TABLE OF CONTENTS

PART I – SUPPLEMENTAL SPECIFICATIONS

DIVISION 1 - GENERAL PROVISIONS AND COVENANTS

SECTION 1010

1.03 – DEFINITIONS AND TERMS

JURISDICTION: The Jurisdiction is the City of West Branch. Any reference to either shall be considered one in the same.

SECTION 1030

1.02 – RELEASE OF BID SECURITY

A. The Jurisdiction shall retain the bid security of the lowest three bidders. The bid securities of the three lowest bidders will be released after the Jurisdiction's approval of the contract executed by the lowest bidder.

SECTION 1040

1.05 – PLANS

A. Contractor's bids shall be based on the final Plans and any addendum received.

D. Electronic files made available to the Contractor shall be limited to the finished ground surface and general linework. The full project CAD file will not be made available.

1.06 – INCREASE OR DECREASE OF WORK

B. Quantity change, regardless of the percentage increase or decrease of the total bid, shall not affect the unit bid price of that item.

C. The Jurisdiction expressly reserves the right to remove any bid item from the project at any time prior to construction of that item. Payment to the Contractor for the removed item shall only take place if materials are delivered to the project site. The Contractor shall be due any transportation and restocking charges for standard items, or transportation and supplier invoice price for specialty items. Under no circumstance will the Contractor be due any scheduled profit on work not performed on the project.

SECTION 1050

1.03 – COOPERATION BY THE CONTRACTOR - SPECIAL ATTENTION TO THIS SECTION IS REQUESTED OF ALL BIDDING CONTRACTORS

SECTION 1060

1.02 – ALTERNATE PROCESSES, EQUIPMENT, OR MATERIALS

B. 3. Any products and materials called out by proprietary or manufacturer's name may be substituted with those of equal or better quality and/or performance if preapproved by the Engineer prior to bid. Those products and materials shall have information submitted in writing to the Engineer not less than ten days before the bid. Any products successfully preapproved shall be listed in an addendum issued not less than five days before the bid.

1.04 – STORAGE OF MATERIALS

The Project Site east of the waterway and outside of the pipeline easement may be used as a staging area for storage of equipment and materials for this project where indicated on the Plans. Contractor shall return areas not scheduled to be disturbed to a condition similar to that prior to construction. This includes, but is not limited to: smoothing any ruts, removing all trash and debris, and reseeding the area. No payment will be made for work or materials required to return staging area to preconstruction condition.

SECTION 1070

2.02 – CONVENIENCE AND SAFETY - SPECIAL ATTENTION TO THIS SECTION IS REQUESTED OF ALL BIDDING CONTRACTORS

C. Work shall be completed in a manner that will cause the least inconvenience and annoyance to the public and property owners abutting the work area, and shall provide access to the abutting property to the greatest extent practicable. Contractor

shall notify property owners a minimum of 48 hours in advance when access will be restricted to their properties.

2.06 – TRAFFIC CONTROL

A. 3. Traffic Control shall be paid for by lump sum and shall include any and all traffic control used on the Project, including flaggers, pilot cars, signs, barricades, safety closures, etc., if necessary. The Contractor shall take full responsibility for Traffic Control and hold both the Jurisdiction and the Jurisdictional Engineer harmless.

2.13 – BORROW AND WASTE SITES

A. Contractor shall secure and operate, at its own expense, sites for disposal of Class 13 Excavation, Structures, Surfacing Materials, and Rubbish and Debris.

3.01 – PERFORMANCE, PAYMENT, AND MAINTENANCE BOND

B. Products and Completed Operations shall be maintained for the duration of the work; and shall be further maintained for a minimum period of two (2) years after final acceptance and payment.

3.02 – INSURANCE REQUIREMENTS

C. 2. j. Not Applicable.

6. Additional Insured Endorsements –

c. See Section 1070, Part 3.06 for information on all required endorsements which include naming of the Jurisdiction as an additional insured, cancellation and material change endorsement, and Nonwaiver of Governmental Immunity.

3.05 – PROPERTY INSURANCE – NOT APPLICABLE

SECTION 1080

1.01 – SUBLETTING OR ASSIGNMENT OF CONTRACT

A. The percentage of work to be completed by the contractor is waived on this project due to the types of work required.

1.02 – CONTRACT TIME

A. 1. Contractor shall fully complete the project by November 2, 2018.

B. Contractor shall complete the work required to commence the Grow-In Plan per the Special Provisions by June 15, 2018.

SECTION 1090

1.05 – PROGRESS PAYMENTS

D. Partial pay estimates shall be submitted by the Contractor to the Engineer by the last Saturday of each month for work completed the previous month.

<u>DIVISION 2 - EARTHWORK</u>

SECTION 2010

1.03 – SUBMITTALS

A. The Jurisdictional Engineer hereby requests that all materials to be incorporated into the work have certifications furnished which show that the materials comply with Specifications prior to any construction.

1.07 – SPECIAL REQUIREMENTS

A. Electronic Files: During bidding, Contractors will be provided the following data upon request and subject to the Contractors' agreement to the terms of Fehr Graham's

'LETTER OF AGREEMENT FOR TRANSFER OF ELECTRONIC DATA'. Electronic files are provided for contractor's convenience and Plans shall govern.

1. Existing and proposed project linework in .dwg format.
2. Existing topographic surface and proposed finished surface in .xml format. Finished surface will be to top pavement and top of topsoil.
3. No other formats will be provided for bidding. It shall be the contractors' responsibility to independently verify the data for accuracy and conformance to the Plans both for bidding and construction. Request for data must be requested through Fehr Graham's Cedar Rapids office at 319.294.6909. Data will be provided within two business days from receipt of request.

1.08 – MEASUREMENT FOR PAYMENT

D. 1.a. Measurement for topsoil stripped, salvaged, and spread will be Plan quantity in cubic yards, without final field measurement. The project quantity is 15,160 CY for Phase 1 and 675 CY for Phase 2 and is calculated on the basis of a uniform 9-inch thickness within the excavation limits for respective phases.

E. 1. Estimates of Earth work for the Project, unadjusted, are as follows:

Phase 1 Total Excavation – 36,540 CY Fill Material – 36,750 CY Cut Material. Excavation shall be considered balanced for this project. The figures noted do not include shrinkage factor, Contractor shall make these interpretations at their own risk. This site contains sufficient borrow to account for shrinkage where is, as is. In addition, the figures provided exclude topsoil, subbase, and pavements.

Phase 2 Total Excavation – 0 CY Fill Material – 2,191 CY Cut Material. Excess material shall be disposed of by the contractor. The figures noted do not include shrinkage factor, Contractor shall make these interpretations at their own risk. This site contains sufficient borrow to account for shrinkage where is, as is. In addition, the figures provided exclude topsoil, subbase, and pavements.

3. g. Excavation shall include subgrade preparation at no additional cost.

G. 2. No separate payment shall be made for Subgrade Preparation as it shall be incidental to the Excavation.

I. Subbase: Subbase shall include furnishing and placement of Modified Subbase. Measurement shall be by the ton of material placed based on weight tickets. Placement beyond that indicated in the Plans or as directed by the Engineer will be measured and converted to tons using a factor of 140 lbs./cu.ft. and deducted from the weight indicated by the ticket totals.

N. Contractor to complete proof rolling as required in Part 3.06, B. No additional payment will be made for proof rolling, as it shall be incidental to the Excavation bid item.

O. SUBBASE, WASHED SAND

1. **Measurement:** Measurement will be in tons placed of sand base placed.
2. **Payment:** Payment will be at the unit price per ton of material placed.
3. **Includes:** Work includes, but is not limited to, furnishing, placing, compacting, and trimming to the proper grade. Refer to Infield Skin Surface Special for additional requirements. Provide minimum 5 lb. sample to Engineer for approval prior to placement.

P. Infield/Warning Track Skin Surface

1. **Measurement:** Measurement will be in tons placed for the infield and warning track locations indicated in the plans.
2. **Payment:** Payment will be at the unit price per ton of material placed.

