mm) Drop.
- C. ANSI/ASTM D2922 - Test Methods for Density Soil and Soil-Aggregate in place by Nuclear Methods (Shallow Depth).
- D. ANSI/ASTM D3017 - Test Method for Water Content of Soil and Rock in place by Nuclear Methods (Shallow Depth).
- E. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb Rammer and 18 inch Drop

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Samples: Submit 40 lb sample of each type of fill to testing laboratory.

1.5 FIELD MEASUREMENTS

- A. Verify that survey benchmark and intended elevations for the Work are as shown on Drawings.

2. PART 2 PRODUCTS

2.1 FILL MATERIALS

- A. Types Subsoil as specified in Section 02223.

2.2 BED MATERIALS

- A. Type 1 Material: Fine Crushed Stone Aggregate.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify fill materials to be reused, are acceptable.

3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Maintain and protect existing utilities remaining, which pass through work area.
- C. Protect plant life, lawns, and other features remaining as a portion of final landscaping.
- D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.
- E. Protect above and below grade utilities which are to remain.
- F. Cut out soft areas of subgrade not capable of insitu compaction. Backfill and compact to density equal to or greater than requirements for subsequent backfill material.

3.3 EXCAVATION

- A. Excavate subsoil required for storms sewer, sanitary sewer and water piping to municipal utilities.
- B. Cut trenches sufficiently wide to enable installation of utilities and allow inspection.
- C. Excavation shall not interfere with normal 45 degree bearing splay of foundations.
- D. Hand trim excavation. Remove loose matter.

- E. Remove lumped subsoil, boulders, and rock.
- F. Correct unauthorized excavation at no cost to Owner.
- G. Correct areas over-excavated by error.
- H. Stockpile excavated material and remove excess material not being used, from site.

3.4 BEDDING

- A. Support pipe and conduit during placement and compaction of bedding fill.

3.5 BACKFILLING

- A. Backfill trenches to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- C. Granular Fill: Place and compact materials in continuous layers not exceeding 6 inches compacted depth.
- D. Soil Fill: Place and compact material in continuous layers not exceeding 8 inches compacted depth.
- E. Employ a placement method that does not disturb or damage foundation perimeter drainage and conduit in trench.
- F. Maintain moisture content of backfill materials within three (3) percentage points of the material's optimum moisture content as determined by the ASTM D698 test procedure to attain required compaction density.
- G. Remove surplus backfill materials from site.
- H. Leave fill material stockpile areas completely free of excess fill materials.

3.6 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01410.
- B. Tests and analysis of fill material will be performed in accordance with ANSI/ASTM D698.
- C. Compaction testing will be performed in accordance with ANSI/ASTM D2992 and D3017 test methods.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.7 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Section 01500.
- B. Recompact fills subjected to vehicular traffic.

END OF SECTION

SECTION 02513

BITUMINOUS CONCRETE PAVING

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Preparation of sub-grade to receive aggregate base course.
- B. Aggregate base course.
- C. Tack coat.
- D. ID-2 bituminous concrete wearing course and base course.
- E. Line painting and stripping.

1.2 RELATED SECTIONS

- A. Section 02211 - Rough Grading.
- B. Section 02222 - Excavation.
- C. Section 02223 - Backfilling.

1.3 QUALITY ASSURANCE

- A. Use only materials which are furnished by a bulk bituminous concrete producer regularly engaged in production of hot-mix, hot-laid bituminous concrete and has been qualified as a supplier by the Pennsylvania Department of Transportation.

1.4 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - D1188 Bulk Specific Gravity of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens.
 - D1556-64 (1974) Density of Soil in Place by the Sand-Cone Method.
 - D698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.
 - D1559 Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.
- B. Additional Procedures and Specification included in appropriate Section of Pennsylvania Department of Transportation Specifications (PennDOT), Form 408, dated 1990.

1.5 PROJECT CONDITIONS

- A. Apply prime and tack coats only when ambient temperature is above 50 degrees F. and when temperature has not been below 35 degrees F for 12 hours immediately prior to application. Do not apply when base surface is wet or contains an excess of moisture.
- B. Place bituminous concrete courses only when atmospheric temperature is above 40 degrees F and rising and when the underlying base surface is dry.

PART 2 PRODUCTS

- A. Asphalt (AC-20) and aggregate (coarse and fine) used shall be uniform in texture and shall be in conformance with supplies approved by PennDOT as listed in the latest edition of their Bulletin #25 and #27. Only one manufacturer shall be used throughout the project.
- B. Materials used in the construction of the crushed aggregate base course shall be in conformance with PennDOT Specifications, Form 408, dated 1990, Section 401.

PART 3 EXECUTION

3.1 PREPARATION OF SUB-GRADE

- A. Ensure compaction and grading of sub-grade are in accordance with Section 02222 and 02223 of these Specifications and Section 210 of PennDOT Specifications, Form 408 before placing either aggregate or bituminous concrete base course. These specifications shall prevail where conflicts with PennDOT Specifications occur.

3.2 PLACEMENT OF AGGREGATE BASE COURSE

- A. Place aggregate base course as specified on the drawings on prepared sub-grade in compacted layers to establish required thickness and elevations.
- B. Place base course materials in equal layers of not more than 6 inches compacted thickness.
- C. Spread, shape, and compact all aggregate base materials deposited on the sub-grade, during the same day.
- D. Maintain optimum moisture content for compacting base materials during placement operations.
- E. Compact layers of aggregate base course materials to not less than 100 percent of maximum density, ASTM D698, Method D.
- F. Proof roll prepared base course surface using heavy, rubber tired rollers. Correct unstable areas and areas requiring additional compaction.
- G. Compaction requirements will conform to the applicable section of PennDOT Specifications, Form 408, Section 350.

3.3 APPLICATION OF TACK COATS

- A. Provide and apply tack coat in accordance with Section 460 of PennDOT Form 408 Specifications for preparation of existing bituminous paving to be overlaid with new paving.
- B. Apply tack coat prior to placement of bituminous concrete paving. Allow surfaces to dry until tack coat material is at condition of tackiness to receive paving.

3.4 PLACEMENT OF BITUMINOUS CONCRETE PAVING

- A. Place bituminous concrete on prepared aggregate base course and compact to establish required density, thickness and elevations.
- B. Spread and strike-off bituminous concrete mixture using self-propelled paving machine except that inaccessible and small areas may be placed by hand. Spread mixture at a minimum temperature of 225 degrees F.
- C. Place paving in strips not less than 10 feet wide.
- D. Ensure joints made during bituminous concrete paving operations are straight, vertical, tightly bonded free of broken or loose material and have same texture, density and smoothness as adjacent paving.
- E. Compact each bituminous concrete paving course with self-propelled rolling equipment. Start compaction as soon as paving will bear equipment without checking or undue displacement.
- F. Carry out compaction in three operations (breakdown or initial rolling, second rolling and finish rolling) in pass sequence to produce smooth surfaces of uniform texture, free from depressions ("bird baths") and roller marks.
- G. Compact with hand tampers in areas not accessible to rolling equipment.
- H. Compact bituminous concrete paving in accordance with PennDOT Specifications Section 401, Form 408, dated 1990.
- I. Do not allow vehicular traffic on newly paved areas until surface has cooled to atmospheric temperature.

3.5 TOLERANCES

- A. Elevation: Plus or minus 1/2 inch of required elevations except that no differences in elevation will be permitted at joints with other surfaces intended to be at same elevation as bituminous concrete paving.
- B. Thicknesses indicated are minimum in-place compacted thicknesses for each paving course.
- C. Surface Smoothness: within 3/16 inches deviation when checked with 10 feet straight edge.

3.6 TESTING

- A. Field compaction testing of aggregate base course will be performed in accordance with ASTM D2922 or D3017.

- B. The in-place density of compacted bituminous concrete paving will be tested in accordance with PennDOT Specifications, Form 408, dated 1990.

3.7 LINE PAINTING AND STRIPPING

- A. As indicated on the drawings, provide line painting and stripping in accordance with PennDOT specifications, Form 408.
- B. Painting thoroughly clean areas where line stripping will be applied. Apply the paint in strict accordance with the manufacturer's recommendations using all means necessary to protect the painted surface until dry.

END OF SECTION

SECTION 02721

AGGREGATE BASE COURSE

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aggregate base course.
- B. Related Sections:
 - 1. Section 02207 - Aggregate Materials.
 - 2. Section 02211 - Rough Grading: Preparation of site for base course.
 - 3. Section 02218 - Landscape Grading: Topsoil fill at areas adjacent to aggregate base course.
 - 4. Section 02223 - Backfilling: Compacted fill under base course.
 - 5. Section 02225 - Trenching: Compacted fill under base course.
 - 6. Section 02513 - Bituminous Concrete Paving.

1.2 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. American Society for Testing and Materials:
 - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 2. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
 - 3. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - 4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
 - 5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

- A. Section 01300 - Submittal Procedures: Requirements for submittals.

1.4 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout the Work.

- B. Perform Work in accordance with PennDOT standards.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Subbase Aggregate conforming to PennDOT Specification Form 408.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.2 PREPARATION

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place fill on soft, muddy, or frozen surfaces.

3.3 AGGREGATE PLACEMENT

- A. Spread aggregate over prepared substrate to a total compacted thickness as shown on the drawings.
- B. Place aggregate in maximum 8 inch layers and roller compact to specified density.
- C. Level and contour surfaces to elevations and gradients indicated.
- D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.
- F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.4 TOLERANCES

- A. Section 01400 - Quality Requirements: Tolerances.
- B. Maximum Variation From Flat Surface: 1/4 inch measured with 10 foot straight edge.

- C. Maximum Variation From Thickness: 1/4 inch.
- D. Maximum Variation From Elevation: 1/2 inch.

3.5 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Requirements: Testing and inspection services and Section 01700 - Execution Requirements: Testing, adjusting, and balancing.
- B. Compaction testing may be performed by direction of Engineer.
- C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

3.6 SCHEDULES

- A. Under Asphalt Pavement:
 - 1. Compacted thickness per drawings.

END OF SECTION

SECTION 02751

STORM DRAINAGE SYSTEMS

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Storm drainage piping.

1.2 RELATED SECTIONS

- A. Section 02223 - Backfilling
- B. Section 02225 - Trenching.
- C. Section 03300 - Cast-In-Place Concrete.

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO).
Standard Specifications for Transportation Materials and Methods of Sampling and Testing,
Part 1 Specifications, latest edition.

M36-82 Metallic Coated Corrugated Steel Culverts and Underdrains.
- B. American Society for Testing and Materials (ASTM).

C32-73 Sewer and Manhole Brick.

C62-81 Building Brick.

C76-82a Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

C139-73 Concrete Masonry Units for Construction of Catch Basins and Manholes.
- C. Pennsylvania Department of Transportation Specifications Form 408.

PART 2 PRODUCTS

2.1 PIPE MATERIALS

- A. General: Ells, tees, reducing tees, wyes, couplings, increasers, crosses, transitions and end caps of same type and class of material as piping unless otherwise indicated.
- B. Polyvinyl Chloride Pipe: ASTM D2729, unperforated, plane end with required fittings.
- C. Corrugated polyethylene pipe.

2.2 CONCRETE MATERIALS

- A. Concrete: As specified in Section 03300, unless otherwise indicated.

PART 3 EXECUTION

3.1 PIPING INSTALLATION

- A. Lay piping true to grades and alignment indicated with unbroken continuity of invert.
- B. Lay piping by proceeding upgrade. Place groove ends of tongue-and-groove pipe pointing upgrade.
- C. Install gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements.
- D. Clear piping interior of dirt and other superfluous material as work progresses.
- E. Place plugs in ends of incomplete piping at end of work day or whenever work stops.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

1. PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide cast-in-place concrete where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Quality control:
 - 1. Do not commence placement of concrete until mix designs have been reviewed by the Engineer and all governmental agencies having jurisdiction, and until copies are at the job site, the batch plant, and the building department.
- C. Materials and work shall conform to the requirements of all standards, codes, and recommended practices required in this section. In conflicts between standards, required standards and this specification, or this specification and the local building code, the more stringent requirement shall govern.
 - 1. Applicable Standards
 - a. "Specifications for Structural Concrete for Buildings" ACI 301 (latest edition).
 - b. "Building Code Requirement for Reinforced Concrete" ACI 318 (latest edition).
 - c. "Standard Specification for Ready-Mixed Concrete" ASTM C 94-73a
 - d. "Manual of Standard Practice" Concrete Reinforcing Steel Institute
 - 2. Field Reference Manual: Contractor shall have available in the field office "Specifications for Structural Concrete for Buildings" with selected references of ACI.
- D. Testing and Inspection
 - 1. Materials and operations shall be tested and inspected as work progresses. Failure to detect defective work shall not prevent rejection when defect is discovered, nor shall it obligate the Engineer for final acceptance. When it appears that any material furnished or work performed by the Contractor fails to fulfill specifications and requirements, the testing agency shall report such deficiency to the Owner, Engineer and the Contractor.
 - 2. Testing agencies shall meet the requirements of "Recommended Practice for

- Inspection and Testing Agencies for Concrete and Steel in Construction" (ASTM E 329).
3. The following testing services will be performed by the designated agency and shall be paid by the Owner:
 - a. Secure composite samples in accordance with "Method of Sampling Fresh Concrete (ASTM C 172)". Each sample shall be obtained from a different batch of concrete on a random basis, avoiding any selection of the test batch other than by a number selected at random before commencement of concrete placement.
 - b. Mold and cure four specimens from each sample in accordance with "Method of Making and Curing Concrete Compression and Flexural Specimens in the Field" (ASTM C31). Any deviations from the requirements of this Standard shall be recorded in the test report submitted. Four cylinders shall be laboratory cured after initial curing. Contractor shall provide cure box to maintain appropriate initial curing conditions per ASTM test methods.
 - c. Test specimens in accordance with "Method of Test for Compressive Strength of Molded Concrete Cylinders (ASTM C39)". Two specimens shall be tested at 28 days for acceptance and one shall be tested at seven days for information. One cylinder shall be reserved as a space for additional testing if required. The acceptance test results shall be the average of the strengths of the two specimens tested at 28 days. If one specimen in a test manifests evidence of improper sampling, molding or testing, it shall be discarded and the strength of the remaining cylinder shall be considered the test result. Should both specimens in a test show any of the above defects, the entire test shall be discarded. When high early strength concrete is used, the specimens shall be tested at the ages indicated in the Contract Documents.
 - d. Make at least one strength test for each 30 cubic yards, or fraction thereof, of each mix design of concrete placed in any one day.
 - e. Determine slump of the concrete sample for each strength test and whenever consistency of concrete appears to vary, using "Method of Test for Slump of Portland Cement Concrete" (ASTM C 143).
 - f. Determine air content of normal weight concrete sample for each strength test in accordance with either "Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method" (ASTM C231), "Method of Test for Air Content of Freshly Mixed Concrete by the Volumetric Method" (ASTM C173) or "Method of Test for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete" (ASTM C138).
 - g. Determine temperature of concrete sample for each strength test.
 4. The agency shall report all test results (two copies each) to the Engineer and Contractor immediately after they are performed. All test reports shall include the exact location in the work at which the batch represented by a test was deposited. Reports of strength tests shall include detailed information on storage and curing of specimens prior to testing.
 5. The testing agency and its representatives are not authorized to revoke, alter, relax, enlarge, or release any requirement of the Contract Documents, nor to approve or accept any portion of the work.
 6. The Contractor shall provide the necessary testing services for the following:
 - a. Qualification of proposed materials and the establishment of mix designs.
 - b. Other testing services needed or required by the Contractor.

7. The use of testing services shall in no way relieve the Contractor of the responsibility to furnish materials and construction in full compliance with the Contract Documents.
 8. The Contractor shall submit to the Engineer a list of the concrete materials and the concrete mix designs proposed for use with a written request for approval. This submittal shall include the results of all testing performed to qualify the materials and to establish the mix designs. No concrete shall be placed in the work until the Contractor has received such approval in writing.
 9. To facilitate testing and inspection, the Contractor shall:
 - a. Furnish any necessary labor to assist the designated testing agency in obtaining and handling samples at the project or other sources of materials.
 - b. Advise the designated testing agency sufficiently in advance of operations to allow for completion of quality tests and for the assignment of personnel.
 - c. Provide and maintain for the sole use of the testing agency adequate facilities for safe storage and proper curing of concrete test specimens on the project site for the first 24 hours as required by "Method of Making and Curing Concrete Compression and Flexural Specimens in the Field" (ASTM C31).
- E. Evaluation and Acceptance
1. The strength level of the concrete will be considered satisfactory if 95% of the strength test results and the averages of all sets of three consecutive strength test results equal or exceed specified strength and no individual test result is below specified strength by more than 500 psi.
 2. Completed concrete work will be accepted when the requirements of "Specifications for Structural Concrete for Buildings" ACI 301 Chapter 18 have been complied with.
 3. Completed concrete work which fails to meet a requirement of Chapter 18 shall be brought into compliance by repair or removed and replaced if required by the Engineer at the Contractor's expense.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01300.
- B. Product data:
 1. Materials list of items proposed to be provided under this Section;
 2. Submit two copies of laboratory trial mix designs proposed in accordance with Method 1 ACI 301, or one copy each of 30 consecutive test results and the mix design used from a record of past performance in accordance with ACI 301 Method 2;
 3. Submit a sample ready-mixed concrete delivery ticket in accordance with the requirements of ASTM C-94.
 4. 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, arrangement of concrete reinforcement. Include special reinforcement required and openings through concrete structures.
 5. The Contractor shall furnish an affidavit from the manufacturer or fabricator, certifying that the materials or products delivered to the job meets the requirements specified. However, such certification shall not relieve the Contractor from the

responsibility of complying with any added requirements specified herein.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01600.
- B. Delivery and storage of reinforcing:
 - 1. Use necessary precautions to maintain identification after bundles are broken.
 - 2. Store in a manner to prevent excessive rusting and fouling with dirt, grease, and other bond-breaking coatings.

2. PART 2 - PRODUCTS

2.1 CEMENT

- A. Portland Cement, Type I conforming to ASTM C 150 Cement used in the work shall correspond to that upon which the selection of concrete proportions was based.
 - 1. Only one brand and manufacturer of approved cement shall be used for exposed concrete.
 - 2. Type III cement shall be used only with prior written approval from the Engineer.

2.2 AGGREGATES

- A. Aggregates, conforming to ASTM C33, local aggregates not complying with this standard may be used providing it can be shown by special test or a record of past performance these aggregates produce concrete of adequate strength and durability.
 - 1. Fine aggregate, clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances, within allowable standards.
 - 2. Coarse aggregate, clean, uncoated, graded aggregate containing no clay, mud, loam or foreign matter.

2.3 WATER

- A. Water, shall be fresh, clean, and drinkable.

2.4 ADMIXTURES

- A. General
 - 1. Concrete admixtures, provide admixtures produced and serviced by established, reputable manufacturers and used in compliance with manufacturers recommendations.
- B. Air-Entraining Admixture
 - 1. Air-entraining agent, conforming to ASTM C 260 and as manufactured by the following:
 - a. "Sika Aer"; Sika Corp.
 - b. "MB-VR or MB-AE"; Master Builders.
 - c. "Dorex AEA"; W. R. Grace.
- C. Water-Reducing Admixture

1. Water reducing, set-controlling admixture, conforming to ASTM C 494-71, type A (water-reducing), type D (water-reducing and retarding) and type E (water-reducing, accelerating) "Pozzolith" polyhydroxylated polymer admixture, manufactured by Master Builders, Euclid Chemical Co., or Sika Chemical Corp.
- D. Reinforcing Materials: Metal Reinforcement, shall be provided in accordance with the working drawings.
1. Reinforcing steel, conforming to ASTM A 615 "Specifications for Deformed Billet Steel Concrete Reinforcing".
 2. Welding wire fabric, conforming to ASTM A 185 "Specifications for Welded Steel Wire Fabric for Concrete Reinforcement".
 3. Steel wire, conforming to ASTM A 82 "Specifications for Cold-Drawn Steel Wire for Concrete Reinforcement".
 4. Plain smooth dowels shall conform to the requirements of ASTM A306 or ASTM A36. Provide cap sleeves for dowels and install as indicated on the Drawings. All concrete anchors shall be 1/2" diameter headed concrete anchors as detailed in the Drawings.
- E. Metal Accessories: Metal Accessories shall conform to the requirements of the Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice for Reinforcing Concrete Construction.
- F. Expansion Joint: Expansion Joint, conforming to ASTM D 1751.
- G. Curing: Kure-N-Seal W by Sonneborn, Sealtight 1215 by Sealtight, or Concrete Cure WB20 by Changer Corporation.
- H. Forms:
1. For Concrete Exposed to View: Use plywood with DFPA stamp of "B-B plyform". Plywood shall be 5/8" thick for supports 12" on center maximum or 3/4" thick supports 16" on center maximum. Use in as large sheets as practical to keep joints to a minimum.
 2. For Concrete Not Exposed to View: Clean, straight lumber, plywood or metal.
 3. Form ties used for exposed concrete surfaces shall have a minimum working strength when fully assembled of at least 3,000 pounds. Ties shall be so adjustable in length as to permit complete tightening of forms and of such type as to leave no metal closer than 1-1/2" to the surface. Ties shall be factory fabricated, removable or snap-off ties that will not allow form deflection and will not spall concrete upon removal, fitted with devices that will leave holes in the concrete surface not less than 1/2 inch or more than one inch in diameter and of depth not greater than diameter at the exposed surface.
 4. Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.
- I. Grout
1. Non-shrink Grout: CRD-C 588, factory pre-mixed grout.
 - a. Products: Subject to compliance with requirements, provide one of the following:

Non-Metallic:

- (1) "Masterflow 713"; Master Builders
- (2) "SonogROUT"; Sonneborn-Contech.
- (3) "Euco-NS"; Euclid Chemical Co.
- (4) "Crystex"; L & M Cons. Chemical Co.
- (5) "Sure-Grip Grout"; Dayton Superior Co.
- (6) "Horngrout"; A.C. Horn.

J. Related Materials:

1. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
2. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
 - a. Polyethylene film.
 - b. Polyethylene-coated burlap.
3. Bonding Compound: Polyvinyl acetate or acrylic base, rewettable type.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - (1) "Weldcrete"; Larson Products
 - (2) "Everbond"; L & M Construction Chem.
 - (3) "EucoWeld"; Euclid Chemical Co.
 - (4) "Hornweld"; A.C. Horn.
 - (5) "Sonocrete"; Sonneborn-Contech.
4. Epoxy Adhesive: ASTM C 881, two component material suitable for use on dry or damp surfaces. Provide material "Type", "Grade", and "Class" to suite project requirements.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - (1) "EpoxTite"; A.C. Horn.
 - (2) Sikadur Hi-Mod"; Sika Chemical Corp.
 - (3) Euco Epoxy 463 or 615"; Euclid Chem. Co.
 - (4) "Sure-Poxy"; Kaufman Products Inc.

2.5 CONCRETE MIXES

- A. Concrete for all parts of the work shall be of the specified quality capable of being placed without excessive segregation and, when hardened, of developing all characteristics required by these specifications and the contract documents.
- B. The specified compressive strength of the concrete f'_c for each portion of the structure shall be as designated in the contract documents. Strength requirements shall be based on 28-day compressive strength unless a different test age is specified.
- C. All concrete which will be exposed to the weather shall be air-entrained with an air content of 6% plus or minus 1%. All other concrete shall be air-entrained with an air content of 4% plus or minus 1%.
- D. The concrete shall be proportioned and produced having a maximum slump of 3 inches or less for slabs and 3 inches for footings. A tolerance of up to 1 inch above the indicated maximum shall be allowed for individual batches provided the average for all batches or the

most recent 4 batches tested, whichever is fewer, does not exceed the maximum limit. A lower slump up to a minimum allowable slump of 1" is permissible provided the Contractor previously demonstrates his ability to properly place and consolidate the concrete.

- E. The nominal maximum size of coarse aggregate shall be not more than 3/4 inches (No. 67) as described by ASTM C33. Aggregate for concrete masonry fill shall be 1/2 inches maximum.
- F. Admixtures used in the concrete shall not contain any lignin or chloride ions added during manufacture. The use of calcium chloride in concrete is not permitted. All admixtures to be used in the concrete must be approved in advance by the Engineer.
- G. The proportions of ingredients shall be such as to produce a mixture which will work readily into the corners and angles of the forms and around reinforcement by the methods of placing and consolidation employed on the work, but without permitting the materials to segregate or excessive free water to collect on the surface. The proportions of ingredients shall be selected in accordance with Section 3.8.2 Method 1 or 2, to produce the proper placeability, durability, strength, and other required properties.

3. PART 3 - EXECUTION

3.1 FORMWORK

- A. Formwork shall be in accordance with Chapter 4, ACI 301 with the following additional requirements:
 - 1. Earth cuts may be used as side forms for vertical surfaces for footings and other areas as indicated in the Drawings provided the soil is stable, the subgrade is wetted immediately prior to pouring and provide 1" on each side of the minimum design profiles and dimensions shown on the Drawings.
 - 2. In cold weather, removal of form work should be deferred or form work should be replaced with insulation blankets, to avoid thermal shock and consequent crazing of the concrete surface.

3.2 REINFORCEMENT

- A. Reinforcement shall be in accordance with Chapter 5, ACI 301.

3.3 JOINTS

- A. Joints and embedded items shall be in accordance with Chapter 6, ACI 301.

3.4 PRODUCTION OF CONCRETE

- A. The production of concrete shall be in accordance with Chapter 7, ACI 301 with the following additional requirements:
 - 1. Controls shall be provided to insure that the batch cannot be discharged until the required mixing time has elapsed. At least three-quarters of the required mixing time shall take place after the last of the mixing water has been added.

Ready mixed cement concrete may be transported in truck mixers or truck agitators

operating at the specified agitation speed, or in approved non-agitating equipment, under the following conditions:

- a. Truck Mixers and Truck Agitators - The concrete shall be delivered to the site of the work and discharged within one and one-half hours after the completion of the mixing. In hot weather or under conditions contributing to quick stiffening of the concrete or when the temperature of the concrete is 85 F or above, the time between completion of the mixing and discharge of the concrete shall not exceed one hour. It is permissible, anytime after mixing, to stop agitating for periods not to exceed 30 consecutive minutes each. At the end of any non-agitation period, the concrete must be agitated for at least 20 revolutions. The total drum revolutions and the specified discharge time shall not be exceeded. The concrete, at the point of placement, shall be of the consistency and workability required for the job. The rate of discharge of the plastic concrete from the drum shall be controlled by the speed of the rotation of the drum in the discharge direction with the discharge gate fully open. Mixed or agitated concrete which has remained in the drum of the truck mixer or truck agitator for more than 30 minutes without mechanical agitation shall not be used.

A truck mixer and truck agitator shall be operated within a capacity not to exceed 63 or 80 percent, respectively, of the gross volume of the drum and at the specified speed of rotation for mixing or agitating. Truck mixers or truck agitators used for transporting mixed concrete shall be operated within the specified limits of capacity and speed of rotation for mixing or agitating.

- b. Central-Plant-Mixed Cement Concrete - Vehicles for transporting central-plant-mixed cement concrete shall be approved horizontal-axis or inclined-axis revolving-drum agitators or approved truck mixers of the same design operated at agitating speed. Such vehicles, when loaded to their rated capacity, shall be capable of maintaining the mixed concrete in a thoroughly mixed and uniform mass and of discharging the concrete without segregation.
- c. Other Concrete Hauling Equipment - In addition to the revolving-drum type hauling equipment, the concrete may also be transported in approved truck-mounted concrete hauling bodies of agitator or non-agitator type.

The bodies of the equipment shall be smooth, watertight, containers equipped to permit controlled discharge of the concrete. Covers meeting with the approval of the Engineer shall be provided for protection against weather.

The concrete shall be delivered to the site of the work in a thoroughly mixed and uniform mass and totally discharged with a satisfactory degree of uniformity. Slump tests of representative samples shall not differ by more than one inch nor exceed the specified requirements. Discharge shall be completed within 30 minutes after the mixing of the concrete.

- d. Mixing and Delivery Control - The interval between placing succeeding batches shall be controlled, and in no case shall exceed 30 minutes.

Two-way radio communications shall be provided, and maintained, by the Contractor between the proportioning plant and the site of the work for the purpose of providing uniformity and control of the concrete mixture.

The method and time of delivery of each load of ready-mixed cement concrete shall be controlled by plant slips issued to the driver and signed by the authorized representative of the Engineer at the Plant. At concrete paving plants, automatic clocks for recording time and date will be required. The plant slips shall contain the name and location of the plant, the size of the batch, the class of concrete, the time of completion of the mixing, and, when required, the recording of the revolution counter.

Upon arrival, the plant slip shall be delivered by the driver to the authorized representative of the Engineer at the site of the work. No concrete shall be used until the data noted on the plant slip has been verified and found to comply with the specification requirements.

2. Cold weather concreting procedures shall be required from in the fall, from the time of the first frost when the mean daily temperature at the job site falls below 40 degrees F for more than one day in a row until in the spring after the mean daily temperature rises above 40 degrees F for more than three successive days. Cold weather concreting is not permitted unless the Contractor shall submit, in writing, his cold weather concreting procedures to the Engineer for review, for concrete construction during this period. All cold weather concreting shall be in accordance with ACI 306-86.
3. Hot weather concreting procedures shall be required when the ambient temperature is 85 degrees F or above. Hot weather concreting is not permitted unless the Contractor shall submit, in writing, his hot weather concreting procedures to the Engineer for review. All hot weather concreting shall be in accordance with ACI 305-77.

3.5 PLACING

- A. Concrete shall be placed in accordance with Chapter 8, ACI 301 with the following additional requirements:
 1. General - Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be located as shown in the Contract Documents or as approved. Placing shall be carried on at such a rate that the concrete which is being integrated with fresh concrete is still plastic. Concrete which has partially hardened or has been contaminated by foreign materials shall not be deposited. Temporary spreaders in forms shall be removed when the concrete placing has reached an elevation rendering their service unnecessary. They may remain embedded in the concrete only if made of metal or concrete and if prior approval has been obtained.

The Contractor shall submit to the Engineer for approval, a schedule showing the

methods and sequence of placing concrete before work is started. Before placing the concrete, the Contractor shall notify the Engineer 48 hours prior to each pour and inform him as to the location and time of the pour and the type and quantity of concrete to be placed.

Before placing the concrete, the Contractor shall make all necessary arrangements and have all materials on hand, and in place if necessary, for curing and protecting the concrete. Concrete footings for abutments, piers, wing walls, and retaining walls shall not be constructed until the foundation material has been examined and approved by the Engineer. The Contractor may be required to drill or to drive a bar into the foundation material below the bottom of the footing to a depth sufficient to determine the suitability of the material.

Suitable means shall be used for placing concrete without segregation. Concrete which is segregated, too wet or not of uniform consistency, shall be removed and be discarded. Arrangement shall be made to use tremies, "elephant trunks", bottom dump buckets, or concrete buggies wherever practicable. In most cases, it will be necessary to use an "elephant truck" to discharge the concrete into narrow or deep forms. Long chutes shall be used only when approved, and if subsequently found unsatisfactory their use shall be discontinued. Short troughs, pipes or chutes of metal, or of wood lined with metal, may be used when feasible. Where the slope of the chute is steep, a satisfactory method to control the flow of the concrete shall be used. The concrete mixture shall not be dropped for a distance of more than 4 feet. Concrete may be placed by means of pumps or other similar devices only with written approval.

Pipes, tremies, troughs, chutes made of aluminum will not be permitted for the transmission of concrete.

Concrete shall be placed in the forms within the time intervals specified in Section 7.2.2.5. Concrete not to be vibrated shall be placed in horizontal layers of not more than 8 inches in depth. Concrete to be vibrated shall be placed in horizontal layers of not more than 15 inches in depth. Special care shall be taken to fill each part of the form by depositing the concrete as close to its final position as possible. Working or flowing of concrete along the forms from point of deposit will not be permitted, except as hereinafter provided. It shall be manipulated the minimum practical amount for proper placement. Care shall be taken to work the concrete under and around all reinforcement without displacing it. Concrete shall be so placed that after it has been struck off and the initial shrinkage has taken place, the upper surface of the concrete will be at the specified elevation.

In areas where reinforcement extends through or beyond a construction joint, concrete to be vibrated shall not be placed adjacent to previously placed concrete until a time interval of not less than 48 hours has elapsed.

2. Concrete shall not be deposited under water.

3.6 FINISHING OF FORMED SURFACES

- A. Finishing of formed surfaces shall be in accordance with Chapter 10, ACI 301 with the following additional requirements:
 1. All concrete with formed surfaces shall have a smooth form finish.

2. All exterior and interior vertical surfaces exposed to view shall have a grout cleaned finish in accordance with Section 10.3.2. All exposed edges shall have a 3/4" x 3/4" chamfer unless noted otherwise.

3.7 SLABS

- A. Slabs shall be in accordance with Chapter 11, ACI 301 with the following additional requirements:
 1. Finishes - Concrete floors shall be accurately screened and floated to required levels providing allowance for total thickness of any applied finish materials. Floor shall slope uniformly to floor drains where such occurs. All floors shall be steel troweled to a smooth dense finish.
 2. All exterior concrete surfaces shall have a broom or belt finish. All exterior steps shall have a non-slip finish.
 3. Floor slabs shall be placed to a Class A tolerance.

3.8 CURING AND PROTECTION

- A. Curing and protection shall be in accordance with Chapter 12, ACI 301 with the following additional requirements:
 1. Immediately after completion of concrete placement and finishing for concrete deck on precast plank, the concrete surface shall be wet cured only for multi-purpose room floor and kitchen floor receiving poured in place floor finish.

3.9 REPAIR OF SURFACE DEFECTS

- A. Repair of surface defects shall be in accordance with Chapter 9, ACI 301.

3.95 ARCHITECTURAL CONCRETE

- A. Architectural concrete shall be in accordance with Chapter 13, ACI 301.

END OF SECTION

SECTION 04100

MORTAR

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Mortar and grout for masonry.

1.2 RELATED WORK

- A. Section 04300 - Unit Masonry System: Installation of mortar and grout.

1.3 REFERENCES

- A. ASTM C5 - Quicklime for Structural Purposes.
- B. ASTM C91 - Masonry Cement.
- C. ASTM C94 - Ready-Mixed Concrete.
- D. ASTM C144 - Aggregate for Masonry Mortar.
- E. ASTM C150 - Portland Cement.
- F. ASTM C207 - Hydrated Lime for Masonry Purposes.
- G. ASTM C270 - Mortar for Unit Masonry.
- H. ASTM C387 - Packaged, Dry, Combined Materials, for Mortar and Concrete.
- I. ASTM C404 - Aggregates for Masonry Grout.
- J. ASTM C476 - Grout for Masonry.
- K. ASTM C595 - Blended Hydraulic Cement.
- L. ASTM C780 - Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
- M. ASTM C1019 - Method of Sampling and Testing Grout.
- N. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.4 SUBMITTALS

- A. Submit product data under provisions of Section 01300.
- B. Include design mix, indicate Proportion or Property method used, required environmental conditions, and admixture limitations.
- C. Samples: Submit two ribbons of mortar color, illustrating color and color range.
- D. Submit test reports on mortar indicating conformance to ASTM C270.
- E. Submit test reports on grout indicating conformance to ASTM C476.
- F. Submit manufacturer's certificate that products meet or exceed specified requirements.
- G. Submit premix mortar manufacturer's installation instructions under provisions of Section 01300.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01600.
- B. Store and protect products under provisions of Section 01600.
- C. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Cold Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

2. PART 2 PRODUCTS

2.1 MATERIALS

- A. Portland Cement: ASTM C150, Type I, gray color.
- B. Blended Cement: ASTM C595, Type.
- C. Masonry Cement: ASTM C91, Type M, S, and N.
- D. Mortar Aggregate: ASTM C144, standard masonry type.
- E. Hydrated Lime: ASTM C207.
- F. Quicklime: ASTM C5, non-hydraulic type.
- G. Premix Mortar: ASTM C387, using gray cement, Normal strength.
- H. Grout Aggregate: ASTM C404.

I. Water: Clean and potable.

2.2 MORTAR COLOR

A. Not Applicable.

2.3 ADMIXTURES

A. Water repellent additive for exterior decorative block masonry units.

2.4 MORTAR MIXES

A. Mortar for Load Bearing Walls and Partitions: ASTM C270, Type S using the Property Method.

B. Mortar for Non-load Bearing Walls and Partitions: ASTM C270, Type S using the Property Method.

C. Exterior Mortar Type S using the Property Method with a cement and lime composition.

2.5 MORTAR MIXING

A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C270.

B. Add mortar color in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.

C. Do not use anti-freeze compounds to lower the freezing point of mortar.

D. If water is lost by evaporation, retemper only within two hours of mixing.

E. Use mortar within two hours after mixing at temperatures of 80 degrees F (26 degrees C), or two-and-one-half hours at temperatures under 50 degrees F (10 degrees C).

2.6 GROUT MIXES

A. Masonry wall units: 3000 psi (21 MPa) strength at 28 days; 7-8 inches slump; premixed type in accordance with ASTM C94.

2.7 GROUT MIXING

A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and/or course grout as required.

B. Do not use anti-freeze compounds to lower the freezing point of grout.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Request inspection of spaces to be grouted.

3.2 PREPARATION

- A. Plug cleanout holes with block masonry units to prevent leakage of grout materials. Brace masonry for wet grout pressure.

3.3 INSTALLATION

- A. Install mortar in accordance with manufacturer's instructions as required to meet specifications.

3.4 GROUT INSTALLATION

- A. Install grout to requirements of the specific masonry Sections.
- B. Work grout into masonry cores and cavities to eliminate voids.
- C. Do not displace reinforcement while placing grout.
- D. Remove grout spaces of excess mortar.

END OF SECTION

SECTION 04300

UNIT MASONRY SYSTEM

I. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Concrete masonry.
- B. Reinforcement, anchorage, and accessories.

1.2 RELATED SECTIONS

- A. Section 01400 - Quality Control: Testing laboratory services.
- B. Section 04100 - Mortar: Mortar and grout.

1.3 REFERENCES

- A. ANSI/ASTM A82 - Cold-Drawn Steel Wire for Concrete Reinforcement.
- B. ANSI/ASTM C34 - Structural Clay Load Bearing Wall Tile.
- C. ANSI/ASTM C55 - Concrete Building Brick.
- D. ANSI/ASTM C56 - Structural Clay Non-Load Bearing Tile.
- E. ANSI/ASTM C73 - Calcium Silicate Face Brick (Sand-Lime Brick).
- F. ANSI/ASTM C126 - Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units.
- G. ANSI/ASTM C212 - Structural Clay Facing Tile.
- H. ANSI/ASTM C216 - Facing Brick (Solid Masonry Units Made From Clay or Shale).
- I. ANSI/ASTM C315 - Clay Flue Linings.
- J. ANSI/ASTM C530 - Structural Clay Non-Load Bearing Screen Tile.
- K. ANSI/ASTM C652 - Hollow Brick (Hollow Masonry Units Made From Clay or Shale).
- L. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

- M. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate.
- N. ASTM A525 - Steel Sheet, Zinc Coated, (Galvanized) by the Hot-Dip Process.
- O. ASTM A580 - Stainless and Heat-Resisting Steel Wire.
- P. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- Q. ASTM B370 - Copper Sheet and Strip for Building Construction.
- R. ASTM C27 - Fireclay and High-Aluminum Refractory Brick.
- S. ASTM C62 - Building Brick (Solid Masonry Units Made From Clay or Shale).
- T. ASTM C90 - Hollow Load Bearing Concrete Masonry Units.
- U. ASTM C129 - Non-Load Bearing Concrete Masonry Units.
- V. ASTM C145 - Solid Load Bearing Concrete Masonry Units.
- W. ASTM C744 - Prefaced Concrete and Calcium Silicate Masonry Units.
- X. ACI 530.1-92/ASCE 6-92/TMS 602-92 Specifications for Masonry Structures.
- Y. UL - Underwriters' Laboratories.

1.4 SUBMITTALS

- A. Submit product data under provisions of Section 01300.
- B. Submit product data for decorative prefaced masonry units, fabricated wire reinforcement and steel anchor and ties.
- C. Submit samples under provisions of Section 01300.
- D. Submit four samples of each decorative block and face brick units to illustrate color, texture and extremes of color range.
- E. Submit manufacturer's certificate under provisions of Section 01400 that products meet or exceed specified requirements.
- F. Submit manufacturer's installation instructions under provisions of Section 01300.