3. **Includes:** Work includes, but is not limited to, furnishing, placing, compacting, and trimming to the proper grade. Refer to Infield Skin Surface Special for additional requirements.

Q. Batting Cage Surface
1. **Measurement:** Measurement will be in tons placed.
2. **Payment:** Payment will be at the unit price per ton of material placed.
3. **Includes:** Work includes, but is not limited to, furnishing, placing, compacting, and trimming to the proper grade.

3.04 – EMBANKMENT CONSTRUCTION

E. Type A Compaction required for all embankment construction and subgrade preparation.

3.06 – SUBGRADE PREPARATION

A. A disk of the size indicated in Section 2010, Part 3.04, C. 4 shall be used to turn and mix all soils in cut or fill sections. Type A Compaction required for all subgrade preparation.

DIVISION 3 – TRENCH AND BACKFILL

SECTION 3010

1.03 – SUBMITTALS

B. Results of Standard Proctor and In-Place Density tests will not be required.

1.08 – MEASUREMENT AND PAYMENT

D. If material on site is suitable, it shall be used with no additional payment before offsite replacement material is used. Authorization for use of offsite replacement material shall be obtained from the Engineer and agreed upon change order unit price before it is hauled. Any hauling and placement prior to authorization shall be at the Contractor's cost.

F. No payment shall be made for trench compaction testing, when required. Jurisdictional Engineer or Jurisdiction to require compaction testing only if backfill operations are deemed inappropriate or proof rolling over trenches indicates a deficiency.

2.02 – BEDDING MATERIAL

A. 1. Use clean stone for pipe envelope in wet trench or as directed by the Engineer. IDOT gradation no. 11, 12 or 31 shall be used for pipe envelope in dry trench unless otherwise directed by the Engineer. Contractor shall note on weigh tickets use of material and shall stockpile separate from Subbase for parking lot and trail use.

3.05 – PIPE BEDDING AND BACKFILL

Pipe Embedment Requirements for Rigid Gravity Pipe:
Rigid Pipe – RCP: No bedding required
Rigid Pipe – RCAP and RCEP: Class R-5
Rigid Pipe – DIP: No bedding required

Pipe Embedment Requirements for Flexible Gravity Pipe:
Semi-Rigid – PVC Truss Pipe and DR18: Class F-2

Flexible Pipe – HDPE, PP, and PVC Gravity Pipe (SDR 23.5, 26, 35): Class F-3

Pipe Embedment Requirements for Pressure Pipe:
Rigid Pipe – DIP: Class P-1 or Class P-2
Semi-Rigid Pipe – PVC DR18: Class P-3

3.07 – DRAINAGE TILE REPAIR

Contractor shall repair any drainage tile damaged by trenching operations. Damaged drainage tile shall be repaired with Schedule 40 PVC of the same nominal interior diameter

as the existing drainage tile. A minimum 2' length of pipe on each side of the trench shall be placed on undisturbed ground. PVC repair section shall be abutted to existing tile ends with 1/8" maximum joint spacing and joint wrapped with engineering fabric. Trench backfill below tile repair shall be compacted to 95% standard proctor density. Granular pipe envelope will not be required for tile repair. Drainage tiles shall be replaced so that the former gradient and alignment is restored. Contractor shall furnish all materials. Drainage tile repair shall be incidental for all tile repairs with tile crossing trench perpendicular plus or minus 70 degrees to the trench unless otherwise indicated in the Plans or Contract Documents. Repair of tile crossings within 20 degrees of parallel to the trench shall have a separate payment item.

DIVISION 4 – SEWERS AND DRAINS

SECTION 4010

1.03 – SUBMITTALS

A. The Jurisdictional Engineer hereby requests that all materials to be incorporated into the work have certifications furnished which show that the materials comply with Specifications prior to any construction.

1.08 – MEASUREMENT FOR PAYMENT

A. 1. b. Payment shall be Plan length unless modification is approved by the Engineer.

E. Sanitary Sewer Service Stub shall include one full pipe length (+/- 13 feet) and cap for future connection by Others.

2.01 – PRODUCTS

A. 1. Sanitary sewer main to be PVC SDR 26 heavy wall sewer pipe.

3.04 – PIPE JOINTING

F. 1. Connection between existing pipe and new pipe of dissimilar materials shall be made by flexible couplers with stainless steel shear ring such as Fernco, or approved equal. Connection between new pipes of dissimilar materials shall be with DIP solid repair sleeve and appropriate transition gaskets. These couplers shall be incidental to installation of the sewer pipe.

SECTION 4020

1.03 - SUBMITTALS

A. The Jurisdictional Engineer hereby requests that all materials to be incorporated into the work have certifications furnished which show that the materials comply with Specifications prior to any construction.

1.08 – MEASUREMENT FOR PAYMENT

A. 1. a. Measure each size and type of pipe installed from inside wall of intake/manhole to inside wall of intake/manhole.

2.01 – STORM SEWERS

A. 2. Storm sewer main to be RCP class 2000D or HDPE as specified in the Plans.

3. Use tongue and groove joints wrapped with engineering fabric, unless a rubber O-ring or profile gasket complying to ASTM C 443 is specified. (Take heed that O-ring gasket and non-gasket pipes may be of different pipe construction)

SECTION 4040

1.03 – SUBMITTALS

A. The Jurisdictional Engineer hereby requests that all materials to be incorporated into the work have certifications furnished which show that the materials comply with Specifications prior to any construction.

3.01 – SUBDRAIN

A. 2" HDPE Subdrain shall be installed in compliance with Sportsfield Subdrainage Special Provision.

SECTION 4060

3.04 – SANITARY SEWER LEAKAGE TESTING

C. Low pressure air test shall be required unless alternate testing method is required or approved by jurisdictional Engineer due to ground water levels.

3.05 – DEFLECTION TESTING

A. Deflection test shall be required on all sanitary sewer flexible pipes.

DIVISION 5 – WATER MAINS AND APPURTENANCES

SECTION 5010

1.03 - SUBMITTALS

A. The Jurisdictional Engineer hereby requests that all materials to be incorporated into the work have certifications furnished which show that the materials comply with Specifications prior to any construction.

1.08 – MEASUREMENT FOR PAYMENT

C. 2. Payment will be made based on the body weight of compact ductile iron fittings for each fitting as listed below. All joint accessories, including thrust blocks and/or mechanical joint restraints, shall be incidental to the bid item.

8" by 6" MJ Reducer – 38 LBS
6" MJ 90° Bend – 43 LBS
6" MJ 45° Bend – 36 LBS
6" MJ 22.5° Bend – 34 LBS
6" 11.25° Bend – 30 LBS
6" by 6" MJ Tee – 60 LBS
6" Cap or Plug – 18 LBS
6" Solid Repair or Cutting-In Sleeve – 85 LBS
6" by 3" MJ Tee – 47 LBS
3" Cap or Plug – 8 LBS

3. Weight for any fitting used not included on the Plans will be determined by the Jurisdictional Engineer and use of such fitting shall be preapproved by the Jurisdictional Engineer.

D. All connectors, corporations, valves, and fittings required for service lines shall be incidental to the service stub.

F. Payment will be made at the unit price for each point of connection to the existing water main with the new main. Unit price includes, but is not limited to all excavation, labor, equipment, and incidental materials required to locate the existing location point, shut down water, review proposed connection, cut existing piping, dewater excavation, and make connection.