1.5 QUALIFICATIONS

- A. Installer: Company specializing in performing the work of this Section with minimum five (5) years documented experience.

1.6 REGULATORY REQUIREMENTS

- A. Conform to UL Assembly requirements for fire rated masonry construction.

1.7 PRE-INSTALLATION CONFERENCE

- A. Convene one week prior to commencing work of this Section.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01600.
- B. Store and protect products under provisions of Section 01600.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Cold and Hot Weather Requirements: ACI 530.1-92 Specifications for Masonry Structures.

2. PART 2 PRODUCTS

2.1 CONCRETE MASONRY UNITS

- A. Hollow Load Bearing Block Units: ASTM C90, Grade N, Type I - Moisture Controlled; Controlled normal weight and light weight.
- B. Solid Load Bearing Block Units: ASTM C145, Grade N, Type I - Moisture Controlled.
- C. Hollow Non-Load Bearing Block Units: ASTM C129, Type I - Moisture Controlled; normal weight.

2.3 REINFORCEMENT AND ANCHORAGE

- A. Single Wythe Joint Reinforcement: Ladder type; hot dip galvanized after fabrication cold-drawn steel conforming to ANSI/ASTM A82, 9 gage side rods with 9 gage cross ties.
- B. Multiple Wythe Joint Reinforcement with insulation: Ladder type, triangular 3/16 ties with restraint bar and vertical J bars.
- C. Reinforcing Steel: ASTM A615, 60 ksi yield grade, deformed billet bars, unprotected finish.
- D. Strap Anchors: bent steel shape, 1-1/4 x inch wide x 1/8 inch thick, galvanized to ASTM A123 G90 finish.
- E. Formed Steel Wire Wall Ties: 3/16" gage Thick, galvanized steel finish.
- F. Dovetail Anchors: Bent steel strap, 1-1/4 inch Size x 1/8 inch thick, galvanized to ASTM A123 G90 finish.

2.5 ACCESSORIES

- A. Cleaning Solutions: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Verify items provided by other Sections of work are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.
- D. Beginning of installation means installer accepts existing conditions.

3.2 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied to other Sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.3 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Lay concrete masonry units in running bond. Course one unit and one mortar joint to equal 8 inches. Form concave mortar joints.

3.4 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
- D. Remove excess mortar as Work progresses.
- E. Interlock intersections and external corners.

- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- E. Perform job site cutting of masonry units with proper tools to provide straight, clean, un-chipped edges. Prevent broken masonry unit corners or edges.

3.6 REINFORCEMENT AND ANCHORAGES - SINGLE WYTHE MASONRY

- A. Install horizontal joint reinforcement 16 inches o.c.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place joint reinforcement continuous in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches. Extend minimum 16 inches each side of openings.

3.7 REINFORCEMENT AND ANCHORAGES - REINFORCED UNIT MASONRY

- A. Install horizontal joint reinforcement 16 inches oc.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place joint reinforcement continuous in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches. Extend minimum 16 inches each side of openings.
- E. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- F. Embed anchors embedded in concrete or attached to structural steel members. Embed anchorages in every second block joint.

3.10 GROUTED COMPONENTS

- A. Reinforce bond beam with 2, No. 5bars, placed 1" above bottom web unless noted otherwise.
- B. Lap splices minimum 24 bar diameters.
- C. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- D. Place and consolidate grout fill without displacing reinforcing.
- E. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side

of opening.

3.11 ENGINEERED MASONRY

- A. Lay masonry units with core cells vertically aligned and cavities clear of mortar and unobstructed.
- B. Place mortar in masonry unit bed joints back 1/4 inch from edge of unit grout spaces, bevel back and upward. Permit mortar to cure 3 days before placing grout.
- C. Reinforce masonry unit cores and cavities with reinforcement bars and grout as indicated.
- D. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 6 feet. Splice reinforcement as noted on drawings.
- E. Wet masonry unit surfaces in contact with grout just prior to grout placement.
- F. Grout spaces less than 2 inches in width with fine grout using low lift grouting techniques. Grout spaces 2 inches or greater in width with course grout using high or low lift grouting techniques.
- G. When grouting is stopped for more than one hour, terminate grout 1-1/2 inch below top of upper masonry unit to form a positive key for subsequent grout placement.
- H. Low Lift Grouting: Place first lift of grout to a height of 16 inches and rod for grout consolidation. Place subsequent lifts in 8 inch increments and rod for grout consolidation.
- I. High Lift Grouting:
 - 1. Provide cleanout opening no less than 4 inches high at the bottom of each cell to be grouted by cutting one face shell of masonry unit.
 - 2. Clean out masonry cells and cavities with high pressure water spray. Permit complete water drainage.
 - 3. Request the Engineer to inspect the cells and cavities. Allow 3 days advance notice of inspection.
 - 4. After cleaning and cell inspection, seal openings with masonry units.
 - 5. Pump grout into spaces. Maintain water content in grout to intended slump without aggregate segregation.
 - 6. Limit grout lift to 48 inches and rod for grout consolidation. Wait 30 to 60 minutes before placing next lift.

3.13 BUILT-IN WORK

- A. As work progresses, build in anchor bolts and plates, and other items furnished by other Sections.
- B. Build in items plumb and level.

3.14 TOLERANCES

- A. Maximum Variation From Alignment of Columns and Pilasters: 1/4 inch.
- B. Maximum Variation From Unit to Adjacent Unit: 1/32 inch.
- C. Maximum Variation From Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.
- D. Maximum Variation From Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- E. Maximum Variation From Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.
- F. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.
- G. Maximum Variation From Cross Sectional Thickness of Walls: 1/4 inch.

3.15 CUTTING AND FITTING

- A. Cut and fit for chases, pipes, conduit, sleeves and grounds. Coordinate with other Sections of work to provide correct size, shape, and location.
- B. Obtain Engineer approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.16 CLEANING

- A. Clean work under provisions of Section 01700.
- B. Remove excess mortar and mortar smears.
- C. Replace defective mortar. Match adjacent work.
- D. Clean soiled surfaces with cleaning solution.
- E. Use non-metallic tools in cleaning operations.

3.17 PROTECTION OF FINISHED WORK

- A. Protect finished installation under provisions of Section 01500.
- B. Without damaging completed work, provide protective boards at exposed external corners which may be damaged by construction activities.

END OF SECTION

SECTION 04523

MASONRY ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Weep Systems:
 - 1. Hollow Core Masonry Units (CMU) as Single Wythe Walls:
 - a. Cavity Weep. (CV 5010)
 - 2. Steel Lintel:
 - a. Head Joint Weeps. (HJW 3845)

1.2 RELATED SECTIONS

- A. Section 043000 - Unit Masonry.

1.3 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM C 1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2008.
 - 2. ASTM D 1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2010.
 - 3. ASTM D 4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles; 1996 (2209).
 - 4. ASTM D 4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 1991 (2008).
 - 5. ASTM D 4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products; 2000 (2007).
 - 6. ASTM SEQ CHAPTER 1E 96/E 96M - Standard Test Methods for Water Vapor Transmission of Materials; 2005.
 - 7. ASTM E 2273 - Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies; 2003.
 - 8. ASTM G 154 - Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials; 2000a (2006).
- B. CAN/CGSB 148.1 No. 7.3 - Methods of Testing Geotextiles and Geomembranes Grab Tensile Test for Geotextiles; 1992.
- C. ICC-ES EG 114 - Low Temperature Flux.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Shop Drawings: Provide drawings of special joint conditions.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 5 year experience manufacturing similar products.

B. Installer Qualifications: Minimum 2 year experience installing similar products.

1.6 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to starting work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and Handling Requirements: Store materials in clean, dry, inside area in accordance with manufacturer's instructions. Protect materials from damage during handling and installation.

1.8 PROJECT CONDITIONS

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

1.9 SEQUENCING

A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.10 WARRANTY

A. Manufacturer Warranty: Submit manufacturer's standard 20 year limited warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Masonry Technology, Inc, which is located at: 24235 Electric St. P. O. Box 214; Cresco, IA 52136; Toll Free Tel: 800-879-3348; Tel: 563-547-1122; Fax: 563-547-1133; Email:[request info \(info@mtidry.com\)](mailto:request_info@mtidry.com); Web:www.mtidry.com

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 WEEP SYSTEMS FOR HOLLOW CORE MASONRY UNITS (CMU) AS SINGLE WYTHE WALLS

A. Cavity Weep (CV 5010):

1. Description: Forms the bottom side of the bed joint of mortar on the exterior face shell to create tunnels/ channels that reach from the outside surface of the exterior face shell into the open core of a single wythe (CMU) wall.
2. Materials: High impact polystyrene sheets, 0.024 inch (0.61 mm) thick, formed with corrugations.
 - a. Weep Legs: 2-1/4 inch (57 mm) wide at 9-1/2 inches (242 mm) on center.
 - b. Continuous Belt Width: 1 inch (25 mm).
 - c. Overall Width: 6 inches (152 mm).
 - d. Length: 25 feet (7.6 m).

- e. Squared - Channel Depth: 3/16 inch (4.76 mm).
- f. Color: Translucent.
- 3. Performance Criteria:
 - a. Fungi Resistance: No Growth; ASTM C 1338.
 - b. Ultra-violet (UV) Exposure: No Cracking, checking, crazing, erosion or other characteristics that might affect performance; ASTM G 154.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 VERIFICATION OF CONDITIONS

- A. Verify that field conditions are acceptable and are ready to receive this work.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for installation of this work.
- D. Interface with Other Work: Provide proper installation of other materials and work as required for a complete and properly functioning system.

3.4 WEEP SYSTEM INSTALLATION

- 1. Weep Systems for Hollow Core Masonry Units (CMU) as a Single Wythe Wall:
 - a. Cavity Weep (CV 5010) installed in conjunction with a through wall Z flashing system. Installed on the first course above a bond beam.
 - 1) Install Cavity Weep (CV 5010) on the lower horizontal surface of the Z flashing.
 - 2) Position Cavity Weep (CV 5010) with the back of the 1 inch (25 mm) continuous belt 1/2 inch (12 mm) from the vertical surface of the Z flashing and the 6 inches (152 mm) legs extending out from the exterior face of the wall.
 - 3) Cut down to the appropriate height Sure Cavity (SC 5016) or 10MM Sure Cavity (SCMM 2516) and install to the vertical surface of Z flashing trim 4 inches (102 mm) fabric skirt to overlay Cavity Weeps 1 inch (25 mm) continuous belt.
 - 4) Install mortar bed joint atop weep system and lay CMU.
 - 5) Tool joints and lightly score weep legs along face of CMU wall and crack off by pushing downward while mortar is still plastic.
 - 6) Finish-tool joints and brush wall.

END OF SECTION

SECTION 05120
STRUCTURAL STEEL

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Structural steel framing members.
- B. Baseplates.
- C. Grouting under baseplates.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 03300 - Concrete: Anchor bolts.

1.3 RELATED SECTIONS

- A. Section 05311 - Steel Roof Deck.
- B. Section 09900 - Painting.

1.4 REFERENCES

- A. ASTM A36 - Structural Steel.
- B. ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
- C. ASTM A123 - Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products.
- D. ASTM A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware.
- E. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.
- F. ASTM A325 - High Strength Bolts for Structural Steel Joints.
- G. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- H. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- I. ASTM A572 - High-Strength, Low-Alloy Columbium-Vanadium steels of structural quality.
- J. AWS A2.0 - Standard Welding Symbols.
- K. AWS D1.1 - Structural Welding Code.

- L. AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
- M. AISC - Specification for Architectural Exposed Structural Steel.
- N. SSPC - Steel Structures Painting Council.

1..5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, and locations of structural members.
 - 2. Connections.
 - 3. Indicate welded connections with AWS A2.0 welding symbols. Indicate net weld lengths.
 - 4. Anchor bolt layout plan.
- C. Manufacturer's Mill Certificate: Submit certification that products meet or exceed specified requirements.
- D. Mill Test Reports: Submit Manufacturer's Certificates, indicating structural strength, destructive and non-destructive test analysis.
- E. Bolt Certification: Submit Manufacturer's Certification that products meet or exceed specified requirements.
- F. Welders' Certificates: Submit Manufacturer's Certificates, certifying welders employed on the Work, verifying AWS qualifications within the previous 12 months.

1..6 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC\ Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

1..7 QUALIFICATIONS

- A. Design connections not detailed on the Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the Commonwealth of Pennsylvania.

2. PART 2 PRODUCTS

2..1 MATERIALS

- A. Structural Steel Members: ASTM A36, ASTM A572, Grade 50 and A992.
- B. Structural Tubing: ASTM A500, Grade C . ASTM A501.

- C. Pipe: ASTM A53, Grade B.
- D. Bolts, Nuts, and Washers: ASTM A325
- E. Anchor Bolts: ASTM A307.
- F. Welding Materials: AWS D1.1; type required for materials being welded.
- G. Shop and Touch-Up Primer: SSPC Paint 15, Type 1, red oxide.

2.2 FINISH

- A. Prepare structural component surfaces in accordance with SSPC SP-2.
- B. Shop prime structural steel members. Do not prime surfaces that will be in contact with high strength bolts. Coordinate primer compatibility requirements with finish painting.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means erector accepts existing conditions.

3.2 ERECTION

- A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- B. Field weld components indicated on Drawings.
- C. Do not field cut or alter structural members without approval of Engineer.
- D. After erection, prime welds, abrasions, and surfaces not shop primed galvanized, except surfaces to be in contact with concrete.

3.4 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION

SECTION 05313
STEEL FLOOR DECK

1. PART 1 GENERAL

1..1 SECTION INCLUDES

- A. Steel floor deck and accessories.
- B. Formed steel deck end forms to contain wet concrete.
- C. Framing for openings up to and including 18 inches.
- D. Bearing plates and angles.

1..2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 03300 - Concrete: Installation of anchors for bearing plates and angles cast in concrete.

1..3 RELATED SECTIONS

- A. Section 03300 - Cast-in-Place Concrete: Concrete topping over metal floor deck.
- B. Section 05120 - Structural Steel: Structural framed openings larger than 18 inches

1..4 REFERENCES

- A. AISI - Specification for the Design of Cold-Formed Steel Structural Members.
- B. ASTM A36 - Structural Steel.
- C. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality.
- D. ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- E. ASTM A525 - Steel Sheet, Zinc-Coated, Galvanized by the Hot-Dip Process.
- F. ASTM A611 - Steel, Cold-Rolled Sheet, Carbon, Structural.
- G. AWS D1.1 - Structural Welding Code.
- H. SDI - Design Manual for Composite Decks, Form Decks, Roof Decks.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate decking plan, support locations, projections, openings and reinforcement, outlet box locations, pertinent details, and accessories.
- C. Product Data: Provide deck profile characteristics and dimensions, structural properties and finishes.
- D. Manufacturer's Installation Instructions: Indicate specific installation sequence, special instructions, anchor procedures.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01600.
- B. Store and protect products under provisions of Section 01600.
- C. Cut plastic wrap to encourage ventilation.
- D. Separate sheets and store decking on dry wood sleepers; slope for positive drainage.

1.7 FIELD MEASUREMENTS

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

2. PART 2 PRODUCTS

2.1 MATERIALS

- A. Sheet Steel: ASTM A446, Grade B Structural Quality; with G60 galvanized coating conforming to ASTM A525.
- B. Bearing Plates and Angles: ASTM A36 steel, unfinished.
- C. Welding Materials: AWS D1.1.
- D. Touch-Up Primer: Red oxide type.

2.2 ACCESSORIES

- A. Flute Closures: Closed cell foam rubber, 1/2 inch thick; profiled to fit tight to the decking.

2.3 FABRICATION

- A. Composite Metal Deck Floor: Minimum 22 gage galvanized sheet steel, 1½" high, 36"

wide sheets, lapped edged and deformed ends for ventilation of concrete.

- B. Metal Closure Strips, Wet Concrete Stops, Cover Plates, and Related Accessories: 20 gage galvanized sheet steel; of profile and size as indicated or required.
- C. Fasteners: Galvanized hardened steel, self-tapping.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means installer accepts existing conditions.

3.2 INSTALLATION

- A. Erect metal decking in accordance with SDI Design Manual for Form Decks.
- B. Bear decking on steel supports with 3 inch minimum bearing. Align and level.
- C. Fasten deck to steel support members at ends and intermediate supports with mechanical fasteners as noted on drawings.
- D. Mechanically fasten male/female side laps at 24 inches oc maximum.
- E. Reinforce steel deck openings from 6 to 18 inches in size with 2 x 2 x 1/4 inch steel angles. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and mechanically attach to deck at each flute.
- F. Install 6 inch minimum wide sheet steel cover plates, of same thickness as decking, where deck changes direction. Mechanically fasten 12 inches oc maximum.
- G. To contain wet concrete, install stops at floor edge upturned to top surface of slab. Provide stops of sufficient strength to remain stationary without distortion.
- H. Install sheet steel closures and angle flashings to close openings between deck and walls, columns, and openings.
- I. Install single row of foam flute closures above walls and partitions perpendicular to deck flutes.

END OF SECTION

SECTION 05500

METAL FABRICATIONS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Shop fabricated metal lintels and bollards prime painted.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 03300 - Cast-In-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 04300 - Unit Masonry System : Placement of metal fabrications in masonry.

1.3 REFERENCES

- A. ASTM A36 - Structural Steel.
- B. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.
- C. ASTM A325 - High Strength Bolts for Structural Steel Joints.
- D. AWS A2.0 - Standard Welding Symbols.
- E. AWS D1.1 - Structural Welding Code.
- F. SSPC - Steel Structures Painting Council.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
- C. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

1.5 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on Drawings.

SECTION 05510

METAL STAIRS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Steel stair frame of structural sections, with closed risers.
- B. Pan to receive concrete fill stair treads and landings.
- C. Integral balusters and handrailing.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 03300 - Cast-In-Place Concrete: Placement of metal anchors in concrete.

1.3 RELATED SECTIONS

- A. Section 03300 - Cast-In-Place Concrete: Concrete fill in stair pans and landings; mesh reinforcement for landings.
- B. Section 05520 - Handrails and Railings: Handrails and balusters other than specified in this Section.

1.4 REFERENCES

- A. ANSI A117.1 - Buildings and Facilities - Providing Accessibility and Usability For Physically Handicapped People.
- B. ASTM A36 - Structural Steel.
- C. ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
- D. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- E. ASTM A202.1 - Metal Bar Grating Manual for Steel and Aluminum Gratings and Stair Treads.
- F. ASTM A283 - Carbon Steel Plates, Shapes, and Bars.
- G. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.
- H. ASTM A325 - High Strength Bolts for Structural Steel Joints.
- I. ASTM A386 - Zinc-Coating (Hot-Dip) on Assembled Steel Products.

- J. ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- K. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- L. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- M. AWS A2.0 - Standard Welding Symbols.
- N. AWS D1.1 - Structural Welding Code.
- O. SSPC - Steel Structures Painting Council.

1.5 DESIGN REQUIREMENTS

- A. Fabricate stair assembly to support live load of 100 lb/sq ft with deflection of stringer or landing framing not to exceed 1/360 of span.
- B. Railing assembly, wall rails, and attachments to resist lateral force of 200 lbs at any point without damage or permanent set.

1.6 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
- C. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

1.7 QUALIFICATIONS

- A. Prepare Shop Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the place where the Project is located.
- B. Welders' Certificates: Submit under provisions of Section 01300, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.8 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

2. PART 2 PRODUCTS

2.1 MATERIALS

- A. Steel Sections: ASTM A36.
- B. Steel Tubing: ASTM A500, Grade B.
- C. Plates: ASTM A283.
- D. Pipe: ASTM A53, Grade B Schedule 40.
- E. Sheet Steel: ASTM A446, Grade B Structural Quality with galvanized coating.
- F. Stair Treads: Concrete in metal pan; 2 inches deep; smooth surface.
- G. Concrete for Treads and Landings: Portland cement Type I, 3000 psi, 28 day strength, 2 to 3 inch slump.
- H. Tread and Landing Concrete Reinforcement: Mesh or bar type as required.
- I. Bolts, Nuts, and Washers: ASTM A307.
- J. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; consistent with design of stair structure.
- K. Welding Materials: AWS D1.1; type required for materials being welded.
- L. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

2..2 FABRICATION - GENERAL

- A. Fit and shop assemble in largest practical sections, for delivery to site.
- B. Fabricate components with joints tightly fitted and secured.
- C. Continuously seal jointed pieces by intermittent welds and plastic filler.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- G. Accurately form components required for anchorage of stairs, landings and railings to each other and to building structure.

2..3 FABRICATION - PAN STAIRS AND LANDINGS

- A. Fabricate stairs and landings with closed risers and treads of metal pan construction, ready

to receive concrete.

- B. Form treads and risers with minimum 14 gage sheet steel stock.
- C. Secure tread pans to stringers with clip angles; welded in place.
- D. Form stringers with rolled steel channels, 12 inches deep.
- E. Form landings with minimum 12 gage thick sheet stock. Reinforce underside with angles to attain design load requirements.
- F. Form balusters with 1/2 inch square steel sections, welded to stringers.
- G. Prime paint all components.

2..4 FINISHES

- A. Prepare surfaces to be primed in accordance with SSPC SP 2.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Prime paint items with one coat.

3. PART 3 EXECUTION

3..1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means erector accepts existing conditions.

3..2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be embedded into concrete with setting templates, to appropriate sections.

3..3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide anchors, plates, angles, hangers and struts required for connecting stairs to structure.
- C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. Field weld components indicated on shop drawings. Perform field welding in accordance

with AWS D1.1.

- E. Field bolt and weld to match shop bolting and welding. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- F. Mechanically fasten joints butted tight, flush, and hairline. Grind welds smooth and flush.
- G. Obtain Engineer approval prior to site cutting or making adjustments not scheduled.
- H. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.4 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION



SECTION 05520

HANDRAILS AND RAILINGS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Steel handrails, balusters, and fittings.

1.2 RELATED SECTIONS

- A. Section 05510 - Metal Stairs: Handrails other than specified in this Section.
- B. Section 09900 - Painting: Paint finish.
- C. ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
- D. ASTM A386 - Zinc-Coating (Hot-Dip) on Assembled Steel Products.
- E. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- F. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- G. ASTM B211 - Aluminum-Alloy Bars, Rods, and Wire.
- H. ASTM B221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
- I. ASTM B241 - Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.
- J. ASTM B483 - Aluminum and Aluminum-Alloy Drawn Tubes for General Purpose Applications.
- K. SSPC - Steel Structures Painting Council.

1.3 DESIGN REQUIREMENTS

- A. Railing assembly, wall rails, and attachments to resist lateral force of 200 lbs at any point without damage or permanent set.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

1..5 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

2. PART 2 PRODUCTS

2..1 STEEL RAILING SYSTEM

- A. Pipe: ASTM A53, Grade B Schedule 40
- B. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.
- C. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

2..2 FABRICATION

- A. Fit and shop assemble components in largest practical sizes, for delivery to site.
- B. Fabricate components with joints tightly fitted and secured.
- C. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- E. Continuously seal joined pieces by intermittent welds and plastic filler.
- F. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- G. Accurately form components to suit stairs and landings, to each other and to building structure.

3. PART 3 EXECUTION

3..1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means erector accepts existing conditions.

3..2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete and/or embedded in masonry with setting templates, to appropriate Sections.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects.
- C. Provide anchors, plates and angles required for connecting railings to structure. Anchor railing to structure.
- D. Field weld anchors as indicated on shop drawings. Touch-up welds with primer. Grind welds smooth.
- E. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.4 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch .

END OF SECTION

SECTION 61063

EXTERIOR ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Elevated deck including wood bridge decking, railings and support framing.

B. Related Sections:

- 1. Section 61323 "Heavy Timber Construction".

1.3 DEFINITIONS

- A. Boards: Lumber of less than 2 inches nominal (38 mm actual) in thickness and 2 inches nominal (38 mm actual) or greater width.
- B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.
- C. Timber: Lumber of 5 inches nominal (114 mm actual) or greater in least dimension.
- D. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NLGA: National Lumber Grades Authority.
 - 3. RIS: Redwood Inspection Service.
 - 4. SPIB: The Southern Pine Inspection Bureau.
 - 5. WCLIB: West Coast Lumber Inspection Bureau.
 - 6. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

- A. Product Data: For preservative-treated wood products and metal framing anchors.
 - 1. For preservative-treated wood products, include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
 - 2. For metal framing anchors, include installation instructions.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. For lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by ALSC's Board of Review.
2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.

B. Certificates of Inspection: Issued by lumber grading agency for exposed wood products not marked with grade stamp.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials under cover and protected from weather and contact with damp or wet surfaces. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

B. Handle and store plastic lumber to comply with manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

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

1. Factory mark each item 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 wood products.
3. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 DIMENSION LUMBER

A. Maximum Moisture Content: 15 percent for 2-inch nominal (38- mm actual) thickness or less; 19 percent for more than 2-inch nominal (38-mm actual) thickness.

B. Exposed Lumber: Provide material hand selected for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.

C. Deck Framing: No. 1 any of the following species:

1. Southern pine; SPIB.
 2. Douglas fir-larch; WCLIB or WWPA.
- D. Dimension Lumber Posts: No. 1 grade and of the following species:
1. Douglas fir-larch, Douglas fir-larch (North), or Douglas fir-south; NLGA, WCLIB, or WWPA.
- 2.3 Southern pine; SPIB.PRESERVATIVE TREATMENT
- A. Pressure treat boards and dimension lumber with waterborne preservative according to AWPA C2.
1. Pressure treat timber with waterborne preservative according to AWPA C15 requirements for "sawn building poles and posts as structural members."
- 2.4 FASTENERS
- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.
1. Use **stainless steel** unless otherwise indicated.
 2. For pressure-preservative-treated wood, use stainless-steel fasteners.
- B. Power-Driven Fasteners: NES NER-272.
- C. Wood Screws: ASME B18.6.1.
- D. Lag Screws: ASME B18.2.1 (ASME B18.2.3.8M).
- E. Stainless-Steel Bolts: ASTM F 593, Alloy Group 1 or 2 (ASTM F 738M, Grade A1 or A4); with ASTM F 594, Alloy Group 1 or 2 (ASTM F 836M, Grade A1 or A4) hex nuts and, where indicated, flat washers.
- F. Post installed Anchors: Stainless-steel, **chemical** anchors with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies 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 and inspecting agency.
- 2.5 Stainless-steel bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).METAL FRAMING ANCHORS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Products: Subject to compliance with requirements, provide product name or designation or comparable products by one of the following:
1. Simpson Strong-Tie Co., Inc.
 2. USP Structural Connectors.
- C. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of basis-of-design products. Manufacturer's published

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

- D. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G90 (Z270) coating designation.
- E. Stainless-Steel Sheet: ASTM A 666, **Type 304**.
- F. Joist Hangers: U-shaped, with 2-inch- (50-mm-) long seat and 1-1/4-inch- (32-mm-) wide nailing flanges at least 85 percent of joist depth.
- G. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION, GENERAL

- A. Set exterior rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit exterior rough carpentry to other construction; scribe and cope as needed for accurate fit.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction" unless otherwise indicated.
- C. Install wood decking with crown up (bark side down).
- D. Secure decking to framing with flush decking fasteners.
- E. Install metal framing anchors to comply with manufacturer's written instructions.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- H. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with

function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

- I. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
- J. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

END OF SECTION

SECTION 07212
BOARD INSULATION

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Board insulation at perimeter foundation wall.

1.2 RELATED SECTIONS

- A. Section 04330 - Unit Masonry.

1.3 REFERENCES

- A. ANSI/ASTM D2842 - Water Absorption of Rigid Cellular Plastics.
- B. ASTM C240 - Testing Cellular Glass Insulating Block.
- C. ASTM C578 - Preformed Cellular Polystyrene Thermal Insulation.
- D. ASTM E96 - Test Methods for Water Vapor Transmission of Materials.
- E. FS HH-I-530 - Insulation Board, Thermal, Unfaced, Polyurethane or Polyisocyanurate.
- F. FS HH-I-551 - Insulation Block and Boards, Thermal (Cellular Glass).
- G. FS HH-I-1972/GEN - Insulation Board, Thermal, Faced, Polyurethane or Polyisocyanurate.

1.4 PERFORMANCE REQUIREMENTS

- A. Materials of this Section shall provide continuity of thermal barrier at building enclosure elements.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide data on product characteristics, performance criteria, and limitations.
- C. Manufacturer's Installation Instructions: Indicate special environmental conditions required for installation and installation techniques.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.6 ENVIRONMENTAL REQUIREMENTS

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

2. PART 2 PRODUCTS

2.1 MANUFACTURER - INSULATION MATERIALS

- A. Dow Chemical Company - Product Styrofoam Brand Insulation.

2.2 INSULATION MATERIALS

- A. Polystyrene Insulation Type A: Extruded cellular type, conforming to the following:

Thermal Resistance	R of 5.0 per inch thickness
Thickness	Thickness indicated
Compressive Strength	Minimum 40
Water Absorption	In accordance with ANSI/ASTM D2842 0.3 percent by volume maximum
Style	Square Edge

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation boards are dry and ready to receive insulation and adhesive.
- B. Verify substrate surface is flat and free of materials or substances that may impede adhesive bond.

3.2 INSTALLATION - FOUNDATION PERIMETER

- A. Adhere boards to foundation wall. Place boards in a method to maximize contact bedding. Stagger joints. Butt edges and ends tight to adjacent board and to protrusions.

3.3 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Section 01500
- B. Do not permit Work to be damaged prior to covering insulation.

3.4 SCHEDULES

- A. Perimeter Insulation - Type A, extruded polystyrene.

END OF SECTION

SECTION 07213

PRE-ENGINEERED BUILDING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pre-Engineered Building Insulation for existing pre-engineered building and for Outdoor Paint Room Building.

1.2 RELATED SECTIONS AND WORK

- A. Section 13121 – Outdoor Paint Room Building.

1.3 REFERENCES

- A. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. ASTM E 96 - Standard Test Method for Water Vapor Transmission of Materials in Sheet Form (Procedure B).
- C. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- D. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- E. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
- F. ASTM C 1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.

1.4 DESIGN REQUIREMENTS

- A. Thermal Resistance of Installed System: R-Value of 30 (roof) and 19 (wall).
- B. Insulating system shall have a continuous vapor barrier inside of building purlins, girts, and insulation to provide complete isolation from inside conditioned air.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.

3. Installation instructions.
- C. Shop Drawings: Indicate locations of connections and attachments, general details, anchorages and method of anchorage and installation.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing product systems specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing work of this section.
- C. Insulation system components to include a five-year material warranty.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products indoors and protect from moisture, construction traffic, and damage.

1.8 PROJECT CONDITIONS

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

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Thermal Design, Inc., Bay Insulation or approved equal.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 MATERIALS

- A. Insulation System consisting of Batt Insulation, Roof Insulation, Wall Insulation, Vapor Barrier Liner Fabric, Thermal Breaks, Straps, and other devices and components in a proprietary insulation system as follows:
 1. Roof Insulation: Fiberglass batt or fiberglass blanket complying with ASTM C 665 and ASTM E 84 with a thermal resistance and thickness as follows:
 - a. R-30; 9-1/2 inches (241 mm), 6 inches (152 mm) plus 3-1/2 inches (89 mm) (two layers).
 2. Wall Insulation: Fiberglass blanket or batt complying with ASTM C 665 and ASTM E 84 with a thermal resistance and thickness as follows:
 - a. R-19; 6 inches (152 mm).
 3. Vapor Barrier Liner Fabric: Lamtec WMP-VR-R Plus (Gym Guard) woven, reinforced, high-density fiberglass yarns coated on both sides with a

continuous white metalized polyethylene coatings, as follows:

- a. Product complies with ASTM C 1136, Types I through Type VI.
 - b. Perm rating: 0.02 for fabric and for seams in accordance with ASTM E 96.
 - c. Flame/Smoke Properties:
 - 1) 25/50 in accordance with ASTM E 84.
 - 2) Self-extinguishes with field test using matches or butane lighter.
 - d. Ultra violet radiation inhibitor to minimum UVMAX® rating of 8.
 - e. Size and seaming: Manufactured in large custom pieces by extrusion welding from roll goods, and fabricated to substantially fit defined building area with minimum practicable job site sealing.
 - f. Factory-folded to allow for rapid installation.
 - g. Color:
 - 1) White.
4. Vapor Barrier Lap Sealant: Solvent-based, Simple Saver polyethylene fabric adhesive.
 5. Vapor Barrier Tape: Double-sided sealant tape 3/4 inch (19 mm) wide by 1/32 inch (.79 mm) thick.
 6. Vapor Barrier Patch Tape: Single-sided, adhesive backed sealant tape 3 inches (76 mm) wide made from same material as liner fabric.
 7. Thermal Breaks:
 - a. 1/8 inch (3 mm) thick by 3 inch (76 mm) wide white, closed-cell polyethylene foam with pre-applied adhesive film and peel-off backing.
 - b. Polystyrene Snap-R snap-on thermal blocks.
 8. Straps:
 - a. 100 KSI minimum yield tempered, high-tensile-strength steel.
 - b. Size: Not less than 0.020 inch (0.50 mm) thick by 1 inch (25 mm) by continuous length.
 - c. Galvanized, primed, and painted to match specified finish color on the exposed side.
 - d. Color:
 - 1) White.
 9. Fasteners:
 - a. For light gage steel: #12 by 3/4 (19 mm) inch plated Tek 2 type screws with sealing washer, painted to match specified color.
 - b. For heavy gage steel: #12 by 1-1/2 inch (38 mm) plated Tek 4 type screws with sealing washer, painted to match specified color.
 - c. For wood, concrete, other materials: As recommended by manufacturer.
 10. Wall Insulation Hangers: Fast-R preformed rigid hangers, 32 inch (813 mm) long galvanized steel strips with barbed arrows every 8 inches (203 mm) along its length.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that building structure including all bracing and any concealed building systems are completed and approved prior to installing liner system and insulation in the structure.

- B. Correct any unsatisfactory conditions before proceeding.
- C. If conditions are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 INSTALLATION - GENERAL

- A. Install pre-engineered building insulation system in accordance with manufacturer's installation instructions and the approved shop drawings.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Install in exterior spaces without gaps or voids. Do not compress insulation.
- D. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- E. Fit insulation tight in spaces and tight to exterior side of the sealed liner fabric and around mechanical and electrical services within plane of insulation.

3.3 ROOF INSULATION INSTALLATION

- A. Straps:
 - 1. Cut straps to length and install in the pattern and spacings indicated on shop drawings.
 - 2. Tension straps to required value.
- B. Vapor Barrier Fabric:
 - 1. Install vapor barrier fabric in large one-piece custom fabricated pieces to substantially fit defined building areas with minimum practicable job site sealing.
 - 2. Position pre-folded fabric on the strap platform along one eave purlin.
 - 3. Clamp the two bottom corners at the eave and also centered on the bay.
 - 4. Pull the other end of the pleat-folded fabric across the building width on the strap platform, pausing only at the ridge to fasten the straps and fabric in position where plane of roof changes and to release temporary fasteners on the opposite ridge purlins.
 - 5. Once positioned, install fasteners from the bottom side at each strap/purlins intersection.
 - 6. Trim edges and seal along the rafters.
 - 7. All seams must be completely sealed and stapled seams not acceptable.
- C. Insulation:
 - 1. Unpack, and shake to a thickness exceeding the specified thickness.
 - 2. Ensure that cavities are filled completely with insulation.
 - 3. Place on the vapor barrier liner fabric without voids or gaps.
 - 4. Place top layer of insulation over and perpendicular to the purlins without voids or gaps, as roof sheathing is applied.
 - 5. Place thermal block on top of purlins or bottom of purlins for retrofit work, if no other thermal break exists.

6. Place new insulation between purlins at the required thickness for the R-value specified.
- D. Seal vapor barrier fabric to the wall fabric and elsewhere as required to provide a continuous vapor barrier.

3.4 WALL INSULATION INSTALLATION

- A. Insulation:
 1. Install thermal break to exterior surface of girts as wall sheathing is applied.
 2. Position and secure Fast-R hangers to girts on the inside face of the wall sheathing.
 3. Cut insulation to required lengths to fit vertically between girts.
 4. Fluff the insulation to the full-specified thickness.
 5. Neatly position in place and secure to Fast-R hangers.
 6. Ensure that cavities are filled completely with insulation.

3.5 CLEANING

- A. Clean dirt or exposed sealant from the exposed vapor barrier fabric.
- B. Remove scraps and debris from the site.

3.6 PROTECTION

- A. Protect system products until completion of installation.
- B. Repair or replace damaged products before completion of insulation system installation.

3.7 SCHEDULE

- A. Ceiling Insulation general: R-30.
- B. Wall Insulation: R-19.

END OF SECTION



SECTION 07900

JOINT SEALERS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Throughout the Work, seal and caulk joints where shown on the Drawings and elsewhere as required to provide a positive barrier against passage of moisture and passage of air.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01300.
- B. Product data:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's Specifications and other data needed to prove compliance with the specified requirements;
 - 3. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01600.
- B. Do not retain at the job site material which has exceeded the shelf life recommended by its manufacturer.

PART 2 - PRODUCTS

2.1 SEALANTS

- A. Provide the following materials manufactured by Sonneborn Building Products, or equals approved in advance by the Engineer, where indicated and where otherwise required for a complete and proper installation.

Material:

Location of use:

1. Dow Corning 795
Silicone Building Sealant

EIFS panels at perimeter, joints and aluminum windows, walls, and existing door assembly and glazing.

2. Sonolastic NP I

Throughout the Work, except where other sealant is specified, where anticipated joint movement will be 25% or less;

3. Sonolastic NP II

Throughout the Work, except where other sealant is specified, where anticipated joint movement will be 50% or less;

4. Sonolastic Paving Joint
Sealant

Horizontal joints exposed to pedestrian and vehicular traffic, and all joints subject to immersion;

Where required to prevent 3-point adhesion.

5. Sonofoam Backer-Rod

B. For other services, provide products especially formulated for the proposed use and approved in advance by the Engineer.

C. Colors:

1. Colors for each sealant installation will be selected by the Engineer from standard colors normally available from the specified manufacturer.
2. Should such standard color not be available from the approved manufacturer except at additional charge, provide such colors at no additional charge.
3. In concealed installations, and in partially or fully exposed installations where so approved by the Engineer, use standard gray or black sealant.

2.2 PRIMERS

A. Use only those primers which have been treated for durability on the surfaces to be sealed and are specifically recommended for this installation by the manufacturer of the sealant used.

2.3 BACKUP MATERIALS

A. Use only those backup materials which are specifically recommended for this installation by the manufacturer of the sealant used, which are non-absorbent, and which are non-staining.

2.4 MASKING TAPE

A. For masking around joints, provide an appropriate masking tape which will effectively prevent application of sealant on surfaces not scheduled to receive it, and which is removable without damage to substrate.

2.5 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. Concrete and ceramic tile surfaces:
 - 1. Install only on surfaces which are dry, sound, and well brushed, wiping free from dust.
 - 2. At open joints, remove dust by mechanically blown compressed air if so required.
 - 3. To remove oil and grease, use sandblasting or wire brushing.
 - 4. Where surfaces have been treated, remove the surface treatment by sandblasting or wire brushing.
 - 5. Remove laitance and mortar from joint cavities.
- B. Steel surfaces:
 - 1. Steel surfaces in contact with sealant:
 - a. Sandblast as required to achieve acceptable surface for bond.
 - b. If sandblasting is not practical, or would damage adjacent finish, scrape the metal or wire brush to remove mill scale and rust.
 - c. Use solvent to remove oil and grease, wiping the surfaces with clean white rags only.
 - 2. Use only such solvents to remove protective coatings as are recommended for that purpose by the manufacturer of the aluminum work, and which are non-staining.

3.3 INSTALLATION OF BACK MATERIAL

- A. When using backup of tube or rod stock, avoid lengthwise stretching of the material. Do not twist or braid hose or rod backup stock.
- B. Installation tool:
 - 1. For installation of backup material, provide a blunt-surfaced tool of wood or plastic, having shoulders designed to ride on the adjacent finished surface and a protrusion of the required dimensions to assure uniform depth of backup material below the sealant.
 - 2. Do not, under any circumstances, use a screwdriver or similar tool for this purpose.
 - 3. Using the approved tool, smoothly and uniformly place the backup material to the depth indicated on the Drawings or otherwise required, compressing the backup material 25% to 50% and securing a positive fit.