G. Irrigation Delivery System for 3 Fields

1. **Measurement**: Lump sum item; no measurement will be made.
2. **Payment**: Payment will be the contract lump sum price.
3. **Includes**: Work includes, but is not limited to, trench excavation, dewatering, furnishing bedding material, placing bedding and backfill material, and all labor and materials necessary to install the irrigation delivery system in accordance with the plans. Refer to Irrigation Special Provision for detailed requirements. Some required materials include:
    a. 2" service line stub from mechanical room
    b. Backflow preventer
    c. Irrigation controller
    d. Valves, drains and accessories

e. Ridged electrical conduit chase from mechanical room

H. Irrigation system

1. **Measurement**: Lump sum item; no measurement will be made.
2. **Payment**: Payment will be the contract lump sum price for each application.
3. **Includes**: Work includes, but is not limited to, trench excavation, dewatering, furnishing bedding material, placing bedding and backfill material, and fittings. Refer to Irrigation Special Provision for detailed requirements. Some required materials include:
    a. Irrigation system design drawings
    b. Irrigation system mainline
    c. Control valves and boxes
    d. Quick coupler valves and boxes
    e. Control wiring
    f. Lateral piping
    g. Sleeves
    h. Heads
    i. Isolation valves

2.01 – WATER MAIN PIPE

B. Water main shall be PVC DR18 or Class 52 ductile iron pipe as noted on the Plans.

2.02 – BOLTS FOR WATER MAIN AND FITTINGS

A. Bolts and nuts may be stainless steel or "Cor-blue" per standard specification.

B. All other bolts and nuts shall be stainless steel.

2.03 – FITTINGS

A. 5. Fittings shall be made in the USA. Fittings include mechanical restrained joints where applicable.

2.04 – CONCRETE THRUST BLOCKS

B. Minimum bearing surface area (Square Feet) shall be as follows against undisturbed soils for test water pressure of 150 lbs./sq.in. If water test pressure is above 150 lbs./sq.in., the thrust bearing area shall be increased based on the actual test pressure.

Main Size (in.)	Tee or Dead End	90º Bend	45º Bend	22.5º Bend	11.25º Bend
4	1.4	1.9	1.0	1.0	1.0
6	2.8	4.0	2.1	1.1	1.0
8	4.8	6.8	3.7	1.9	1.0
10	7.3	10.3	5.6	2.8	1.4
12	10.3	14.5	7.9	4.0	2.0
16	17.8	25.2	13.6	7.0	3.5

The above areas are based upon a soil bearing capacity of 2,000 lbs./sq.ft. If soil bearing strength is less than 2,000 lbs./sq.ft., the thrust bearing area shall be increased based on the actual soil bearing strength. Thrust blocks may be waived for 11.25º bends on mains 8" or less if restrained fittings are used and a minimum of 9 feet of pipe is connected to each side of the fitting.

D. Restrained joints are to be used in addition to thrust blocks. Thrust blocks shall be poured as per Section 5010, 2.04 or shall be a single precast concrete block with integral lift hook(s) of sufficient size (minimum 2'x2'x3' of solid concrete) meeting the bearing area requirement with mechanically compacted soils between block and

undisturbed trench wall. If main is to be put back in to service immediately, poured thrust blocks shall be of M-4 mix with calcium chloride for rapid setting.

2.05 – PIPELINE ACCESSORIES

A. Polyethylene Wrap is required for DIP on this project.

B. Tracer System is required on this project.

2.10 – Irrigation System

A. Comply with Irrigation Special Provision.

3.06 – TRACER SYSTEM INSTALLATION

F. Tracer wire station required.

G. Contractor is required to test tracer system upon completion of construction. Test shall be witnessed by Engineer or Owner.

3.12 – Irrigation System

A. Comply with Irrigation Special Provision.

SECTION 5020

2.01 – VALVES

A. 4. Valves shall be Mueller or Clow brand with standard thread operation. Valve manufacturer and model must be approved by Engineer prior to ordering by Contractor. Unapproved and delivered valves shall be returned by Contractor and replaced with approved model at no additional cost to the Jurisdiction.

2.02 – FIRE HYDRANT ASSEMBLY

B. New Fire Hydrant shall be Mueller Super Centurion 250, Catalog No. A-423 type hydrant. Nozzle threads shall match common existing Jurisdiction hydrant threads. Minimum depth of bury shall be 6.5'. Fire Hydrant manufacturer and model must be approved by Engineer prior to ordering by Contractor. Unapproved and delivered hydrants shall be returned by Contractor and replaced with approved model at no additional cost to the Jurisdiction.

C. Features:

4. HOSE NOZZLES: Two 2-1/2" hose nozzles and one 5" SOTRZ connection.

7. OTHER:

a. Nozzle threads: National Standard.

b. Operating nut: National Standard, open left;

SECTION 5030

3.03 – DISINFECTION

A. 5. Testing shall be responsibility of the Contractor. No additional payment will be made for the testing, as it shall be incidental to the water main in place.

B. 5. AWWA C651 requires two consecutive sets of acceptable samples, taken at least 24 hours apart, from new main.

<u>DIVISION 6 – STRUCTURES FOR SANITARY AND STORM</u>

SECTION 6010

1.03 - SUBMITTALS

The Jurisdictional Engineer hereby requests that all materials to be incorporated into the work have certifications furnished which show that the materials comply with Specifications prior to any construction.

2.05 – PRECAST RISER JOINTS

B. 1.c. Butyl Sealant Wrap shall be placed on exterior at all riser section joints. See figure 6010.301.

2.10 – CASTINGS (RING, COVER, GRATE, AND EXTENSIONS)

C. 4. Manhole casting Types A, C, and E shall be used with non-paved or flexible surfaces, including HMA, seal coat, gravel, and brick as per Table 6010.03. Manhole castings

Types B, D, and F shall be used with PCC surfaces, including castings in concrete box outs as per Table 6010.03.

2.11 – CHIMNEY SEAL - REQUIRED

A. 1. Use external seal on sanitary manholes with Type A & C castings under unpaved areas.
2. Use internal seal on sanitary manholes with Type B & D castings or Type A & C castings under paved areas and all Type E manholes.

SECTION 6030

3.04 – SANITARY SEWER MANHOLE TESTING

B. Vacuum Test: Waived unless visual inspection by Jurisdictional Engineer shows cause for additional testing prior to Jurisdiction acceptance.

C. Exfiltration Test: Waived unless visual inspection by Jurisdictional Engineer shows cause for additional testing prior to Jurisdiction acceptance.

DIVISION 7 – STREETS & RELATED WORK

SECTION 7010

1.03 - SUBMITTALS

All submittals listed in the standard specifications shall be provided.

D. Certified plant inspection by the Contractor is NOT required on this project. Standard Iowa DOT plant report forms shall be completed by the Contractor/Supplier and submitted to the Jurisdictional Engineer weekly. Iowa DOT Standard form 830212 for ready mix concrete (load tickets) shall be completed for each load for collection at the grade.

1.07 – SPECIAL REQUIREMENTS

A. Maturity Method for determination of opening time may be used for this project at the Contractor's option. Contractor/Supplier shall develop and/or verify maturity curve prior to the start of paving operations. No additional payment shall be made for Maturity Method or development or verification of maturity curve.

1.08 – MEASUREMENT FOR PAYMENT

2.01 – MATERIALS

D. Class 3 durability ONLY for this project.

2.02 – MIXES, IOWA DOT IM 529

A. 1. Minimum compressive strength shall be 4,500 psi at 28 days. Contractor may use Class M mix, but no additional payment will be made for this mix.

SECTION 7030

1.08 – MEASUREMENT FOR PAYMENT

I. Contractor will not be required to perform Plastic Concrete testing. Air, Slump, Cylinders, and/or Beams to be completed by the Jurisdictional Engineer. Contractor shall provide materials for these tests with no additional payment.

2.01 – PORTLAND CEMENT CONCRETE MIX

A. Class C, 4,500 psi at 28 days compressive strength required.

2.07 – DETECTABLE WARNINGS

A. Detectable warnings shall be pre-manufactured panels. Panels shall be brick red in color or other color approved by the Engineer prior to placement. Panels shall be uncoated cast iron, precast concrete, ceramic composite, glass and carbon composite (fiberglass), or other rigid materials approved by the Engineer prior to placement.

3.04 – PCC RECREATIONAL TRAILS, SIDEWALKS, AND DRIVEWAYS

F. 2. b. 3. All transverse contraction joints shall be sawed. Joints may be sawed within 12 hours of placement with a 1/8-inch blade saw to a depth of 1/3 the pavement thickness. Use a straightedge if joints are sawed with a hand-held saw.

3. b. 2. All longitudinal contraction joints shall be sawed. Joints may be sawed with a 1/8-inch blade to a depth of 1/3 the pavement thickness. Use a straightedge if joints are sawed with a hand-held saw.

5. b. Sealing of expansion and isolation joints is required. Trim preformed joint material to a depth of ½ inch below the concrete surface. Ensure the joint is clean and dry. Install joint sealant per manufacturer's recommendations.

DIVISION 8 – TRAFFIC CONTROL

SECTION 8020

1.08 – MEASUREMENT FOR PAYMENT

C. PAINTED PAVEMENT MARKINGS, DURABLE:

1. **Measurement**: Lump sum item; no measurement will be made.
2. **Payment**: Payment will be the contract lump sum price.

SECTION 8030

1.08 – MEASUREMENT FOR PAYMENT

A. SIGN, INSTALL, HANDICAP:

1. **Measurement:** Each sign installed shall be counted. When specified, W/ VAN item includes both standard restricted parking sign (R7-8) and van sign (R7-8P) and shall be counted as one sign.

2. **Payment:** Payment will be the unit price for each sign installed.

3. **Includes:** Work includes, but not limited to, furnish perforated square tube post and anchor, aluminum sheet metal sign, nuts and bolts, materials, labor, and equipment necessary to install each sign in accordance with the plans, specifications, and MUTCD.

2.01 – SIGN PANELS

A. Signs shall be fabricated from sheet aluminum in accordance with Section 4186.02 A. of the Iowa Department of Transportation Standard Specifications.
B. Retroreflective Sheeting shall be in accordance with Section 4186.03 of the Iowa Department of Transportation Standard Specifications.
C. Sign fabrication shall be in accordance with Section 4186.06 of the Iowa Department of Transportation Standard Specifications.
D. Fastening Accessories shall be in accordance with Section 4186.09 A. of the Iowa Department of Transportation Standard Specifications.
E. Sign shall conform to MUTCD restricted parking sign (R7-8). Arrows may be omitted. When required, van sign shall include both R7-8 and R7-8P.

2.02 – Sign Posts

A. Sign posts shall be Perforated Square Steel Tube (PSST) Posts, 2" square with a 14-gauge wall and 11 feet in length. Steel shall conform to ASTM A1011, Grade 50. Average minimum yield strength after cold-forming must be 60,000 psi. Must be corner welded, scarfed after welding, then zinc coated after scarfing. Must be coated with a chromate conversion coating and clear organic polymer topcoat. Interior and exterior will be galvanized. Must be made in the United States of America.

2.03 – Anchor Post

A. Anchor posts shall be 2-1/4" perforated square steel tube with a 12-gauge wall and 48" in length. Steel shall conform to ASTM A1011, Grade 50. Average minimum yield strength after cold-forming must be 60,000 psi. Must be corner welded, scarfed after welding, then zinc coated after scarfing. Must be coated with a chromate conversion coating and clear organic polymer topcoat. Interior and exterior will be galvanized. Must be made in the United States of America.

3.01 – Sign Panels

A. Signs shall be erected in accordance with Section 2524.03 B.1. of the Iowa Department of Transportation Standard Specifications.

3.02 – Sign Posts

A. Perforated Square Steel Tube (PSST) Posts and Anchors shall be installed in accordance with Section 2524.03 B.3. of the Iowa Department of Transportation Standard Specifications.

DIVISION 9 – SITE WORK & LANDSCAPING

SECTION 9010

1.02 - DESCRIPTION OF WORK

Completed installation shall include preparation of the seedbed, furnishing and installing seed, fertilizer and mulch, maintenance, and guarantee for completed seeded areas.

1.07 – SPECIAL REQUIREMENTS

A. Warranty is required and is incidental to the seeding bid item. No separate bid item is allowed. Warranty is for only permanent seeding within the dates for each variety specified per Section 9010, 2.02.

B. Warranty period is two full years from acceptance.

1.08 – MEASUREMENT FOR PAYMENT

A. 1. Seeding for a completed installation shall be measured in acres, of accepted seeding within the contract or easement limits. Seeding item includes supplying and applying proper seed and fertilizer. Different method of application will not be permitted.

2. Fertilizing shall be incidental to the seeding bid item and will not be paid separately.

B. 1. Measurement: Measurement will be in acres for area of hydraulic mulching.

2. Payment: Payment will be in unit price per acre for area of hydraulic mulching.

3. Includes: Unit price includes, but not limited to, Standard Specifications except furnishing and placing seed or fertilizer.

E. Warranty for seeding, fertilizing, and mulching is required but is incidental to the related bid items. Warranty period shall be for two full years from the date of acceptance. No separate bid item is allowed.

F. Sportsfield Soil Preparation:

1. **Measurement:** Lump sum item; no measurement will be made.
2. **Payment:** Payment will be the contract lump sum price.
3. **Includes:** Work includes, but is not limited to, furnishing, excavating, manipulating, replacing, and trimming to proper grade throughout project. Refer to Special Provisions for additional requirements.

G. Sportsfield Grow In Plan: See Special Provisions.

2.02 – SEED MIXTURES

A. Type 1 (Permanent Lawn Mixture).

D. Type 4 (Urban Temporary Erosion Control Mixture)

I. Ballfield Seeding: Sowing of grass seeds shall be performed only when daytime temperatures are consistently between 60°F and 75°F and nighttime temperatures do not exceed 70°F. Typically Between April 15 through May 31 and September 15 through October 31. Use the following seed mixture for areas designated for Ballfield Seeding.

LEGEND SUPER PRO ELITE by Conserve FS or approved equal

Table 9010.14 Ballfield Seeding Mixture

J. No Mow Fescue: Use the following seed mixture for areas designated for No Mow Fescue. Apply between March 1 and May 31 and between August 10 and September 30

Table 9010.15 No Mow Fescue

Common Name	Application Rate	Purity	Germination
	lb/acre	(%)	(%)
Hard Fescue	63	95	85
Chewings Fescue	62	98	85
Sheeps Fescue	62	90	85
Dawson Red Fescue	38	98	85
Creeping Red Fescue	25	98	85

K. Short Grass Prairie: When soil is free of frost through July 1, use the following seed mixture for areas designated for Short Grass Prairie.

Table 9010.16 Short Grass Prairie Seeding Mixture

8.00 PLS Lbs/Acre	**82.00 Seed/Square Foot**	
Scientific Name	**Common Name**	**Oz/Acre**
Wildflowers		
Alisma subcordatum	Common Water Plantain	1.00
Asclepias incarnata	Marsh (Red) Milkweed	3.00
Aster novae-angilae	New England Aster	1.00
Aster puniceus	Swamp Aster	1.00
Eupatorium maculatum	Spotted Joe Pye Weed	1.00
Eupatorium perfoliatium	Boneset	0.50
Helenium autumnale	Sneezeweed	0.30
Helianthus grosseserratus	Sawtooth Sunflower	0.50
Liatris spicata	Marsh Blazing Star	3.00
Lobelia cardinalis	Cardinal Flower	0.30
Lobelia siphilitica	Great Blue Lobelia	0.35
Pycanthemum virginianum	Mountain Mint	0.50
Rudbeckia laciniata	Wild Golden Glow	3.00
Silphium perfoliatum	Cup Plant	4.00
Solidago riddellii	Riddell's Goldenrod	4.00
Verbena hastata	Blue Vervain	2.00
Vernonia fasciculata	Ironweed	4.00
Zizia aurea	Golden Alexanders	4.00
Grasses, Sedges, & Rushes		
Bromus ciliatus	Fringed Brome	24.00
Carex vulpinoidea	Brown Fox Sedge	4.00
Elymus riparius	Riverbank Wild Rye	30.00
Elymus virginicus	Virginia Wild Rye	24.00
Glyceria grandis	Reed Manna Grass	2.00
Leersia oryzoides	Rice Cut Grass	2.00
Scirpus atrovirens	Dark Green Bulrush	1.00

Scirpus cyperinus	Wool Grass	0.25
Scirpus fluviatilis	River Bulrush	3.00
Scirpus validus	Great Bulrush	0.30
Spartina pectinata	Prairie Cordgrass	4.00

L. Flood Plain: When soil is free of frost through July 1, use the following seed mixture for areas designated for Flood Plain.