3.4 PRIMING

- A. Use only the primer approved by the Engineer for the particular installation, applying in strict accordance with the manufacturer's recommendations as approved by the Engineer.

3.5 BOND-BREAKER INSTALLATION

- A. Provide an approved bond-breaker where recommended by the manufacturer of the sealant, and where directed by the Engineer, adhering strictly to the manufacturers' installation recommendations.

3.6 INSTALLATION OF SEALANTS

- A. Prior to start of installation in each joint, verify the joint type according to details on the Drawings, or as otherwise directed by the Engineer, and verify that the required proportion of width of joint to depth of joint has been secured.
- B. Equipment:
 - 1. Apply sealant under pressure with power-actuated hand gun or manually-operated hand gun, or by other appropriate means.
 - 2. Use guns with nozzle of proper size, and providing sufficient pressure to completely fill the joints as designed.
- C. Thoroughly and completely mask joints where the appearance of primer or sealant on adjacent surfaces would be objectionable.
- D. Install the sealant in strict accordance with the manufacturer's recommendations, thoroughly filling joints to the recommended depth.
- E. Tool joints to the profile shown on the Drawings, or as otherwise required if such profiles are not shown on the Drawings.
- F. Cleaning up:
 - 1. Remove masking tape immediately after joints have been tooled.
 - 2. Clean adjacent surfaces free from sealant as the installation progresses, using solvent or cleaning agent recommended by the manufacturer of the sealant used.
 - 3. Upon completion of the work of this Section, promptly remove from the job site all debris, empty containers, and surplus material derived from this portion of the Work.

END OF SECTION

SECTION 08111

STANDARD STEEL DOORS AND FRAMES

1. PART 1 GENERAL

1.1 WORK INCLUDED

- A. Non-rated rolled steel doors and frames.
- B. Interior light frames.

1.2 RELATED WORK

- A. Section 08710 - Hardware.
- B. Section 08800 - Glazing.
- C. Section 09900 - Painting: Field painting of doors and frames.

1.3 REFERENCES

- A. ASTM E152 - Methods of Fire Tests of Door Assemblies.
- B. DHI - Door Hardware Institute: The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
- C. NFPA 80 - Fire Doors and Windows.
- D. NFPA 252 - Fire Tests for Door Assemblies.
- E. SDI-100 - Standard Steel Doors and Frames.
- F. SDI-105 - Recommended Erection Instructions for Steel Frames.
- G. UL 10B - Fire Tests of Door Assemblies.

1.4 QUALITY ASSURANCE

- A. Conform to requirements of SDI-100.

1.5 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01300.
- B. Indicate frame configuration, anchor types and spacings, location of cutouts for hardware, reinforcement, and finish.
- C. Indicate door elevations, internal reinforcement, closure method, and cut outs for glazing.

- D. Submit manufacturer's installation instructions under provisions of Section 01300.

1.6 DELIVERY, STORAGE AND PROTECTION

- A. Protect products under provisions of Section 01600.
- B. Protect doors with resilient packaging sealed with heat shrunk plastic.
- C. Break seal on-site to permit ventilation.

2. PART 2 PRODUCTS

2.1 DOORS AND FRAMES

- A. Exterior Doors: SDI-100 Grade III Model 2. Galvanized.
- B. Interior Doors: SDI-100 Grade II Model 2.
- C. Exterior Frames: 16 gage material, Galvanized.
- D. Interior Frames: 16 gage material.

2.2 DOOR CORE

- A. Core: Impregnated cardboard honeycomb, interior and Polyurethane insulation, exterior.
- B. Insulated door insulation value of R-16.

2.3 ACCESSORIES

- A. Rubber Silencers Resilient rubber.
- B. Glazing Stops: Rolled steel channel shape, butted or mitered corners; prepared for countersink style screws.

2.4 PROTECTIVE COATINGS

- A. Bituminous Coating: Fibered asphalt emulsion.
- B. Primer: Zinc chromate type.

2.5 FABRICATION

- A. Fabricate frames for knock down field assembly type.
- B. Fabricate frames and doors with hardware reinforcement plates welded in place.
- C. Prepare frame for silencers. Provide three single rubber silencers for single doors on strike side, and two single silencers on frame head at double doors without mullions.

- D. Attach fire rated label to each frame and door unit.
- E. Close top edge of exterior door flush with inverted steel channel closure. Seal joints watertight.

2..6 FINISH

- A. Interior Units: primed.
- B. Exterior Units: 0.60 oz/sq ft galvanized and primed.
- C. Primer: Baked on.

3. PART 3 EXECUTION

3..1 INSTALLATION

- A. Install frames in accordance with SDI-105.
- B. Install doors in accordance with DHI.
- C. Coordinate with wall construction for anchor placement.
- D. Coordinate installation of glass and glazing.

3..2 TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3..3 ADJUSTING AND CLEANING

- A. Adjust hardware for smooth and balanced door movement.

END OF SECTION

SECTION 08360
OVERHEAD DOORS

1. PART 1 GENERAL

1..1 SECTION INCLUDES

- A. Motor operated sectional overhead doors, with accessories and components.

1..2 RELATED SECTIONS

- A. Section 09900 – Painting.
- B. Section 05500 – Metal Fabrications.
- C. Section 04300 – Unit Masonry Systems.
- D. Section 13121 – Outdoor Paint Room Building.

1..3 REFERENCES

- A. ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors; 1996.
- B. ASTM A 229/A 229M - Standard Specification for Steel Wire, Oil-Tempered for Mechanical Springs; 1993.
- C. ASTM A 653/A 653M - Standard Specification for Steel Sheets, Zinc-coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process; 1997.
- D. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- E. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference; 1996.
- F. IBC 2003.

1..4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's specifications and technical literature.
- C. Shop Drawings: Drawings of openings, showing locations of track anchors and other supports.
- D. Operation and Maintenance Data.

1..5 QUALITY ASSURANCE

- A. Installer Qualifications: Authorized by manufacturer.

1.6 WARRANTY

- A. Provide manufacturer's standard seven-year warranty against separation/degradation of the polyurethane foam from the steel skin of the panel. Standard manufacturer's ten-year warranty against cracking, splitting or deterioration due to rust-through.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Sectional Overhead Doors: Provide products manufactured by Cornell, only alternate equal may be submitted as open end alternate by Contractor.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 SECTIONAL OVERHEAD DOORS

- A. Rolling Overhead Doors: Thermiser Max Model ES D30 panels with roll-formed internal struts with polypropylene rib caps to provide thermal break; end caps to provide tight seal at jambs; and hardware plates at all fastener points.
 - 1. Complying with ANSI/DASMA 102 requirements for commercial doors.
 - 2. Wind Load Performance: Withstanding 20 psf external pressure and 12 psf internal pressure when tested in accordance with ASTM E 330.
 - 3. Insulation: Foamed-in-place high density polyurethane core with flamespread of 10 and smoke density of 210 when measured in accordance with ASTM E 84.
 - 4. Finish: Baked-on polyester primer and finish coat.
 - 5. Panel Design: Flush.
 - 6. Thermal Resistance: Calculated "R" value of 8.
 - 7. Zinc Coating: Z275 galvanized, before finishing.
 - 8. Color: Grey.
- B. Components
 - 1. Tracks: Graduated wedge type weathertight design, with mounting brackets.
 - a. Material: 16 gage, 0.06 inch, galvanized steel sheet, ASTM A 653/A 653M, Z120 hot-dipped zinc-aluminum coating.

- b. Depth: 3 inches.
- 2. Hardware
 - a. Hinges: Hot-dipped galvanized steel.
 - b. Track Rollers: Steel, with case-hardened inner steel races and 10 ball bearings.
 - c. Weatherstripping: Rubber head seal, panel joint seals, and compressible U-shaped PVC bottom seal mounted in aluminum retainer.
- 3. Counterbalances: Spring torsion type capable of supporting entire door weight, made of ASTM A 229/A 229M oil-tempered steel wire.
 - a. Performance: Minimum of 100,000 cycles.
 - b. Spring Fittings and Drums: Die-cast high strength aluminum.
 - c. Cables: Preformed galvanized steel aircraft cables with minimum safety factor of 5 to 1.
- 4. Electrical operator – As required.
 - a. Operation – motor with chain hoist.
 - b. 120 volt, ½ hp motor.
 - c. Controlled from interior and exterior wall at door location
- 5. Locks: Rim cylinder and locking bar, operable from outside and inside.

3. PART 3 EXECUTION

3.1 EXAMINATION

- A. Before beginning work, verify that openings have been properly prepared.

3.2 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and standards. Installation shall be by an authorized representative.
- B. Verify that existing conditions are ready to receive sectional overhead door work.
- C. Beginning of sectional overhead door work means acceptance of existing conditions.
- D. Install door complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports in accordance with final shop drawings, manufacturer's instructions, and as specified herein.

- E. Fit, align and adjust sectional overhead door assemblies level and plumb for smooth operation.
- F. Upon completion of final installation lubricate, test and adjust doors to operate easily, free from warp, twist or distortion and fitting for entire perimeter.

3..3 MAINTENANCE

- A. Provide cleaning instructions per manufacturers recommendation.
- B. Provide maintenance instructions per manufacturers recommendation.
- C. Provide one (1) year maintenance of door systems.

END OF SECTION

SECTION 08410

ALUMINUM ENTRANCES AND WINDOWS

I. PART 1 GENERAL

1..1 WORK INCLUDED

- A. Aluminum doors, frames and glazed lights.
- B. Fixed Windows.
- C. Glass.
- D. Anchors, brackets, and attachments.
- E. Door hardware.
- F. Perimeter sealant.

1..2 WORK INSTALLED BUT FURNISHED UNDER OTHER SECTIONS

- A. Section 08710 - Hardware: Door hardware items other than specified in this Section.

1..3 RELATED WORK

- A. Section 04300 - Unit Masonry System: Preparation of adjacent work to receive work of this Section.
- B. Section 05500 - Metal Fabrications: Fabricated metal attachment devices.
- C. Section 06100 - Rough Carpentry: Framed blocking and Wood perimeter shims.
- D. Section 07900 - Joint Sealers: Perimeter sealant and back-up materials.
- E. Section 08800 - Glazing.

1..4 REFERENCES

- A. ANSI/ASTM A36 - Structural Steel.
- B. ANSI/ASTM A386 - Zinc Coating (Hot-Dip) on Assembled Steel Products.
- C. ANSI/ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- D. ANSI/ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.

- E. ANSI/ASTM E283 - Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors.
- F. ANSI/ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- G. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
- H. FS TT-P-31-Paint, Oil: Iron Oxide, Ready Mixed, Red and Brown.
- I. FS TT-P-641 - Primer Coating; Zinc Dust-Zinc Oxide (for Galvanized Surfaces).
- J. FS TT-P-645 - Primer, Paint, Zinc Chromate, Alkyd Type.

1..5 PERFORMANCE

- A. System to provide for expansion and contraction within system components caused by a cycling temperature range of 170 F degrees without causing detrimental effects to system or components.
- B. Design and size members to withstand dead loads and live loads caused by pressure and suction of wind as calculated in accordance with BOCA code.
- C. Limit mullion deflection to 1/200, or flexure limit of glass with full recovery of glazing materials, whichever is less.
- D. Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior.
- E. Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of assembly surface area, measured at a reference differential pressure across assembly of 0.3 inches water gage as measured in accordance with ANSI/ASTM E283.
- F. System to accommodate, without damage to system or components, or deterioration of perimeter seal: Movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing.

1..6 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01300.
- B. Include system and component dimensions; components within assembly; framed opening requirements and tolerances; anchorage and fasteners; glass and infills; door hardware requirements; and affected related work.
- C. Submit manufacturer's installation instructions under provisions of Section 01300.
- D. Submit samples under provisions of Section 01300.

- E. Submit samples, illustrating prefinished aluminum surface and specified glass.

1..7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and handle system components under provisions of Section 01600.
- B. Store and protect system components under provisions of Section 01600.
- C. Provide wrapping to protect prefinished aluminum surfaces.

1..8 WARRANTY

- A. Provide five year manufacturer's warranty under provisions of Section 01700.
- B. Warranty: Cover complete system for failure to meet specified requirements.

2. PART 2 PRODUCTS

2..1 ACCEPTABLE MANUFACTURERS

- A. Kawneer 350 Series -Wide Style Door and TriFab 450T Style Frames or equivalent manufactured by Amarlite and YKK.
- B. Substitutions: Under provisions of Section 01600.

2..2 MATERIALS

- A. Extruded Aluminum: ANSI/ASTM B221.
- B. Sheet Aluminum: ASTM B209.
- C. Sheet Steel: ANSI/ASTM A446; galvanized.
- D. Steel Sections: ANSI/ASTM A36 shapes to suit mullion sections.
- E. Primer: FS TT-P-31; brown, for shop application and field touch-up.
- F. Touch-Up Primer for Galvanized Surfaces: FS TT-P-641.
- G. Fasteners: Stainless steel.

2..3 FABRICATED COMPONENTS

- A. Frames: 1 3/4 x 4 1/2 inch profile, thermally broken with interior portion of frame insulated from exterior portion.
- B. Doors: 2 inches thick, bevelled glazing stops.
- C. Pivot Mullions - See drawings for correct angles.

2..4 GLASS AND GLAZING MATERIALS

- A. Glass in Exterior Lights: Clear, sealed insulated units of plate glass.
- B. Glass in Doors: and Adjacent Lights: Clear, single pane of tempered glass.
- C. Glass in Multi Purpose Room Window Clear, sealed insulated units with interior pane of fully tempered impact resistant glass.

2..5 HARDWARE

- A. Weatherstripping, Sill Sweep Strips, Thresholds, Hinges: Manufacturers' standard type to suit application.
- B. Weatherstripping: Wool pile, continuous.
- C. Sill Sweep Strips: Resilient seal type, of neoprene compound.
- D. Threshold: Extruded aluminum, one piece per door opening, ribbed surface, handicap accessible.
- E. Pivots: Offset type.
- F. Panic set with pull.
- G. Closer: Norton 8100 BF with handicap delay.
- H. Cylinder Lock: by others.
- I. Thumb Turn.

2..6 FABRICATION

- A. Fabricate doors and frames allowing for minimum clearances and shim spacing around perimeter of assembly, yet enabling installation.
- B. Rigidly fit and secure joints and corners with screw and spline. Make joints and connections flush, hairline, and weatherproof.
- C. Develop drainage holes with moisture pattern to exterior.
- D. Prepare components to receive anchor devices. Fabricate anchorage items.
- E. Arrange fasteners, attachments, and jointing to ensure concealment from view.
- F. Prepare components with internal reinforcement for door hardware.

2..7 FINISHES

- A. Exterior Extruded Aluminum Surfaces: Coat with a Fluoropolymer paint coating per AAMA 605.2. Color to be selected by Engineer.
- B. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

3. PART 3 EXECUTION

3..1 INSPECTION

- A. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.
- B. Beginning of installation means acceptance of existing conditions.

3..2 INSTALLATION

- A. Install doors, frames, windows, glazing and hardware in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely attach frame assembly to structure.
- C. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- D. Coordinate attachment and seal of air and vapor barrier materials.
- E. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- F. Install hardware using templates provided.
- G. Install glass in accordance with manufacturers instructions using exterior wet method of glazing.
- H. Install perimeter type sealant, backing materials, and installation requirements in accordance with Section 07900.
- I. Adjust operating hardware.

3..3 TOLERANCES

- A. Variation from Plane: 0.03 inches per foot maximum or 0.25 inches per 30 feet, whichever is less.
- B. Misalignment of Two Adjoining Members Abutting in Plane: 0.015 inches.

3.4 CLEANING

- A. Remove protective material from prefinished aluminum surfaces.
- B. Wash down exposed surfaces using a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

SECTION 08710

FINISH HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included:
 - 1. Furnish finish hardware required to complete the Work as shown on the Drawings and as specified herein;
 - 2. Furnish trim attachments and fastenings, specified or otherwise required, for proper and complete installation;
 - 3. Deliver to the job site those items of finish hardware scheduled to be installed at the job site; and deliver to other points of installation those items of finish hardware scheduled to be factory installed.

- B. Related work:
 - 1. Section 08111 - Standard Steel Doors and Frames.
 - 2. Section 08410 - Aluminum Entrances and Storefronts.

- C. Definitions:
 - 1. "Hardware groups" described in the Hardware Schedule in Part 3 of this Section are shown on the Door Schedule.

1.2 QUALITY ASSURANCE

- A. Provide the services of an AHC or DAHC member of the American Society of Architectural Hardware Consultants to:
 - 1. Be available for consultation with the Engineer at no additional cost to the Owner during progress of construction;
- B. The hardware consultant may be an employee of the supplier.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01300.

- B. Product data: Within 21 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - a. Approval of this list by the Engineer will not relieve the Contractor of the responsibility to provide all finish hardware items required for the Work even though such required items may not have been shown on the approved list.

- C. Templates: In a timely manner to assure orderly progress of the Work, deliver templates or physical samples of the approved finish hardware items to pertinent manufacturers of interfacing items such as doors and frames.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01600.
- B. Individually package each unit of finish hardware, complete with proper fastenings and appurtenances, clearly marked on the outside to indicate contents and specific locations in the Work.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Fasteners:
 - 1. Furnish necessary screws, bolts, and other fasteners of suitable size and type to anchor the hardware in position for long life under hard use.
 - 2. Where necessary, furnish fasteners with toggle bolts, expansion shields, sex bolts, and other anchors approved by the Engineer, according to the material to which the hardware is to be applied and according to the recommendations of the hardware manufacturer.
 - 3. Provide fasteners which harmonize with the hardware as to finish and material.
- B. Where butts are required to swing 180 degrees, furnish butts of sufficient throw to clear the trim.
- C. Furnish silencers for door frames at the rate of three for each single door and two for each door or pair of doors; except weatherstripped doors and doors with light seals or sound seals.

2.2 KEYING

- A. Factory key and masterkey, locks and cylinders as directed by the Owner.
- B. Furnish two factory keys for each lock and two masterkeys for each set.
- C. Construction keying:
 - 1. Furnish a construction masterkey system with 4 keys for locks and cylinders.
 - 2. Use only the construction keys during construction.
 - 3. Upon Substantial Completion of the Work, as that Date is established by the Engineer, void the construction key system and, in the presence of the Engineer, demonstrate that the specified keying system is operating properly.
- D. Identification and delivery:
 - 1. Factory stamp permanent keys, "DO NOT DUPLICATE."
 - 2. Identify permanent keys with tags, and send direct to the Owner by registered mail or receipted personal delivery.
- F. Match Owner's existing keying system.

2.3 TOOLS AND MANUALS

- A. With the delivery of permanent keys, deliver to the Owner one complete set of adjustment tools and one set of maintenance manuals for locksets, latchsets, closers, and panic devices.

2.4 ACCEPTABLE PRODUCTS

- A. Single source for items:
1. Except as specifically otherwise approved in advance by the Engineer, furnish for each item (such as "door butt type 1") only the product of a single manufacturer (such as "Soss BB 1279").
2. To the maximum extent practicable, furnish similar items (such as "door butts") only as the product of a single manufacturer (such as "Soss").
B. For each of the required items of finish hardware, provide from the specified manufacturer or from one of the indicated acceptable substitutes:

Table with 3 columns: Item, Manufacturer, and Acceptable substitute. Rows include Butts, Closers, Lock Set, Panic bolts, Thresholds, and Miscellaneous.

- C. Provide the finishes shown on the schedule.

2.5 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 DELIVERIES

- A. Stockpile items sufficiently in advance to assure their availability, and make necessary deliveries in a timely manner to assure orderly progress of the total Work.

3.2 COORDINATION

- A. Coordinate as necessary with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
B. Upon completion of the Work, and as a condition of its acceptance, provide the inspection, adjustment, and report described in Article 1.2 above.

3.3 FINISH HARDWARE SCHEDULE

A. Provide finish hardware schedule detailing all hardware for each door in project.

1. Hardware Set No. 1

All hardware to be furnished complete by aluminum door supplier except:

Master keyed cylinder Type as required

2. Hardware Set No. 2 Exterior Doors & Stair Doors

1 ½ pr. BB Butts US26D (NRP Exterior Doors)

1 Door Closer-ADA Delay

1 Exit Bar Device & Lever

1 Masterkey Cylinder

1 ADA Threshold

1 Set Weatherstripping

Silencers

3. Hardware Set No. 3 Closet

1 ½ pr. BB Butts -US26D

1 Lever Lock Set

1 Masterkey Cylinder

Silencers

END OF SECTION

SECTION 08800

GLAZING

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Glass and glazing for Sections referencing this Section for products and installation.
- B. Glass and glazing for hollow metal work and doors.

1.2 RELATED SECTIONS

- A. Section 07900 - Joint Sealers: Sealant and back-up material.

1.3 REFERENCES

- A. ANSI/ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- B. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
- C. ASTM C1036 - Flat Glass.
- D. ASTM C1048 - Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.
- E. FGMA - Glazing Manual.
- F. FGMA - Sealant Manual.
- G. FS TT-C-00598 - Calking Compound, Oil and Resin Base Type.
- H. FS TT-S-001657 - Sealing Compound, Single Component, Butyl Rubber Based, Solvent Release Type.
- I. FS TT-S-00227 - Sealing Compound, Rubber Base, Two Component.
- J. FS TT-S-00230 - Sealing Compounds, Synthetic-Rubber Base, Single Component, Chemically Curing.
- K. FS TT-S-01543 - Sealing Compound, Silicone Rubber Base.
- L. FS TT-G-410 - Glazing Compound, Sash (Metal) for Back Bedding and Face Glazing (Not for Channel or Stop Glazing).

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data on Glass Types Specified: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- D. Manufacturer's Installation Instructions: Indicate special precautions required.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with FGMA Glazing Manual glazing installation methods.

1.6 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on Drawings.

2. PART 2 PRODUCTS

2.1. FLAT GLASS MATERIALS

- A. Tempered Safety Glass (Type FG-B): Clear ; fully tempered conforming to ANSI Z97.1; 1/4 inch thick minimum.
- B. Wire Glass (Type FG-G): Clear , polished both sides, diagonal mesh of woven stainless steel wire of 1/2 inch grid size; 1/4 inch thick.
- C. Insulated Glass: Guardian Industries, SunGuard LE40, 1/4" clear coating on #2 surface, heat strengthened glass, 1/2" air space, inboard lite 1/4" clear with a 1" total thickness with high performance solar coating. Provide face glass with tempered safety glass where noted on drawings or as required by Code.

2.2. GLAZING COMPOUNDS

- A. Butyl Sealant (Type GC-B): FS TT-S-001657; Shore A hardness of 10-20 black color; non-skinning.
- B. Polyurethane Sealant (Type GC-E): FS TT-S-00230, Type II --non-sag, Class A.
- C. Silicone Sealant (Type GC-F): Single component, chemical solvent curing; capable of water immersion without loss of properties; non-staining; cured Shore A hardness of 15-25; color as selected.

2.3. GLAZING ACCESSORIES

- A. Setting Blocks: 80 - 90 Shore A durometer hardness, length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Spacer Shims: 50 - 60 Shore A durometer hardness, minimum 3 inch long x one half the

height of the glazing stop x thickness to suit application, self adhesive on one face.

- C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10 - 15 Shore A durometer hardness; coiled on release paper; black color.

3. PART 3 EXECUTION

3..1 EXAMINATION

- A. Verify that openings for glazing are correctly sized and within tolerance.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3..2 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant.

3..3 INTERIOR - DRY METHOD (TAPE AND TAPE)

- A. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
- C. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
- D. Place glazing tape on free perimeter of glazing in same manner described above.
- E. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- F. Knife trim protruding tape.

3..4 INTERIOR - WET/DRY METHOD (TAPE AND SEALANT)

- A. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sight line.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
- C. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

- D. Install removable stops, with spacer shims inserted between glazing and applied stops at 24 inch intervals, 1/4 inch below sight line.
- E. Fill gaps between pane and applied stop with sealant to depth equal to bite on glazing, to uniform and level line.
- F. Trim protruding tape edge.

3..5 INTERIOR - WET METHOD (COMPOUND AND COMPOUND)

- A. Install glazing resting on setting blocks. Install applied stop and center pane by use of spacer shims at 24 inch centers, kept 1/4 inch below sight line.
- B. Locate and secure glazing pane using spring wire clips glazers' clips.
- C. Fill gaps between glazing and stops with glazing compound until flush with sight line. Tool surface to straight line.

3..6 INSTALLATION - MIRRORS

- A. Set mirrors with adhesive, applied in accordance with adhesive manufacturer's instructions.
- A. Place plumb and level.

3..11 CLEANING

- A. Clean work under provisions of 01700.
- B. Remove glazing materials from finish surfaces.
- C. Remove labels after work is complete.
- D. Clean glass and mirrors.

3..12 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Section 01500.
- B. After installation, mark pane with an 'X' by using removable plastic tape or paste. Do not mark heat absorbing or reflective glass units.

END OF SECTION

SECTION 09260

GYPSUM BOARD SYSTEMS

1. PART 1 GENERAL

1..1 WORK INCLUDED

- A. Metal stud wall framing.
- B. Exterior board sheathing.

1..2 RELATED WORK

- A. Section 06114 - Wood Blocking and Curbing: Wood blocking for support of toilet and bath accessories.
- B. Section 07410 - Metal Wall Panels.
- C. Section 08111 - Standard Steel Doors and Frames.

1..3 REFERENCES

- A. ANSI/ASTM C36 - Gypsum Wallboard.
- B. ANSI/ASTM C79 - Gypsum Sheathing Board.
- C. ANSI/ASTM C442 - Gypsum Backing Board.
- D. ANSI/ASTM C475 - Joint Treatment Materials for Gypsum Wallboard Construction.
- E. ANSI/ASTM C514 - Nails for the Application of Gypsum Wallboard.
- F. ANSI/ASTM C557 - Adhesive for Fastening Gypsum Wallboard to Wood Framing.
- G. ANSI/ASTM C630 - Water Resistant Gypsum Backing Board.
- H. ANSI/ASTM C645 - Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board.
- I. ANSI/ASTM C646 - Steel Drill Screws for the Application of Gypsum Sheet Material to Light Gage Steel Studs.
- J. ANSI/ASTM C754 - Installation of Framing Members to Receive Screw Attached Gypsum Wallboard, Backing Board, or Water Resistant Backing Board.
- K. ANSI/ASTM E90 - Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
- L. ANSI/ASTM E119 - Fire Tests of Building Construction and Materials.

- M. FS HH-I-521 - Insulation Blankets, Thermal (Mineral Fiber, for Ambient Temperatures).
- N. GA-201 - Gypsum Board for Walls and Ceilings.
- O. GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board.

1..4 QUALITY ASSURANCE

- A. Applicator: Company specializing in gypsum board systems work with five years documented experience and approved by manufacturer.

1..5 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01300.
- B. Provide product data on metal framing, gypsum board and joint tape.
- C. Submit manufacturer's installation instructions under provisions of Section 01300.

2. PART 2 PRODUCTS

2..1 FRAMING MATERIALS

- A. Studs and Tracks: ANSI/ASTM C645; galvanized sheet steel, 20 gage minimum thick, or as noted on Drawings.
- B. Furring, Framing and Accessories: ANSI/ASTM C645 as noted on Drawings.
- C. Fasteners: ANSI/ASTM C514.
- D. Adhesive: ANSI/ASTM C557.

2..2 GYPSUM BOARD MATERIALS

- A. Exterior gypsum sheathing board (Dens-Glass Gold) ASTM C1177; moisture resistant type; 5/8 inch thick, maximum permissible length and water repellent faces.

2..3 ACCESSORIES

- A. Corner Beads: Metal.
- B. Edge Trim: GA 201 and GA 216; Type LC and L bead as required.
- C. Joint Materials: ANSI/ASTM C475; reinforcing tape, joint compound, adhesive, water, and fasteners.
- D. Sealing Compound: Manufacturer's compatible fire shield compound fire and smoke stop.

3. PART 3 EXECUTION

3..1 INSPECTION

- A. Verify that site conditions are ready to receive work and opening dimensions are as indicated on drawings.
- B. Beginning of installation means acceptance of existing surfaces and substrate.

3..2 METAL STUD INSTALLATION

- A. Install studding in accordance with ANSI/ASTM C754.
- B. Metal Stud Spacing: 24 inches on center.
- C. Blocking: Screw wood blocking to studs. Bolt or screw steel channels to studs where required. Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, and hardware.
- D. Coordinate installation of bucks, anchors, blocking, electrical and mechanical work placed in or behind partition framing.

3..3 FURRING INSTALLATION

- A. Erect furring for direct attachment to steel framing.
- B. Erect furring vertically. Secure in place at maximum 24 inches on center not more than 4 inches from floor and ceiling lines.

3..4 GYPSUM BOARD INSTALLATION

- A. Erect exterior sheathing in accordance with manufacturer's instructions and applicable instructions GA-253.
- B. Use manufacturer's recommended screws only when fastening gypsum board to metal furring or framing.
- C. Erect exterior gypsum soffit board perpendicular to supports, with staggered end joints over supports.
- D. Treat cut edges and holes in moisture resistant gypsum board and exterior gypsum ceiling board with sealant.
- E. Place control joints consistent with lines of building spaces as directed.
- F. Place corner beads at external corners when required. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials as indicated.

3..5 JOINT TREATMENT

- A. Tape exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
- B. Erect in accordance with manufacturer's instructions.

3.6 TOLERANCES

- A. Maximum Variation from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09511

SUSPENDED ACOUSTICAL CEILINGS

1. PART 1 GENERAL

1.1 WORK INCLUDED

- A. Suspended metal grid ceiling system.
- B. Acoustical tile.

1.2 REFERENCES

- A. ASTM C635 - Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
- B. ASTM C636 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
- C. FS HH-I-521 - Insulation Blankets, Thermal Mineral Fiber, for Ambient Temperatures.
- D. UL - Underwriter's Laboratories System Ratings.

1.3 SUBMITTALS

- A. Submit product data under provisions of Section 01330.
- B. Provide product data on metal grid system components and acoustic units.
- C. Submit samples under provisions of Section 01330.
- D. Submit two samples illustrating material and finish of acoustic units.
- E. Submit two samples of suspension system.
- G. Submit manufacturer's installation instructions under provisions of Section 01330.

1.4 ENVIRONMENTAL REQUIREMENTS

- A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and humidity of 20 to 40 percent prior to, during, and after installation.

1.5 SEQUENCING/SCHEDULING

- A. Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Schedule installation of acoustic units after interior wet work is dry.

1..6 EXTRA STOCK

- A. Provide one carton of extra tile to Owner.

2. PART 2 PRODUCTS

2..1 SUSPENSION SYSTEM MATERIALS

- A. Grid: ASTM C635, intermediate duty, non-fire rated exposed T components die cut and interlocking.
- B. Accessories: As required for suspended grid system.
- C. Grid Materials: Commercial quality cold rolled steel with galvanized coating. Extruded aluminum.
- D. Grid Finish: Color as selected.
- E. Support Channels and Hangers: Galvanized Primed steel; size and type to suit application, to rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1/360.

2..2 ACCEPTABLE MANUFACTURERS - ACOUSTIC UNITS

- A. Genesis

2..3 ACOUSTIC UNIT PRODUCTS

- A. Type ACT 1 - Printed Pro - 746-00
 1. Size: 24 x 48 nominal x 3/16".
 2. Composition: Preformed mineral fiber - Medium texture.
 3. Edge: Square cut.
 4. Surface Color: White.
 5. Grid: 15/16" exposed grid - White.

3. PART 3 EXECUTION

3..1 INSPECTION

- A. Verify that existing conditions are ready to receive work.
- B. Verify that layout of hangers will not interfere with other work.
- C. Beginning of installation means acceptance of existing conditions.

3..2 INSTALLATION

- A. Install system in accordance with manufacturer's instructions and as supplemented in this Section.

- B. Install system capable of supporting imposed loads to a deflection of 1/360 maximum.
- C. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.
- D. Hang system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- E. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- F. Center system on room axis according to reflected plan.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches of each corner; or support components independently.
- H. Do not eccentrically load system, or produce rotation of runners.
- I. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions.
- J. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function.
- K. Install acoustic units level, in uniform plane, and free from twist, warp and dents.
- L. Install hold-down clips to retain panels tight to grid system within 8 ft of an exterior door and where noted.

3.3 TOLERANCES

- A. Variation from Flat and Level Surface: 1/8 inch in 10 ft.
- B. Variation from Plumb of Grid Members Caused by Eccentric Loads: Two degrees maximum.

END OF SECTION

SECTION 09900

PAINTING

1. PART 1 GENERAL

1.1 WORK INCLUDED

- A. Surface preparation.
- B. Surface finish schedule.

1.2 RELATED WORK

- A. Section 05500 - Metal Fabrications: Epoxy Primer.

1.3 REFERENCES

- A. ANSI/ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.
- B. ASTM D2016 - Test Method for Moisture Content of Wood.

1.4 DEFINITIONS

- A. Conform to ANSI/ASTM D16 for interpretation of terms used in this Section.

1.5 SUBMITTALS

- A. Submit samples under provisions of Section 01300.
- B. Submit two samples illustrating range of colors and textures available for each surface finishing product scheduled, for selection.
- C. Submit manufacturer's application instructions under provisions of Section 01300.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01600.
- B. Store and protect products under provisions of Section 01600.
- C. Deliver products to site in sealed and labeled containers; inspect to verify acceptance.
- D. Container labeling to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.

- E. Store paint materials at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in well ventilated area, unless required otherwise by manufacturer's instructions.
- F. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1..7 ENVIRONMENTAL REQUIREMENTS

- A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45 degrees F for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent, unless required otherwise by manufacturer's instructions.
- C. Minimum Application Temperatures for Latex Paints: 45 degrees F (7 degrees C) for interiors; 50 degrees F (10 degrees C) for exterior; unless required otherwise by manufacturer's instructions.
- D. Minimum Application Temperature for Varnish and Finishes: 65 degrees F (18 degrees C) for interior or exterior, unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

1..8 EXTRA STOCK

- A. Provide a one gallon container of each color to Owner.
- B. Label each container with color, texture, room locations, and in addition to the manufacturer's label.

2. PART 2 PRODUCTS

2..1 ACCEPTABLE MANUFACTURERS - PAINT

- A. Pittsburgh Paints
- B. Sherwin-Williams
- C. Duron
- D. Substitutions: Under provisions of Section 01600.

2..2 ACCEPTABLE MANUFACTURERS - VARNISH AND URETHANE

- A. Pittsburgh Paints
- B. Sherwin-Williams
- C. Duron

D. Substitutions: Under provisions of Section 01600.

2.3 ACCEPTABLE MANUFACTURERS - STAIN

A. Pittsburgh Paints

B. Sherwin-Williams

C. Duron

D. Substitutions: Under provisions of Section 01600.

2.4 ACCEPTABLE MANUFACTURERS - PRIMER-SEALERS

A. Pittsburgh Paints

B. Sherwin-Williams

C. Duron

D. Substitutions: Under provisions of Section 01600.

2.5 ACCEPTABLE MANUFACTURERS - MASONRY STAIN

A. Sherwin Williams, H&C Shield Plus Concrete Stain.

B. Muralo Company - Concrete Stain.

C. Morrison Paint Corp. - Dura-Guard Acrylic Latex Concrete Stain.

2.6 MATERIALS

A. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.

B. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.

C. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

2.7 FINISHES

A. Refer to schedule at end of Section for surface finish and color schedule.

3. PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that surfaces substrate conditions are ready to receive work as instructed by the product manufacturer.
- A. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- B. Beginning of installation means acceptance of existing surfaces.

3.2 PREPARATION

- A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or finishing.
- B. Correct minor defects and clean surfaces which affect work of this Section.
- C. Shellac and seal marks which may bleed through surface finishes.
- D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- E. Aluminum Surfaces Scheduled for Paint Finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
- F. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
- G. Gypsum Board Surfaces: Latex fill minor defects. Spot prime defects after repair.
- H. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- I. Uncoated Steel and Iron Surfaces: Remove grease, scale, dirt, and rust. Where heavy coatings of scale are evident, remove by wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.
- J. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Prime metal items including shop primed items.
- K. Interior Wood Items Scheduled to Receive Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.
- L. Exterior Wood Scheduled to Receive Paint Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior caulking compound after prime coat has been applied.

M. Wood and Metal Doors Scheduled for Painting: Seal top and bottom edges with primer.

3.3 PROTECTION

- A. Protect elements surrounding the work of this Section from damage or disfiguration.
- B. Repair damage to other surfaces caused by work of this Section.
- C. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.
- D. Remove empty paint containers from site.

3.4 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Do not apply finishes to surfaces that are not dry.
- C. Apply each coat to uniform finish.
- D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
- E. Sand lightly between coats to achieve required finish.
- F. Allow applied coat to dry before next coat is applied.
- G. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- H. Prime back surfaces of interior and exterior woodwork with primer paint.
- I. Prime back surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.

3.5 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Remove unfinished ceiling louvers and grilles, on mechanical and electrical components and paint separately to match ceiling grid.
- B. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
- C. Replace electrical plates, hardware, light fixture trim, and fittings removed prior to finishing.

3.6 CLEANING

- A. As Work proceeds, promptly remove paint where spilled, splashed, or spattered.

- B. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.
- C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.7 SCHEDULE - SHOP PRIMED ITEMS FOR SITE FINISHING

- A. Metal Fabrications (Section 05500): Exposed surfaces of lintels

3.8 SCHEDULE - EXTERIOR SURFACES

- A. Steel bollards, lintels, railings, and roof hatch.
 - 1. Two coats latex enamel, semigloss.
- B. Steel - Shop Primed (doors and frames)
 - 1. Touch-up with zinc rich primer.
 - 2. Two coats alkyd enamel, semi-gloss.

3.9 SCHEDULE - INTERIOR SURFACES

- A. Miscellaneous Steel (including bollards, doors, frames and ladders)
 - 1. Touch-up with original primer.
 - 2. Two coats latex enamel, semi-gloss.

END OF SECTION

SECTION 10441

PLASTIC SIGNS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Engraved plastic exit sign with braille symbol.

1.2 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01300.
- B. Submit shop drawings listing sign styles, lettering and locations and overall dimensions of each engraved sign.
- C. Submit samples under provisions of Section 01300.
- D. Submit two samples illustrating full size sample sign, of type, style and color specified including method of attachment.
- E. Submit manufacturer's installation instructions under provisions of Section 01300.
- F. Include installation template. and hardware.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01600.
- B. Store and protect products under provisions of Section 01600.
- C. Package signs, labeled in name groups.
- D. Store adhesive tape at ambient room temperatures.

1.4 ENVIRONMENTAL REQUIREMENTS

- A. Do not install signs when ambient temperature is below 70 degrees F. Maintain this minimum during and after installation of signs.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Spencer Industries, Inc.
- B. Or approved equal

- C. Engraved Signs: Laminated colored plastic; total thickness of 0.125 inch; bevelled edges; lettering engraved through face material to expose core color. Characters formed to Helvetica style with standard symbol graphics and raised braille meeting current ADA requirements.
- E. Face Color: To be selected by Engineer.
- F. Core Color: To be selected.

2..2 ACCESSORIES

- A. Mounting Hardware: Brass screws.
- B. Silicone Mounting Adhesive: Adhesive.

3. PART 3 EXECUTION

3..1 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means installer accepts existing surfaces.

3..2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install sign on latch side of door as noted on drawings.
- C. Clean and polish.

END OF SECTION

SECTION 10522

FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

1. PART 1 GENERAL

1.1 WORK INCLUDED

- A. Fire extinguishers.
- B. Cabinets.
- C. Accessories.

1.2 RELATED WORK

- A. Section 06114 - Wood Blocking: Roughed-in wall openings.

1.3 REFERENCES

- A. NFPA 10 - Portable Fire Extinguishers.

1.4 QUALITY ASSURANCE

- A. Conform to NFPA 10 requirements for extinguishers. and fire blankets.

1.5 SUBMITTALS

- A. Submit product data under provisions of Section 01300.
- B. Include physical dimensions, operational features, color and finish, wall mounting brackets with mounted measurements, anchorage details, rough-in measurements, location, and details.
- C. Submit manufacturer's installation instructions under provisions of Section 01300.

1.6 OPERATION AND MAINTENANCE DATA

- A. Submit manufacturer's operation and maintenance data under provisions of Section 01700.
- B. Include test, refill or recharge schedules, procedures, and re-certification requirements. including requirements applicable to the Work.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not install extinguishers when ambient temperatures may cause freezing.