Table 9010.15 Flood Plain Seeding Mixture

13.50 PLS Lbs/Acre	**83.00 Seed/Square Foot**	
Scientific Name	**Common Name**	**Oz/Acre**
Wildflowers		
Allium cernuum	Nodding Pink Onion	6.00
Amorpha canescens	Leadplant	2.50
Asclepias tuberosa	Butterfly Weed	1.50
Aster azureus	Sky Blue Aster	1.50
Aster laevis	Smooth Blue Aster	2.00
Aster novae-angliae	New England Aster	0.50
Chamaecrista fasciculata	Partridge Pea	10.00
Coreopsis palmata	Prairie Coreopsis	6.00
Dalea candida	White Prairie Clover	4.00
Dalea purpurea	Purple Prairie Clover	3.00
Echinacea pallida	Pale Purple Coneflower	2.50
Echinacea purpurea	Purple Coneflower	6.00
Eryngium yuccifolium	Rattlesnake Master	3.00
Heliopsis helianthoides	Early Sunflower	10.00
Liatris psycnostachya	Prairie Blazing Star	2.50
Monarda fistulosa	Wild Bergamot	1.50
Penstemon digitalis	Smooth Penstemon	0.50
Potentilla arguta	Prairie Cinquefoil	0.20
Pycnanthemum virginianum	Mountain Mint	0.20
Ratibida pinnata	Yellow Coneflower	4.00
Rudbeckia hirta	Black-Eyed Susan	2.50
Rudbeckia subtomentosa	Sweet Black-Eyed Susan	2.00
Silphium laciniatum	Compass Plant	0.50
Solidago speciosa	Showy Goldenrod	1.00
Tradescantia ohiensis	Spiderwort	1.50
Veronicastrum virginicum	Culver's Root	0.10
Grasses, Sedges, & Rushes		
Bouteloua curtipendula	Side Oats Grama	42.00
Carex bicknellii	Copper-Shouldered Oval Sedge	1.00
Elymus canadensis	Canada Wild Rye	32.00
Elymus virginicus	Virginia Wild Rye	32.00
Koeleria cristata	June Grass	2.00

Schizachyrium scoparium	Little Bluestem	32.00

3.08 – RE-SEEDING

A. When all work related to seeding on an area has been completed but is washed out or damaged prior to final acceptance of the seeding area, the area shall be reseeded, refertilized, and remulched without additional compensation.

3.10 – ACCEPTANCE AND WARRANTY

B. 1. Required but incidental to the seeding bid item and shall not be paid separately.
2. The warranty period is twenty-four months beginning on the date of acceptance.

3.11 – HYDRAULIC MULCHING

A. Hydraulic mulching shall be conducted after conventional seeding and fertilizing is completed. Seeding by hydraulic method shall not be permitted.

B. All mulching within the ballfields shall be completed with a clean machine to prevent cross contamination of seed bed. The Engineer shall inspect the hydro mulching equipment prior to beginning work.

SECTION 9030

1.08 – MEASUREMENT FOR PAYMENT

F. Live Fascine

1. Measurement: Measurement will be in linear feet of live fascine placed.
2. Payment: Payment will be at the unit price per linear foot of live fascine placed.
3. Includes: Work includes, but is not limited to, furnishing materials, excavating, equipment, and labor to install the live fascine in accordance with Live Fascine Special Provision.

SECTION 9040

1.08 – MEASUREMENT FOR PAYMENT

P. 2. Water used for Dust Control shall be measured and paid for by the square yard of treated area where applied as directed. Dust Control measures shall be taken when directed by the Engineer.

T. 1. C. Unit price includes removal of the device upon completion of project and is incidental to installation and will not be measured separately. Bid price for each device installed shall include restoration of the area to finished grade and removal and disposal of the device, any appurtenances for the device, and accumulated sediment.

2.15 – DUST CONTROL

A. Clean water, supplied by the Contractor. Water may be purchased from the Jurisdiction with prior approval and metering.

B. Calcium Chloride will not be allowed.

C. Lignosulfonates (tree sap) will not be required unless by change order.

D. Soapstock (Soybean Oil) will not be required unless by change order.

3.13 – RIP RAP

Place rip rap on engineering fabric. Incidental to rip rap bid item. Estimated 136 SY of fabric required.

SECTION 9060

1.08 – MEASUREMENT FOR PAYMENT

G. VERTICAL SLATTED WINDSCREEN MATERIAL, 6’ TALL
Measurement:
Payment:
Includes:

H. FENCING CAP, OUTFIELD FENCE
Measurement: Measurement will be by the linear foot of fencing cap.

Payment: Payment will be by the contract unit price per linear foot.
Includes: Unit price includes furnishing and installing plastic fencing cap and all fasteners, equipment, materials, and labor required for proper installation per manufacturer's recommendations.

2.10 VERTICAL SLATTED WINDSCREEN MATERIAL

A. Slats shall be Pexco PDS Bottom-Lock or LiteLink or equivalent bottom locking screening slats manufactured from extruded HDPE with integral color pigment and UV inhibitors specifically design to resist effects of the sun and have at least a 7-year warranty, color dark green/forest green/green.

2.11 FENCING CAP

A. Fencing cap shall be Pexco Safety Top Cap-LITE or equivalent tear-drop shaped safety cap secured with zip ties, manufactured from extruded HDPE with integral color pigment and UV inhibitors specifically designed to resist effects of the sun and have at least a 10-year warranty, color bright yellow/safety yellow/yellow.

3.04 VERTICAL SLATTED WINDSCREEN MATERIAL

A. Furnish and install slats in chainlink fence where indicated on the plans.
B. Install according to manufacturer's recommendations.

3.05 FENCING CAP

A. Furnish and install fencing cap on the top rail of the chainlink fence where indicated on the plans.
B. Install according to manufacturer's recommendations.

SECTION 9090: SITE FINISHINGS AND EQUIPMENT

PART 1- GENERAL

1.01 SECTION INCLUDES

Items listed in 1.08 Measurement for payment

1.02 Description of Work

Refer to Special Provisions

1.03 SUBMITTALS

Comply with Division 1 – General Provisions and Covenants as well as Special Provisions.

1.04 SUBSTITUTIONS

Comply with Division 1 – General Provisions and Covenants as well as Special Provisions.

1.05 DELIVERY, STORAGE, AND HANDLING

Comply with Division 1 – General Provisions and Covenants as well as Special Provisions.

1.06 SCHEDULING AND CONFLICTS

Comply with Division 1 – General Provisions and Covenants as well as Special Provisions.

1.07 SPECIAL REQUIREMENTS

Refer to Special Provisions

1.08 MEASUREMENT FOR PAYMENT

A. Sportsfield Equipment
   1. Measurement: Lump sum item; no measurement will be made.
   2. Payment: Payment will be the contract lump sum price for each type of field.
   3. Includes: Work includes, but is not limited to, furnishing materials, excavating, concrete, reinforcing steel, miscellaneous hardware, leveling sand, equipment, and labor to install the equipment in accordance with Athletic Field Furnishing Special Provision.

B. Electronic Scoreboards
   1. Measurement: Each type and size of scoreboard will be counted.

2. Payment: Payment will be the unit price for each type and size of scoreboard.
3. Includes: Work includes, but is not limited to, furnishing materials, steel support columns, excavating, concrete, reinforcing steel, miscellaneous hardware, leveling sand, certified footing design, conduit, and labor to install the equipment in accordance with Athletic Field Furnishing Special Provision.

C. Batting Cage Equipment
1. Measurement: Lump sum item; no measurement will be made.
2. Payment: Payment will be the contract lump sum price.
3. Includes: Work includes, but is not limited to, furnishing materials, excavating, concrete, reinforcing steel, miscellaneous hardware, leveling sand, equipment, and labor to install the equipment in accordance with Athletic Field Furnishing Special Provision.

D. Bleachers
1. Measurement: Each type and size of bleachers will be counted.
2. Payment: Payment will be the unit price for each type and size of bleacher.
3. Includes: Work includes, but is not limited to, furnishing materials, excavating, equipment, miscellaneous hardware, and labor to install the equipment in accordance with Athletic Field Furnishing Special Provision.

E. Pickleball Court Equipment
1. Measurement: Lump sum item; no measurement will be made.
2. Payment: Payment will be the contract lump sum price.
3. Includes: Work includes, but is not limited to, furnishing materials, excavating, concrete, reinforcing steel, miscellaneous hardware, leveling sand, equipment, and labor to install the equipment in accordance with Athletic Field Furnishing Special Provision.

F. Pickleball Court Surfacing
1. Measurement: Lump sum item; no measurement will be made.
2. Payment: Payment will be the contract lump sum price.
3. Includes: Work includes, but not limited to, surface preparation, materials, labor, and equipment necessary to complete the work in accordance with the plans and Court Surfacing Special Provision.

G. Playground equipment
1. Measurement: Lump sum item; no measurement will be made.
2. Payment: Payment will be the contract lump sum price for each type of field.
3. Includes: Work includes, but is not limited to, furnishing materials, excavating, concrete, reinforcing steel, miscellaneous hardware, leveling sand, equipment, and labor to install the equipment in accordance with Playground Equipment Special Provision.

H. Safety Surfacing
1. Measurement: Item shall be Plan quantity; no measurement will be made. Contractor shall be responsible for placement of uniform 12” depth.
2. Payment: Payment will be at the unit price for plan quantity.
3. Includes: Work includes, but is not limited to, furnishing materials, excavating, equipment, and labor to install the material in accordance with Playground Equipment Special Provision.

I. Bike Racks
1. Measurement: Lump sum item; no measurement will be made.
2. Payment: Payment will be the contract lump sum price.

3. Includes: Work includes, but is not limited to, furnishing materials, miscellaneous hardware, equipment, and labor to install the equipment in accordance with Site Furnishings Special Provision.

J. Park Benches
1. Measurement: Each park bench will be counted.
2. Payment: Payment will be the unit price for each park bench.
3. Includes: Work includes, but is not limited to, furnishing materials, miscellaneous hardware, equipment, and labor to install the equipment in accordance with Site Furnishings Special Provision

K. Trash Receptacles
1. Measurement: Each trash receptacle will be counted.
2. Payment: Payment will be the unit price for each trash receptacle.
3. Includes: Work includes, but is not limited to, furnishing materials, miscellaneous hardware, equipment, and labor to install the equipment in accordance with Site Furnishings Special Provision

L. Flag Pole
1. Measurement: Each type and size of flag pole will be counted.
2. Payment: Payment will be the unit price for each type and size of flag pole.
3. Includes: Work includes, but is not limited to, furnishing materials, excavating, concrete, reinforcing steel, miscellaneous hardware, certified footing design, conduit, equipment, and labor to install the equipment in accordance with Site Furnishings Special Provision

M. Landscape Boulders
1. Measurement: Measurement will be in tons for each type of landscape boulder.
2. Payment: Payment will be the unit price per ton for each type of landscape boulder.
3. Includes: Work includes, but is not limited to, furnishing materials, excavating, subbase, equipment, and labor to install the equipment in accordance with Landscape Boulders Special Provision

N. Dugout, Lumber Framed
1. Measurement: Each dugout will be counted.
2. Payment: Payment will be the contract unit price per each.
3. Includes: Work includes, but is not limited to, furnishing materials, equipment, and labor to install each dugout according to the Plans.

O. Dugout Bench, Lumber
1. Measurement: Each bench will be counted.
2. Payment: Payment will be the contract unit price per each.
3. Includes: Work includes, but is not limited to, furnishing materials, equipment, and labor to install each bench according to the Plans.

P. Cantilever Dugout
1. Measurement: Each dugout will be counted.
2. Payment: Payment will be the contract unit price per each.
3. Includes: Work includes, but is not limited to, furnishing materials, equipment, and labor to install each dugout according to the Plans.

Q. Dugout Bench, Aluminum
1. Measurement: Each bench will be counted.
2. Payment: Payment will be the contract unit price per each.
3. Includes: Work includes, but is not limited to, furnishing materials, equipment, and labor to install each bench according to the Plans and Athletic Field Furnishing Special Provision.

PART 2 – PRODUCTS
REFER TO SPECIAL PROVISIONS
PART 3 – EXECUTION
REFER TO SPECIAL PROVISIONS

SECTION 9100: SITE ELECTRICAL SYSTEMS
PART 1- GENERAL
1.01 SECTION INCLUDES
Items listed in 1.08 Measurement for payment
1.02 Description of Work
Refer to Special Provisions
1.03 SUBMITTALS
Comply with Division 1 – General Provisions and Covenants as well as Special Provisions.
1.04 SUBSTITUTIONS
Comply with Division 1 – General Provisions and Covenants as well as Special Provisions.
1.05 DELIVERY, STORAGE, AND HANDLING
Comply with Division 1 – General Provisions and Covenants as well as Special Provisions.
1.06 SCHEDULING AND CONFLICTS
Comply with Division 1 – General Provisions and Covenants as well as Special Provisions.
1.07 SPECIAL REQUIREMENTS
Refer to Special Provisions
1.08 MEASUREMENT FOR PAYMENT

A. Electrical System
   1. Measurement: Lump sum item; no measurement will be made.
   2. Payment: Payment will be the contract lump sum price.
   3. Includes: Work includes, but is not limited to, furnishing materials, equipment, and labor to install the complete and functional electrical system to serve the site according to the Plans. This includes, but not limited to, providing service to the Pavilion and field lighting, courtesy outlets at amenities such as the dugouts and batting cage, and scoreboards. Refer to Plans and Special Provisions for additional information on loading, circuitry, and other details.

B. Field Lighting Control System & Distribution
   1. Measurement: Lump sum item; no measurement will be made.
   2. Payment: Payment will be the contract lump sum price for each type of system.
   3. Includes: Work includes, but is not limited to, furnishing materials, equipment, and labor to install the complete and functional control and distribution system to serve 3 sports fields according to the Plans. This includes, but is not limited to furnishing materials, equipment, and labor to install the complete and functional control system with conduit and wiring terminating at each pole location based on manufacturer's approved design. Refer to Plans and Special Provisions for additional information for specific details and performance requirements.

C. Field Lighting Poles and Luminaires

1. Measurement: Lump sum item for each individual field; no measurement will be made.
2. Payment: Payment will be the contract lump sum price for each type of field lighting and each field being lighted.
3. Includes: Work includes, but is not limited to, furnishing materials, equipment, and labor to install light poles and luminaires for a complete and functional field lighting. Refer to Plans and Special Provisions for additional information for specific details and performance requirements.

SECTION 9110: STRUCTURES
PART 1- GENERAL
1.01 SECTION INCLUDES
Items listed in 1.08 Measurement for payment
1.02 Description of Work
Refer to Special Provisions
1.03 SUBMITTALS
Comply with Division 1 – General Provisions and Covenants as well as Special Provisions.
1.04 SUBSTITUTIONS
Comply with Division 1 – General Provisions and Covenants as well as Special Provisions.
1.05 DELIVERY, STORAGE, AND HANDLING
Comply with Division 1 – General Provisions and Covenants as well as Special Provisions.
1.06 SCHEDULING AND CONFLICTS
Comply with Division 1 – General Provisions and Covenants as well as Special Provisions.
1.07 SPECIAL REQUIREMENTS
Refer to Special Provisions
1.08 MEASUREMENT FOR PAYMENT
A. Pavilion Building and Appurtenances
1. Measurement: Lump sum item for each individual field; no measurement will be made.
2. Payment: Payment will be the contract lump sum price for each type of field lighting and each field being lighted.
3. Includes: Work includes, but is not limited to, furnishing materials, equipment, and labor to construct a complete and functional pavilion building. Refer to Plans and Building Specifications for additional information for specific details and performance requirements.