2. PART 2 PRODUCTS

2..1 EXTINGUISHERS

- A. Dry Chemical Type: Steel tank, Model Cosmic 10E and Cosmic 5E manufactured by J. L. Industries or equal; with pressure gage, 4A-60BC and 2A-10BC.

2..2 CABINETS

- A. Cabinet: Alum, semi-recessed type, size to accommodate accessories. Clear VU Series with clear bubble manufactured by J. L. Industries or approved equal.

2..3 Mounting Hardware: Appropriate to cabinet.

2..4 FABRICATION

- A. Form body of cabinet with tight inside corners and seams.
- B. Predrill holes for anchorage.
- C. Form perimeter trim and door stiles by welding, filling, and grinding smooth.
- D. Hinge doors for 180 degree opening with two butt continuous piano hinge. Provide nylon roller type catch.
- E. Glaze doors with resilient channel gasket glazing.

2..5 FINISHES

- A. Extinguisher: Red enamel.
- B. Cabinet Trim and Door: Anodized to clear color.
- C. Cabinet Interior: white enamel.

2..6 QUANTITY

- A. Provide where shown on drawings. Coordinate location with drawings and Engineer.

3. PART 3 EXECUTION

3..1 INSPECTION

- A. Verify rough openings for cabinet are correctly sized and located.
- B. Beginning of installation means acceptance of existing conditions.

3..2 INSTALLATION

- A. Install cabinets plumb and level in wall openings
- B. Secure rigidly in place. in accordance with manufacturer's instructions.

END OF SECTION

SECTION 13121

OUTDOOR PAINT ROOM BUILDING

I. PART 1 GENERAL

.1 SECTION INCLUDES

- A. Pre-fabricated building frame and bracing.
- B. Metal roof system assembly including: purlins, standing seam roof, insulation, gutter, trim, and downspouts.
- C. Metal wall system assembly including: girts, metal panels, trim, framed openings

.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 03300 - Concrete: placement of anchor bolts.

.3 RELATED SECTIONS

- 1. Section 03300 - Concrete.
- B. Section 07213 - Pre-engineered Building Insulation.
- C. Section 08111 - Standard Steel Doors and Frames.
- D. Section 08360 - Overhead Doors.
- E. Section 09900 - Painting: Finish painting of exposed interior primed steel surfaces.

.4 REFERENCES

- A. IBC 2018.
- B. AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
- C. ASTM A36 - Structural Steel.
- D. ASTM A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware.
- E. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.
- F. ASTM A325 - High Strength Bolts for Structural Steel Joints.
- G. ASTM A386 - Zinc-coating (Hot-Dip) on Assembled Steel Products.
- H. ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- I. ASTM A490 - Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints.

- J. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- K. ASTM A501 - Hot Formed Welded and Seamless Carbon Steel Structural Tubing.
- L. ASTM A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements.
- M. ASTM A529 - Structural Steel with 42,000 psi (290 MPa) Minimum Yield Point.
- N. ASTM A572 - High Strength Low Alloy Columbium-Vanadium Steel of Structural Quality.
- O. ASTM C665 - Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- P. AWS A2.0 - Standard Welding Symbols.
- Q. AWS D1.1 - Structural Welding Code.
- R. FS HH-I-521 - Insulation Blankets, Thermal, Mineral Fiber.
- S. FS HH-I-558 - Insulation, Blocks, Boards, Blankets, Felts, Sleeving (Pipe and Tube Covering), and Pipe Fitting Covering, Thermal (Mineral Fiber, Industrial Type).
- T. SSPC - Steel Structures Painting Council.

.5 SYSTEM DESCRIPTION

- A. Two span rigid frame.
- B. Bay spacing per manufacturer.
- C. Primary Framing: Rigid frame of rafter beams and columns, braced frames, end wall columns and wind bracing.
- D. Secondary Framing: Purlins, girts, eave struts, flange bracing, sill supports, clips, and other items detailed.
- E. Roof Panel System: Preformed standing seam metal panels of vertical profile, with sub-girt framing/anchorage assembly, insulation and accessory components.
- F. Roof Slope: Per Manufacturer's specs.

.6 DESIGN REQUIREMENTS

- A. Members to withstand dead load, live load, applicable snow load, and design loads due to pressure and suction of wind calculated in accordance with applicable code as indicated in design load schedule and special

loading conditions as noted and compliance with FM design criteria.

- B. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.
- C. Assembly to permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of 60 degrees F.
- D. Size and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance.
- E. Roof live load deflection limits shall be $L/360$ for purlins and $L/240$ for the main structural framing.
- F. Building drift limit shall be $H/240$ using a 10 year mean wind criteria.
- G. The lateral deflection from wind loads on girts supporting masonry shall be $L/240$ using a 10 year mean wind criteria.

.7 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate assembly dimensions, locations of structural members connections, attachments, openings, cambers, loads and design calculations.
- C. Indicate wall and roof system dimensions, panel layout, general construction details, anchorages and method of anchorage and method of installation.
- D. Indicate framing anchor bolt settings, sizes, and locations from datum and foundation loads.
- E. Indicate welded connections with AWS A2.0 welding symbols. Indicate net weld lengths.
- F. Product Data: Provide data on profiles, component dimensions and fasteners.
- G. Manufacturer's Installation Instructions: Indicate preparation requirements and assembly sequence.

.8 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products

specified in this Section with minimum five years documented experience.

- B. Design structural components under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Pennsylvania.

.10 REGULATORY REQUIREMENTS

- A. Conform to indicated codes and FM criteria for preparation of design calculations.

.11 PRE-INSTALLATION CONFERENCE

- A. Convene one week prior to commencing work of this Section.

.12 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

1.13 WARRANTY

- A. Provide manufacturer's written weather tightness warranty for a maximum of twenty (20) years against leaks in roof panels arising out of or caused by ordinary wear and tear under normal weather and atmospheric conditions. Warranty shall be signed by both the metal roofing system manufacture and the metal roofing system contractor.
- B. Provide manufacturer's standard written warranty for twenty (20) years against perforation of metal roof panels due to corrosion under normal weather and atmospheric conditions. Warranty shall be signed by metal roofing system manufacturer.
- C. Provide manufacturer's standard paint film written warranty for twenty (20) years against cracking, peeling, chalking, and fading of the coating on painted walls panels, painted roof panels and soffit panels. Warranty shall be signed by building system or roof system manufacturer and state that the coating contains 70% Kynar 500<< and Hylar 5000<< resin. Manufacturer warrants that coating shall not peel, crack, or chip for 20 years. For a period of 20 years chalking shall not exceed #8 - ASTM and fading shall be 5 E Color Difference Units or less.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS - BUILDING SYSTEM

- A. Finishing Systems, Inc.
- B. Substitutions: Under provisions of Section 01600.

2.2 MATERIALS - FRAMING

- A. Structural Steel Members: ASTM A36 and A572, Grade 50.
- B. Structural Tubing: ASTM A500, Grade.

- C. Plate or Bar Stock: ASTM A529.
- D. Anchor Bolts: ASTM A307, unprimed.
- E. Bolts, Nuts, and Washers: ASTM A325 and A307.
- F. Welding Materials: AWS D1.1; type required for materials being welded.
- G. Primer: SSPC 15, Type 1, Red Oxide.
- H. Grout: Non-shrink type, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents, capable of developing minimum compressive strength of 2400 psi in two days and 7000 psi in 28 days.

2..3 MATERIALS - ROOF SYSTEM

- A. Sheet Steel Stock with galvalume coating.
- B. Insulation: Section 07213 - Pre-engineered Building Insulation.
- C. Joint Seal Gaskets: Manufacturer's standard type.
- D. Fasteners: Manufacturer's standard type, galvanized to ASTM A386, finish to match adjacent surfaces when exterior exposed.
- E. Thermal Blocking: Section 07213 - Pre-engineered Building Insulation.

2..4 FABRICATION - FRAMING

- A. Fabricate members in accordance with AISC Specification for plate, bar, tube, or rolled structural shapes.
- B. Anchor Bolts: Formed with straight shank, assembled with template for casting into concrete.
- C. Provide framing for openings as indicated on drawings.

2..5 FABRICATION - ROOF SYSTEMS

- A. Roof: Minimum 24 gage metal thickness, 24" wide with 2 minor configurations, 2" high (2-3/4" including seam) 24" on center.
- B. Panel material as specified shall be 24 gage steel coated both sides with a layer of (galvalume) aluminum-zinc alloy applied by the continuous hot dip method. Minimum 0.55 ounce coated weight per square foot as determined by the triple spot test per ASTM A-792.
- C. Panels of maximum possible lengths shall be used to minimize endlaps, eave panels shall extend beyond the structural line of the sidewall.
- D. Panels shall be factory pre-punched at panel end to match pre-punched holes in the eave

structural member. Panel end splices shall be factory pre-punched and pre-notched. Panel end splices shall be floating and allow the roof panels to expand and contract with roof panel temperature changes.

- E. Ridge assembly shall be designed to allow roof panels to move lengthwise with expansion/contraction as the roof panel temperature changes. Parts shall be factory pre-punched for correct field assembly. Panel closures and interior reinforcing straps shall be installed to seal the panel ends at the ridge. The attachment fasteners shall not be exposed on the weather side. A lockseam plug shall be used to seal the lockseam portion of the panel. A hi-tensile steel ridge cover shall span from panel closure to panel closure and flex as the roof system expands and contracts.
- F. Girts/Purlins: Rolled formed structural shape to receive exterior wall assemblies and roofing. Roof assembly shall be braced to comply with current code and FM requirements.
- G. Internal and external Corners: Same material thickness and finish as adjacent material, profile brake formed, shop cut and factory mitered to required angles. Back brace mitered internal corners.
- H. Expansion Joints: Same material and finish as adjacent material where exposed of profile to suit system.
- I. Flashings, Closure Pieces, Facia, Infills: Same material and finish as adjacent material, profile to suit system and formed as detailed where noted on drawings.
- J. Fasteners: To maintain load requirements, and weathertight installation, same finish as cladding, non-corrosive type.

2.6 FINISHES

- A. Framing Members: Clean, prepare and shop prime.
- B. Exterior Surfaces of Components and Accessories: Precoated enamel on steel of modified silicone finish, color as selected from manufacturer's standard.

2.7 Premanufactured outdoor rated paint Booth

- A. Equipment Type: Outdoor Recirculating Booth (While Painting)
 - GFS Model Number: RCBWO-322064-PDT-SRSR-OVT-CUF-SP-F3
 - Internal Clear Working Dimensions: 32' 0" W x 20' 0" H x 64' 0" L
 - Overall Dimensions (Approximate): 42' 0" W x 24' 0" H x 64' 4" L
- B. Equipment Base Design
 - Equipment Panel Construction Type: Outdoor Weatherized
 - Equipment Panel Construction Finish: Inside Pre-Coated White Steel
 - Equipment Panel Construction Material: 18 Gauge Thickness

- Equipment Panel Construction Finish: Outside Color to be determined by customer from supplied GFS color chart.
- Equipment Panel Construction Material: 26 Gauge Thickness
- Support Structure Construction Type: I-Beam Structural Steel
- Embedded Plate: Structure connection to concrete slab is designed for "Welded Embedded Plate" design, that will be supplied by others. GFS provides locations and column reactions at plates.
- Equipment Design for Outdoor Construction: Included
- Structural Support Consideration Requirements: (2)
Personnel Lift(s) (Not Provided by GFS)
 - Fall Protection System: Total of (2) - Each fall protection system — designed for one person — features a 64-foot-long trolley rail with mounting hardware and stops. The system includes a trolley roller with maintenance-free bearings; a load bar, anchor point and self-locking carabiner; a ultra-lock self-retracting lifeline with 3 synthetic rope, bumper and self-locking hook; and a full-body harness.
- Airflow Design: Side-Downdraft
- Target Average Air Velocity (FPM): 40 FPM
- Light Quantity: 70 Lights.
- Light Type: LED T8 Inside Access 4-Tube Lights

A. Mechanical Ventilation Basis of Design

- Manual and/or Robotic spray application equipment inside of the spray booth.
- Target fresh air percentage is 20%.
 - Fresh air rate of 16400 CFM based on: maximum total application of 70.6 ounces/min of a material containing 50% solvent [solvent assumed to be Xylene with a lower flammable limit (LFL) of 0.9% in air and a SCFs25 vapor per gal of 26.7].
 - If material has greater application rate, a higher percentage solvent, a higher SCF vapor per gal, or a lower LFL, the ventilation will need to be resized.
- Fresh air will be introduced into the booth through the supply air equipment.

B. Exhaust Design

- Total Design Exhaust CFM: 16400 Design CFM (8200 CFM per Fan)

- Exhaust Method Design: Sidewall Exhaust Chambers
 - Exhaust Fan Framework: (2) 30" Mixed Flow Fan with 10 HP TEFC Motor at 4" SP Aerovent w/piezometer ring
 - Exhaust Filter Selection: Chromate 3 Stage (Wave Media, MEPT Panel, 6-Pocket Bag)
- C. Exhaust Ductwork Inclusions
- Exhaust Duct Building Penetration: Roof (6' Termination Above Roof)
 - Exhaust Duct Construction Design: 1 Lot of Spiral Exhaust Ductwork (42" Diameter)

- Includes: (2) Inspection Door(s); (1 lot) Connection Rings; (2) ARV(s); (2) Motor Cover(s)

F.

Intake Design

- Total Design Supply CFM: 16400 Design CFM
- Intake Method Design: Ceiling Plenum
- Intake Filter Selection: 20x20x1 Tacky Intake Filters (Panel)
- Equipment Pressurization Provided Through: (1) AMU(s)
- Air Make-up Unit Type: RUPP
- Air Make-up Unit Configuration: Vertical Outdoor Top Discharge
- Air make-up Unit MBTU/Discharge Temperature: 1771 MBTU (millions of BTUs) Designed for 160°F Discharge Temp
- Air Make-up Unit Weight/Fuel Connection: 3,000 lbs. (approximate) with 1" Fuel Connection Size
- Air Make-up Unit Performance Operation: Variable Air Volume (VAV)
- Air Make-up Unit Variable Air Volume Design: Paint Curing (VFD Supplied by GFS)
- Air Make-up Unit Mechanical Information: 16400 CFM with 10 HP motor at 3/4" SP
- Air make-up Unit Heating System: Direct Fired Natural Gas
- Air Make-up Unit Filtration Selection: Single Stage
- Air Make-up Unit Stage 1 Intake Filter: EZ Clean Filters (Standard)
- Recirculating Design
- Recirculation Design Intention: Recirculation During Painting Process
- Recirculation Design CFM: 65,600 Design CFM
- Recirculation Design Rate: 80% Recirculated Airflow (20% Fresh Air Added/Exhausted)

G. Recirculation Fan Framework: (4) 40" Mix Flow Fan with 20 HP Motor at 4" SP (16,400 CFM each) w/piezometer rings

H. Equipment Access Design

- Solid Back or Passthrough Equipment Flow: Drive Through
- Front Opening/Product Door Access: Insulated Steel Rollup Door (18-24 gauge) — Designed for outdoor location and power coated white
- Front Opening/Product Door Size: 20' 0" W x 16' 0" H
- Rear Opening/Product Door Access: Insulated Steel Rollup Door

(18-24 gauge) — Designed for outdoor location and power coated white

- Rear Opening/Product Door Size: 20' 0" W x 16' 0" H
- Door Limit Switches: Included
- Personnel Door Access Arrangement: (4) 3' W x 7' H Door(s) with 18" x 24" Observation Window

Electrical Controls Design

- Equipment Electrical Controls Operation: Insight (Siemens)
- Equipment Pressure Control System: Consta Flow & Auto Balance w/flow rings
- Economy Mode Activation Control: Included (Spray Gun Flow Switch Activation Type)
- Safety Solenoid Valve Inclusion: 3/4" Industrial Style
- Filter Monitoring Framework: 3-Stage (Visual through Magnehelic)
- Outdoor Control Requirements: 5' W x 10' H x 10' L Equipment Room Included with Lockable Door
- Internal Lower Flammability Limit Monitoring: LFL Monitor with Alarm Included
- Cascade Control Device: thermocouple
- Include Structurally Engineering Stamped Drawings: Included
- Include Project/Bid Specification Design Considerations: Included — Steel Guidance (RACP)
- All maintenance areas such as fans etc. over 4 feet should have a workplatform with railing around them.

G. Fire protection

- A fire suppression system needs to be designed and installed in accordance with the NFPA 33 standards.
- The fire suppression system should be of the hybrid design using compressed nitrogen over a water mist.
- The outdoor peripherals for the fire suppression system needs to be protected from the elements. Ex. the nitrogen tank.

H. Utilities and foundation

- All utilities must be trenched the paint booth, they are to run from the current paint shop north to the new booth.
- A preliminary foundation and floor slab design is to be coordinated with the final building requirements and updated accordingly by Owner's Engineer. Contractor to provide a plus or minus change order for revisions.

3. PART 3 EXECUTION

3.1 EXAMINATION

- i. Verify site conditions.
- ii. Verify that foundation subframing, floor slab, mechanical and electrical utilities, and anchors are in correct position.

3.2 ERECTION - FRAMING

- A. Erect framing in accordance with AISC Specification.
- B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.
- C. Set column base plates with non-shrink grout to full plate bearing where noted.
- D. Do not field cut or alter structural members without approval of Engineer.
- E. After erection, prime welds, abrasions, and surfaces not shop primed.

3.3 ERECTION - ROOFING AND WALL ASSEMBLY SYSTEMS

- A. Install in accordance with manufacturer's instructions.
- B. Exercise care when cutting pre-finished material to ensure cuttings do not remain on finish surface.
- C. Fasten cladding system to structural supports, aligned level and plumb.
- D. Locate end laps over supports. End laps minimum inches. Place sidelaps over bearing.
- E. Provide expansion joints where indicated.
- F. Use exposed fasteners only on walls and trim. Roof system to have concealed sliding anchorage assembly.
- G. Install insulation and vinyl vapor barrier utilizing roof and wall panel system for attachment.
- H. Install sealant and gaskets to prevent weather penetration.

- I. System: Free of rattles, noise due to thermal movement and wind whistles.

3.4 INSTALLATION - ACCESSORIES

- G. Install framed wall openings in accordance with manufacturer's instructions.
- H. Seal wall accessories watertight and weather tight with sealant.

3.5 TOLERANCES

- Framing Members: 1/4 inch from level; 1/8 inch from plumb.
- Siding and Roofing: 1/8 inch from true position.

END OF SECTION

SECTION 13990

MINOR ALTERATION WORK

1. PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Patching, repair, and alterations not otherwise specified as indicated, or required, or both, to complete the Work under this Contract.
- B. Application of Requirements: Requirements specified in this section apply to alterations work throughout the Work whether specified in this or other sections.
- C. Related Sections:
 - 1. General Removal Requirements: See Section "Demolition".
 - 2. Refer to other sections for specific requirements for removal, alteration, and reuse of existing materials and items not specified in this section.

1.2 SUBMITTALS

- A. General: When work specified in this section is required, submit descriptions of methods to be used. Include manufacturer's data fully describing each material and product, certificates certifying compliance with Contract documents, show drawings showing details of conditions to be encountered, and narrative descriptions, including industry standards, detailing methods proposed for making repairs. Provide such data, shop drawings, and descriptions whether or not materials and methods to be used are indicated in the Contract documents.

1.3 QUALITY ASSURANCE

- A. General: Test materials to be used in making repairs for compatibility with existing materials. Do not proceed with repairs until Engineer approves tests. Do not use incompatible materials.
- B. Acoustical Ceilings: Have reinstallation done by an experienced installer of such systems.

1.4 PROJECT CONDITIONS

- A. Disconnecting Services: Notify Owner and authorities owning or controlling wires, conduits, pipes, and other services affected by renovation and repair before starting operations, refer to General Conditions and other specifications sections for additional requirements related to existing utilities and services.
- B. Protecting Property to Remain: Protection requirements specified in Section "Demolition" also apply to repair and alterations work. Protect from staining and other harm, paving, finished surfaces, casework, equipment, accessories, and devices that remain in place while the Work is being done. When removing items and surfaces to remain, in order to do the Work, protect removed items and materials from damage and staining. Satisfactorily repair

damage done during the Work. Satisfactorily remove stains without damage to the stained surface. Remove and discard items with stains that cannot be satisfactorily removed and provide new matching items at no additional cost. Also remove damaged items that cannot be satisfactorily repaired and provide new matching items, at no additional cost.

- C. Movement, Settlement, and Other Damage to Existing Structure Due to Alterations Work: Be solely responsible for; correct damage resulting from inadequate, improper, or careless construction procedures or inadequate shoring, bracing, support, or protection.
- D. Differing Conditions: Should materials, systems, or conditions be encountered that differ from those indicated, immediately notify Engineer by telephone, followed by letter, and do not proceed without instructions.
- E. Examine Existing Conditions: Examine surfaces to receive alterations Work and conditions under which the Work will be done. Do not proceed with the Work specified in this section before correcting unsatisfactory conditions.

2. PART 2 PRODUCTS

2.1 SALVAGED MATERIALS AND ITEMS

- A. To the extent indicated, reuse materials and items so indicated.
- B. Materials and Items to be Reused: Reinstall materials and items shown to be removed and reinstalled, or which Contractor removes to make a way to do the Work, in the same location from which removed unless indicated otherwise. Materials to be salvaged and reused in the Work include, but are not necessarily limited to exterior exhaust and intake louver grills; and other materials and items indicated to be removed and reinstalled. Materials and items to be salvaged and reused in the work also include items and materials similar to those listed above that must be removed in order to accomplish the Work but that are not specifically shown or specified to be removed, if Engineer approves reinstallation.
- C. Materials and Items Not to Be Reused: Do not reuse in this Project materials and items removed from the existing building to make way for the Work, except with written approval, unless removed material or item is indicated to be reused or unless the Contract documents permit reuse at Contractor's option.
- D. Preparing for Reuse: Clean salvaged materials and items that will be reinstalled. Clean mortar from masonry units by hand. Put operating items in proper working order. Reused materials shall be in good condition without objectionable chips, cracks, splits, checks, dents, scratches, or other defects. Operating items shall operate properly.

2.2 NEW MATERIALS

- A. General:
 - 1. Provide new materials to match existing for closing of openings, repairs, and reconstructions where suitable salvaged materials do not exist, where insufficient quantities of salvaged materials existing shall be same types, sizes, qualities, and

- colors as existing adjacent materials.
- 2. Required new materials where similar materials do not exist shall comply with requirements specified in other specifications sections.
- B. Other New Materials to Match Existing: Same types, sizes, qualities, and colors as existing adjacent materials for closing of openings and repairs where suitable salvaged materials do not exist, or where insufficient quantities of salvaged materials exist to complete the Work required, or where reuse of removed materials is not permitted.
- C. Required new materials where similar materials do not exist shall comply with requirements specified in other specifications sections.

3. PART 3 EXECUTION

3.1 ALTERATIONS, PATCHING, AND REPAIRS

- A. General repair of existing wall and ceiling finishes where cutting, alteration, removal, or repair of such existing materials is indicated as part of the Work, and where existing materials are damaged during the Work, patch and repair using specified products. Finish to match existing adjacent work. Patches and repairs shall not be discernible from normal viewing distance.
- B. Repair of Materials and Items to be Reused: Satisfactorily repair materials and items to be reused that have become damaged during Contractor's operations, or provide new equal products at no additional cost. Provide missing parts necessary to complete each installation.
- C. Patching Coordination: Coordinate patching involving various trades whether or not specifically mentioned in the Contract documents.
- D. Restoring Existing Finishes:
 - 1. Restore floor, wall, and ceiling finishes damaged or defaced because of cutting, patching, demolition, alteration, or repair work to condition equal to that before Work under this Contract started.
 - 2. Where alteration, repair, or removals expose damaged or unfinished surfaces or materials, repairs and finish or refinish such surfaces, or materials and provide new, acceptable, matching surfaces or materials or acceptable salvaged materials, to make continuous areas and surfaces uniform.
- F. Standards: Perform new Work and restore and refinish existing work to comply with applicable requirements of the specifications, except as follows:
 - 1. Materials for use in repair of existing surfaces but not otherwise specified shall conform to the highest standards of the trade involved and be in accordance with approved industry standards, as required to match the existing surface.

2. Workmanship for repair of existing materials not otherwise specified shall conform to similar workmanship existing in or adjacent to space where alterations are to be made.
 3. Reinstall salvaged items where no similar items exist, in accordance with the highest standards of trade involved and in accordance with approved Shop Drawings.
- G. Patching Holes: Properly close and patch holes and openings in existing floor, wall, and ceiling surfaces resulting from alteration work, and those shown to be filled, to match adjacent undisturbed surfaces.

3..2 CLEANING UP

- A. Remove periodically from site the accumulated debris from Work specified in this section, particularly from areas within building and in vicinity of cutting operations.
- B. At completion, remove from premises scaffolding, equipment, excess materials, debris, rubbish, and packings which result from Work specified in this section.

END OF SECTION

SECTION 14600

CRANES AND HOISTS

1. PART 1 – GENERAL

1.01 DESCRIPTION

A. SCOPE

1. This section specifies bridge cranes and hoisting equipment.
2. Runway beams and rail are part of the building steel package and are not included in this section.
3. This specification is intended to ensure bidders offer a true Class “D” crane for heavy duty cycle application and ease of maintenance. As such, while potential bidders should attempt to meet as much of the specification as possible. Any exceptions by bidders to any section noted with “(*E)” shall result in a bid being disqualified without further review or recourse.

B. CRANE SUMMARY

Crane #1 location: Existing Paint Shop
Span: 60 Ft., 0 Inches
Capacity: 30 Tons
Crane type: top running double girder
Classification: Crane shall be designed and constructed to CMAA Specification # 70, as applicable, for Class “D” service requirements and operation in a non-hazardous environment.
Crane speed: 120 FPM, variable
frequency Crane drive: Dual motor drive
Trolley speed: 80 FPM, variable frequency
Trolley drive: Motorized
Hoist speeds: 26 and 2.6 FPM, variable frequency closed loop
Hoist type: Electric wire rope
Hoist lift required: 29 Ft.
Control: Pendant from independent track and MLTX radio

C. WORK INCLUDES THE FOLLOWING:

1. Detailed design of completed crane system, including bridge, end trucks, trolley, hoists, cabling, controls, and all appurtenances specified hereinafter.
2. Shop drawings.

3. Fabrication of a complete crane.
4. Inspection and shop testing.
5. Documentation and schedules.

1.02 REFERENCES

Equipment furnished under this section shall, except as otherwise noted, comply in all respects with the requirements of the following standards:

- | | |
|--------------|---|
| OSHA | Occupational Safety and Health Administration
Part 1926.554 - Overhead Hoists
Part 1910.179 – Overhead and Gantry Cranes |
| *CMAA | Crane Manufacturer’s Association of America
Specifications for Top Running Bridge & Gantry Type Multiple Girder Electric Overhead Traveling Cranes - No. 70 (2004)
Specifications for Top Running and Under Running Single Girder Electric Overhead Cranes Utilizing Under Running Trolley Hoist - No. 74 (2004) |
| *ANSI / ASME | American National Standards Institute /
American Society of Mechanical Engineers
ANSI / ASME HST-4 - 1999 Performance Standard For Overhead Electric Wire Rope Hoists
ANSI / ASME B30.16 – 2003 Overhead Hoists (Underhung)
ANSI / ASME B30.2 - 2001 Overhead and Gantry Cranes (Top Running Bridge, Single Or Multiple Girder, Top Running Trolley Hoist)
ANSI / ASME B30.11 – 2004 Monorails and Underhung Cranes
ANSI / ASME B30.17 – 2003 Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist) |
| NEMA | National Electric Manufacturer’s Association |
| NEC | National Electric Code – 1999
Article 100, Article 240-1, Article 430-31, Article 430-51, Article 610-1, Article 610-31 |

*Compliance to this standard is limited to the extent such standard is incorporated into and made mandatory by OSHA regulations.

1.03 SUBMITTALS

- A. SHOP DRAWINGS AND EQUIPMENT DATA
 1. Manufacturer’s catalog data for hoist.

2. Dimensional drawings and details for bridge crane system.
 3. Wiring schematics. – ship with crane
- B. OPERATIONS AND MAINTENANCE MANUALS (delivered in PDF via email at time of crane shipment)
1. Equipment function, normal operating characteristics, and limiting conditions.
 2. Assembly, installation, alignment, and maintenance instructions.
 3. Lubrication and maintenance instructions.
 4. Guide to “troubleshooting”.
 5. Parts list.
 6. As-built drawing.
 7. Test results.

1.04 APPLICABLE STANDARDS

- A. Contractor shall adhere to OSHA, state, and local safety guidelines, laws, rules, and regulations.
- B. Contractor shall conform to all applicable ANSI, CMAA, and HMI specifications and/or standards.
- C. Comply with CMAA specification 70, as applicable.
- D. Long lead items [hoist, end trucks, drives and controls] will be ordered by contractor upon receipt of purchase order and credit approval. Steel will not be ordered until shop drawings and submittals have been approved by the customer.
- E. All electric equipment shall be UL, CSA c/us or ETL labeled.

1.05 WARRANTIES

- A. Provide two-year warranty for moving parts and controls.
- B. Provide a ten-year warranty for bridge girders and structural steel.

PART 2 - PRODUCTS

2.01 ACCEPTABLE PRODUCTS

- A. Bridge crane package systems shall be provided by one of the following:
EMH Brand
- B. Hoist shall be EMH electric wire rope type.

2.02 MATERIALS

<u>Components</u>	<u>Material</u>
Bridge beams	Steel, ASTM A36 or A992
End trucks	Steel, ASTM A36 (or equal)
Trolley	Steel, ASTM A36 (or equal)
Wheels	Cast iron or steel
Hooks	Forged steel

2.03 EQUIPMENT

A. HOIST AND TROLLEY

1. Top-running double girder cranes shall utilize the EMH double girder trolley electric wire rope hoists as manufactured by EMH.
2. All hoisting components, including hoisting motor, gearbox, and drum, shall be foot mounted to deck of trolley. Face/flange mounted motors and gearboxes are not acceptable.
3. Hoist and trolley motors shall be per 1.01B above, as applicable.
4. Hoist motors shall be connected to the hoist gearbox by a driveshaft with a coupling, flexible gear type.
5. Hoist motor shall never be placed inside the wire rope drum.
6. Wire rope drum shall never be driven by two hoisting motors.
7. Hoisting motor(s) shall be two winding squirrel cage type for variable frequency control.
8. Hoisting motor(s) shall be built on a NEMA frame, 60 minute motor rating, F insulation, and TEFC (totally enclosed fan cooled) for Class "D".

Hoisting motors shall not exceed 2500 revolutions per minute and shall be NEMA motors.

9. Hoist shall be furnished with closed-loop adjustable frequency inverter drive with an encoder mounted on the motor shaft.
10. Hoisting motor shall be by EMH/.
11. Hoisting gearbox shall be horizontally split in order to easily inspect and replace gears and bearings. An inspection port shall be placed on top of the gearbox covering at least 60% of the top surface.
12. The hoisting gearbox shall be made of fabricated steel and foot-mounted to the trolley deck with bolts.
13. Drum bearing shall not require re-alignment after removal.
14. The hoist gears shall be helical through-hardened with encapsulated bearings.
Bearings shall have 10,000 hours L-10 bearing life for Class "D".
15. Trolley shall be furnished with an adjustable frequency inverter drive.
16. Trolley bearings shall be modified MCB type for reliability and ease of access and removal. Trolley wheels shall be 400BHN.
17. Trolley motors shall be inverter duty motors with minimum class "F" insulation and motor enclosures shall be TENV [totally enclosed non-ventilated]. Trolley motors shall not exceed 2500 revolutions per minute and shall be NEMA motors.
18. Motor and gearbox shall be by Nord for easy sourcing of replacement parts.
19. Upper and lower limit switches shall be provided. Limit switch shall provide upper and lower limit of hoist travel, hoist slow down prior to reaching upper limit and phase sequence supervision at upper limit. An additional weighted block operated limit shall be include
20. Hoist motor brake shall be DC disc type with adequate torque to stop and hold over **125%** of the hoist rated load.
21. The wire rope drum shall have a minimum groove depth of 3/8 diameter of the wire rope.
22. The rope drum shall be equipped with a hinged bar to help keep the rope aligned in the grooves of the drum. The bar shall actuate a switch that stops the up-motion when the rope is improperly aligned on the drum.
23. Wire rope shall be constructed from galvanized steel having a minimum safety factor of 5. Wire rope shall not be of metric type; 6x37 or 7x35

shall be preferred.

24. Wire rope sheaves/pulleys mounted on the trolley shall be configured so that said sheaves/pulleys can be inspected and removed from the top and not from underneath for ease of access and maintenance.

Sheaves shall have 10,000 L-10 bearing life and 20:1 ratio to rope diameter for Class "D" cranes.

25. Hoist reeving shall be dual-reeved for true vertical lift. No horizontal hook drift is acceptable when operating the hoisting motion.
26. The actual hoist control enclosure rating shall be at least equivalent to IP55 / NEMA 4 type.
27. Hooks shall be made of forged alloy steel and shall be fitted with a spring-loaded safety latch.
28. Hook block shall be made of plate steel. Stamped or pressed steel shall not be used.
29. Lower block sheaves/pulleys shall be 400BHN for durability. Lower sheaves shall be 20:1 ratio to wire rope diameter for Class "D" cranes.
30. AGMA quality class 12 machine cut, hardened and precision ground hoist gearing. The gears inside the hoist gearboxes shall be lubricated by oil and not semi-fluid grease.
31. AGMA quality class 12, hardened and precision ground trolley drive gearing, lubricated.
32. Trolleys shall have energy absorbing bumpers.
33. All hoist and trolley wiring shall be in rigid or flexible conduit.

B. BRIDGE GIRDER

1. Bridge girder shall be per 1.01B above, as applicable.
2. Bridge girders shall be constructed from Structural beams, Steel, ASTM A36 or A992, as required.
3. Bridge girders shall be fitted with ASCE rail for trolley to run upon.

C. END TRUCKS AND BRIDGE DRIVE

1. End trucks shall be designed in accordance with CMAA specifications as applicable (reference appendix B).
2. End trucks shall be bolted to bridge girder.

3. Bridge drive shall be dual-motor (A-4 arrangement per CMAA).
4. Bridge drive shall be designed to stop the bridge within CMAA specifications.
5. End trucks shall be equipped with rail sweeps and energy-absorbing rubber bumpers.
6. Travel limit switches to be provided as necessary for safe operation.
7. Bridge shall be furnished with an adjustable frequency inverter drive for smooth acceleration and deceleration.
8. Bridge motors shall be inverter duty motors with minimum class "F" insulation and motor enclosures shall be TENV [totally enclosed non-ventilated]. Bridge motors shall not exceed 2500 revolutions per minute and shall be NEMA motors.
9. AGMA quality class 12, hardened and precision ground bridge drive gearing.
10. End trucks shall have dual-flanged wheels designed to run upon ASCE rail fitted to runways by either J-bolts or specifically designed clips.

D. POWER SUPPLY

1. Power supply for the hoist shall be 440 volt, 3 ph., 60 Hz. All power required for the operation of the hoist, trolley, and end trucks shall be developed from this source.
2. Runway electrification shall be 4-bar safety type rigid conductors as manufactured by Insul-8, Duct-O-Wire Company or Wampfler. Wall mounted disconnect switch and power to runway conductors provided by Contractor's Electrical Sub-contractor..
3. Unless otherwise noted, scope of supply shall assume that runway power supply feeds current to runway electrification system at center of runway, and specifically is not end-fed.
4. Crane supplier shall verify that the electrical supply service is adequate.
5. Crane installer is to supply and install runway electrification, from the supply mainline disconnect with fused breaker appropriately sized with conduit up to runway elevation and minimum ten feet of loose cable at end conduit for wiring to runway electrification. Solid core wire shall not be used.
6. Cross bridge electrification shall be flat cable style festoon system with terminal box, multi-conductor cord, plug connectors (when available) and accessories. Cables are to be hardwired when plug connectors are not

available.

E. CONTROLS

The following controls shall be used as applicable:

1. Six-way operation, plug-in pushbutton pendant suspended from independent festoon track and an MLTX remote radio controller.
2. Pendant shall include Start (momentary) button and Emergency Stop (push to maintain, turn to release) that controls a mainline contactor in the bridge control panel.
3. Pushbutton and radio shall be clearly marked with hoist, trolley and bridge travel directions.
4. Hoist shall be variable frequency inverter control with encoder and closed feedback loop.
5. Trolley and bridge controls shall be variable frequency inverter control (standard), as required per section 1.01.B.
6. Electrical control enclosures shall be IP55 or NEMA 4 type. Pushbutton enclosure shall have a rating of IP65, NEMA 4X, 4 or 5.

F. LABELING

1. Hoist and bridge beam shall be labeled with load rating.
2. A corrosion-resistant nameplate shall be fixed to the bridge with the following information:
 - a. Name of manufacturer
 - b. Mfg.'s model number and serial number
 - c. Capacity
 - d. Date of manufacture (month and year)

G. PAINTING

1. Hoist and trolley shall be factory painted (2-part epoxy) per manufacturer's standards.
2. Bridge shall be shop cleaned, primed, and painted per manufacturer's standards.
3. The following items shall not be painted:
 - a. Rail surfaces in contact with wheels

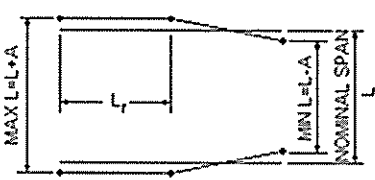
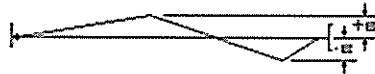


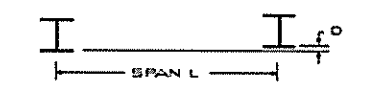
- b. Wheel running surfaces
- c. Hoist wire rope
- d. Conductor bar, festoon cables and supports

PART 3 – EXECUTION (if applicable to crane manufacturer)

3.01 INSTALLATION AND INSPECTION

- A. Inspect structure and crane rail erection for conformance with reviewed shop drawings and contract documents prior to installation of equipment. Bring nonconforming work to the attention of the customer prior to proceeding with crane installation. Non-conforming runway structure or installation must be corrected prior to crane installation and load testing of crane system. Crane provider shall not be required to warrantee or otherwise guarantee proper functioning of equipment installed on a runway that does not meet CMAA specification. Runway end stops shall be included in this specification or scope of supply.

REQUIRED RUNWAY TOLERANCES

ITEM	FIGURE	OVERALL TOLERANCE	MAXIMUM RATE OF CHANGE
CRANE SPAN (L) NOMINAL SPAN L		L ≤ 50' A = 3/16" L > 50' ≤ 100' A = 1/4" L > 100' A = 3/8"	1/4" IN 20'
STRAIGHTNESS (B)		B = 3/8"	1/4" IN 20'
ELEVATION (C)		C = 3/8"	1/4" IN 20'
TOP RUNNING TRANSVERSE RAIL TO RAIL ELEVATION (D)		L ≤ 50' D = +/- 3/16" L > 50' ≤ 100' D = +/- 1/4" L > 100' D = +/- 3/8"	1/4" IN 20'
TRANSVERSE GIRDER TO GIRDER ELEVATION UNDER RUNNING (D)			

- B. Scope of supply shall note explicitly whether installation is required.
- C. General contractor shall engage a third party surveyor that is not in the business of manufacturing overhead cranes or hoists to ensure straightness and levelness of runway for entire length before installation of crane(s).

3.02 TESTING

- A. On-site load testing is required, the crane equipment shall be operated through a complete lift and lowering cycle and through a complete travel of the bridge and trolley to determine that the equipment shall perform smoothly and safely and that pendant cable length is sufficient to permit operation from desired floor levels. All tests shall be carried out with the bridge crane equipment loaded at 125 percent of capacity. The contractor shall provide the test weight loads and rigging. Any defects shall be corrected by the bridge crane provider without any expense to the Owner.

3.03 USE BY CONTRACTOR

- A. If crane is used by the Contractor, it shall be repaired, repainted, and otherwise refurbished to like new condition prior to its acceptance. The crane provider shall then perform a detailed inspection at contractor's cost prior to warranty taking effect. The Contractor assumes all responsibility for operation and maintenance until the crane has been accepted by Owner.

3.04 CLEANUP

- A. Upon completion of work, area shall be cleaned and restored to original condition, acceptable to the Owner.

END OF SECTION