SECTION 11,010: CONSTRUCTION SURVEY
Special attention is directed to the Special Provisions for Infield Construction for required certification of grade tolerances. Certifications are incidental to the Construction Survey.

PART II – SPECIAL PROVISIONS

ATHLETIC FIELD FURNISHINGS

PART 1 – GENERAL

1.01 Description:

A. For the construction of Baseball, and Softball Fields: Provide all equipment, labor, and associated materials necessary to supply and install the following:

1. Foul Pole
2. Dugout Benches
3. Home Plate, Bases, Pitcher's Rubber and Anchors
4. Bleachers
5. Batting Cage
6. Electronic Scoreboard
7. Pickleball posts and Net

1.02 Related Sections:

SUDAS - Cast-in-Place Concrete
Section 06 10 53 - Dugout Roofs for Ballfields
Section 31 00 00 - Earthwork
Section 32 31 13.33 - Chain Link Backstops & Gates
Section 32 91 19.16 - Ballfield Infield Construction

1.03 Quality Assurance:

A. All construction shall be in accordance with the SUDAS Standard Specifications and Plans (most recent edition) except where modified herein.

B. Manufacturer's Instructions: Adhere to manufacturer's instructions for product handling, assembly, installation, and maintenance.

C. Manufacturer's original factory finish must be intact for the installation to be considered satisfactory. On-site touch-up will not be accepted.

D. For Electronic Scoreboard, all electronics must be wired by a licensed electrical contractor.

1.04 Submittals: For each Product Specified, submit the following for approval prior to delivery:

A. Manufacturer's product data.

B. Manufacturer's installation instructions.

C. Submit Shop Drawings for approval, of all electrical lighting fixtures and associated hardware

PART 2 - PRODUCTS

2.01 General:

A. Comply with SPR Standard Specifications and Manufacturer's recommendations at all times. Where these may be in conflict, the more stringent requirements shall prevail.

B. All products shall be supplied as specified, or approved equal. Refer to Section 01 25 00 for Substitution and Product Option requirements.

2.05 Bleachers:

A. Bleachers shall be aluminum and shall be 15 foot length, 4 rows high, with 2x12 aluminum seat planks. Aluminum bleachers shall be one of the following choices:
1. PW Athletic, Model #1171-415A as manufactured by Patterson Williams Company, Mesa, AZ.
2. Kay Park, Model BLRG4A15, as Manufactured by Kay Park Recreation, Janesville, IA.
3. National Recreation Systems, Model NB-0415ALRSTD, as manufactured by National Recreation Systems, Inc., Ft. Wayne, IN.
3. Or, approved equals.

2.06 Dugout Benches:

A. Two Tier Dugout Bench, Aluminum shall have aluminum seat and back with galvanized frame, surface mount benches, and shall be one of the following choices:

1. PW Athletic, Model #1103-15G as manufactured by Patterson Williams Company, Mesa, AZ.
2. Kay Park, Model 152G-A, as Manufactured by Kay Park Recreation, Janesville, IA.
3. National Recreation Systems, Model PB, as manufactured by National Recreation Systems, Inc., Ft. Wayne, IN.
4. Or, approved equal

B. Two Tier Dugout Bench, Lumber, shall be constructed with treated lumber as specified in the plans. All fasteners shall be approved for use with treated lumber.

2.07 Ballfield Equipment:

A. Home Plate, Bases, Pitcher's Rubbers and Anchors, and foul poles shall be the following:

1. Home plates shall be Schutt Universal Home Plate #12807300, all rubber, complete with removable stanchions, female ground anchors, and rubber plugs, or approved equal. Provide (1) home plate for each field and (1) additional spare home plate for each field.

2. Bases (non-break-a-way) shall be Hollywood Pro Impact/Compression Pro, one piece, all rubber construction with universal stanchion, or approved equal. Base Anchors shall be Hollywood CH Standard-duty (1-1/2"), or approved equal. First base on each field shall be an orange safety base with double anchor. Provide one (1) base and anchor(s) for each base location.

3. Pitcher's Rubbers shall be 24"x6" Hollywood Removable Rubber, dual stanchion, or approved equal. Provide (1) rubber and (1) additional spare rubber for each field.

4. Ground Anchors and Plugs shall be provided for each base and pitcher's rubber location. Note: See plans for baseball and softball field layouts.

5. Foul Poles shall be the following Beacon Athletics #130-765-069, 3-12" OD, 13-gauge direct bury, steel tube uprights and an 18" wide expanded metal visibility wing with yellow powder coating.

2.09 Electronic Scoreboard

A. Electronic Scoreboard shall be one of the following:

1. Nevco #1610, 10' x 4' x 8", 18" ht. high intensity Red or Amber LED digits with Console Controller: Nevco #MPCW-7,wireless, with carrying case. Color to be selected from full standard colors. Include all hardware and accessories for two steel column mounting.
2. Daktronics #BA-2518, 9' x 4' x 8", 18" ht. high intensity Red or Amber LED digits with Console Controller: All Sport 1600, wireless, with carrying case.

B. Contractor shall provide two steel H-columns per scoreboard for the purpose of mounting the scoreboards. Bottom of scoreboard shall be mounted at the height specified in the plans. Steel columns shall be primed and painted with two coats of polyurethane paint appropriate for exposed steel.

C. Contractor shall provide certified footing design for scoreboard prior to construction.

2.10 Batting Cage Equipment

A. Batting Cage shall be the following:

1. Beacon Athletics TUFF 1 Modular Outdoor Batting Cage #105-100-780 Single layout 55'L x 14'H x 14'W net. Includes heavy duty 6 5/8" od x

21’ schedule 40 steel poles, Cable offsets units, UV-treated knotless nylon cage net with end panel entrance, pre-assembled overhead cables with quick link attachments, ground cables, and 12’ x 8‘ net protector.

2.11 Pickleball Court Equipment:

A. Pickleball Posts shall be the following:

1. Patterson William #2202-20P, pickleball posts 3-12” OD with 2 fixed eyes, net tightener, and side pully, black powder coating.

B. Pickleball Net shall be the following:

1. Patterson William #8354-36, pickleball 36” x 22’.

2.12 Other Furnishing Installation Materials (as required): Other materials required for product installation which may not be supplied or shipped by the manufacturer or otherwise specified for fabricated items may include the following. These items shall be considered incidental to the respective bid items.

A. Concrete for Direct Burial Footings: Concrete for direct burial footings shall conform to SUDAS and shall be Class “C” concrete.

B. Anchoring Devices for Bolt-down, Surface Installations: Where the manufacturer does not provide a specification for anchoring, use only approved stainless steel wedge anchors as follows:

1. Size to the largest standard diameter that the manufacturer’s pre-made hole will accommodate without force, typically 5/8”.
2. Size to ¾ of the actual depth of concrete to support the installation. Use 2¾” length on standard concrete flatwork.

PART 3 - EXECUTION

3.01 Examination: Verify installation conditions as satisfactory to receive work of this Section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

3.02 Direct Burial Installations:

A. All below-grade steel components scheduled for direct burial installation shall be coated in an approved manner prior to installation, typically either factory powder coating or hot-dipped galvanized.

B. Provide footing excavations sized per measured plans provided with the Contract Drawings, manufacturers printed assembly and installation instructions, or as directed by the Engineer, typically 12" diameter x 18" depth for most installations under 100 lbs/footing.

C. Concrete footings shall be neatly and evenly crowned slightly above adjacent finished grade where adjacent finished grade is generally level, matching adjacent finished grade where adjacent finished grade is sloped, or level to the bottom of base aggregate where installation in paved areas is scheduled. Details provided in the Plan shall govern.

D. Remove all concrete slurry from surrounding surfaces and site furnishings prior to request for inspection.

3.03 Surface Installations:

A. Surface installations shall be made only upon approved concrete surfaces.

B. Use only manufactured approved anchoring devices.

C. Where the manufacturer does not provide a specification for anchoring, use only approved stainless steel wedge anchors as follows;

1. Do not proceed with anchor installation until concrete pavement has had a minimum of 14 days cure time under normal conditions. Where weather conditions are beyond the range of normal, do not proceed with anchor installation without the approval of the Engineer.
2. Size to the largest standard diameter that the manufacturer's pre-made hole will accommodate without force, typically 5/8".
3. Size for embedment of ¾ of the actual depth of concrete to support the installation, in no case less than 2½". Allow for depth of nut plus 3-5 threads protrusion above finished installation.
4. Do not over drill beyond 1/8" the depth necessary to accommodate the anchor.
5. Torque to 80-85% of the anchor manufacturers recommended maximum.
6. Provide at least one anchor for every bolt location hole for any site furnishing.

3.04 Installation of Manufactured Items: Install all equipment in accordance with Specifications, Drawings and manufacturer's directions. Where these may be in conflict, the more stringent requirements govern.

3.05 Installation of Fabricated Items: All fabricated items shall be installed consistent with the measured plans provided in the Contract Drawings utilizing materials

3.06 Cleanup: Remove all metal, wood, and concrete debris, protective wrappings and coverings, and shipping materials from the project site. Remove all residues, repair all stains, scuffs, abrasions, and marks from the finished product prior to requesting inspection. Fully restore all areas of the site that were impacted by the installation activities per SPR Standard Specifications.

END OF SECTION

PICKLEBALL COURT SURFACING

PART 1 - GENERAL

1.01 Description of Work

A. This specification covers the furnishing of materials and the installation of pickleball court surface and markings. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.02 Submittals

A. Submit product data and manufacturer's recommendations for each marking to be furnished.

B. Submit sample of each marking to be furnished.

C. Submit "Line Layout Drawing" prior to installation of marking and upon completion of markings, submit certified line layout drawings indicating all lines and colors. Provide manufacturer’s color palette for Engineer review and approval.

D. Submit product data and instructions for each stencil to be furnished.

1.03 General

A. All construction shall be in accordance with the SUDAS Standard Specifications and Plans (most recent edition) except where modified herein.

B. Manufacturer's Specifications: Adhere to manufacturer's instructions for product handling, assembly, installation, and maintenance.

C. Delivery, Storage and Handling: Deliver paint to site in original sealed containers or drums, with labels legible, intact and unbroken. Comply with all health and fire regulations.

D. Environmental Requirements: Do not install markings on wet or frozen surfaces. Comply with manufacturer's instructions for temperature requirements.

E. Refer to plans for layout and color specifications.

PART 2 - PRODUCTS

2.01 Manufacturers

A. Play Court Surfacing:

1. Plexipave by California Products.

2. Color Plus System by Sports Master Sport Surfaces

3. Acrylotex Sports Coating by Deco Turf
4. Or approved equal.

Color as indicated on drawings.

B. Line Paint:

1. Line Paint for Athletic Wearing Surface court surface: 100% acrylic latex paint, such as Plexicolor by California Products, or approved equivalent.

   Color as indicated on drawings.

2.02 Preparation

A. Ensure no bird baths are present on subject pavement surface for where the court surfacing is intended. Remediate and reconstruct bird baths and surface depressions prior to application of acrylic surfacing.

B. Clear surfaces of deleterious debris.

C. Ensure no access to the subject area until all surfacing and line work are fully cured. Provide barricades as necessary.

D. Schedule application and work accordingly with weather and temperature restrictions. Refer to manufacturer's recommendations.

2.03 Application

A. Install acrylic surface coat per manufacturer's specifications.

B. Line Painting

1. Accurately measure and layout line markings.
2. Apply a minimum of 2 coats of paint.

2.04 Cleaning

A. Upon completion of work, remove containers and debris and leave site in clean orderly condition acceptable to the Owner.

2.05 Protection

A. Erect temporary barriers to protect paint during drying period.

B. Protect markings from damage until completion of project.

END OF SECTION

INFIELD CONSTRUCTION

PART 1 - GENERAL

1.01 Description: Construct the entire ballfield infield and warning track using specified and approved pre-mixed, imported infield soil mix. Spread and compact ***5"*** of specified compact ***5"*** depth of infield mix. Provide and install Batter's/ Catcher's boxes.

1.02 Quality Assurance:

A. All construction shall be in accordance with the SUDAS Standard Specifications and Plans (most recent edition) except where modified herein.

B. Manufacturer's Specifications: Adhere to manufacturer's instructions for product handling, assembly, installation, and maintenance.

1.03 Submittals: For each Product Specified, submit the following for approval prior to delivery:

A. Manufacturer's product data.

B. Manufacturer's installation instructions.

1.04 Related Sections
SUDAS Standard Specifications
Section 11 68 33 – Athletic Field Furnishings
Section 32 80 00 - Irrigation Systems

1.05 Project Conditions: Underground utilities and site elements: Locate all underground utilities and site elements prior to digging. Take care to neither disturb nor damage any existing above ground or underground utilities or site elements.

PART 2 - PRODUCTS

2.01 Infield Materials:

A. Use compacted native topsoil for infield base material:

1. Infield and warning track subgrade shall be compacted to 90% of maximum dry density as measured by the Modified Proctor test (ASTM D1557) shall exhibit an infiltration rate of a minimum of 9 inches per hour.

B. The Infield Aggregate Mix: shall be Bryan Rock Products' Red Ball Diamond Aggregate (RBDA) and shall meet or exceed the following requirements:

Size Sieve	Percent Passing
3/8”	100%
No. 4	95 -100%
No. 40	35-50%
No. 50	50-85%
No. 80	25-35%
No. 200	15-25$

1. 100% Crushed Red Dolomitic Limestone from the Oneota Dolomitic member of the Prairie du Chien Limestone deposit group
2. Color must be red as compared to Bryan Rock Products at Shakopee MN quarry

C. The Contractor shall submit soil analysis results from soils testing laboratory to the Engineer. Indicate source and obtain the Engineer's approval before hauling to site (an analysis test of a 5-pound bag sample is required).

PART 3 - EXECUTION

3.01 Measure and layout infield or warning track according to field dimensions.

3.02 Flag sprinklers if already installed.

3.03 Excavate future infield or warning track area to allow a minimum 5-inch depth. Load, haul and dispose of existing materials in an approved manner.

3.04 Place washed sand subbase. Level with a laser grader.

3.05 Subbase should be damp, but not saturated.

3.06 Compact subbase using a one-ton drum roller. A plate compactor can be used only in areas which a drum roller cannot access.

A. Engineer shall inspect the sub-base for tolerance to grade. A licensed Land Surveyor or Engineer in the State of Iowa shall verify grades on a 10'x10' grid and provide a letter of certification of compliance to tolerances.

3.07 Place Bryan Rock Products’ Red Ball Dimond Aggregate (RBDA) in 2.5” lifts and compact to 90% maximum density.

3.08 The material shall be finish graded with a 2 mm GPS guided device, total station, or laser equipment that allows accuracy to +/- 1/8 inch. A slope as indicated in the plans shall be placed on the infield surface to facilitate surface drainage.

A. The planarity tolerance for the finished grade layer shall be plus or minus 1/8". A duel laser-guided skid steer, box blade or other small equipment shall be used. Following the laser- grading a roller shall be used for final smoothing and compaction. Both the engineer and the owner must approve the final product for both planarity and stability.

3.09 Check for low areas, add additional infield or warning track mix as needed, and compact.

3.10 Install pitcher's rubber, base anchors and home plate area per manufacturer's recommendations and industry standards. Bases, home plate, and pitcher's rubber shall be within 1" of specified distances and locations.

3.11 Cleanup: Remove all metal, wood, and concrete debris, protective wrappings and coverings, and shipping materials from the project site. Remove all residues, repair all stains, scuffs, abrasions, and marks from the finished product prior to requesting inspection.

3.12 Inspection: The finished surface of the infield and warning track shall be smooth and free from any visible dips, humps, bumps or other blemishes which would hinder the removal of water through positive surface drainage or cause undesirable ball hop. Where warranted, a finished elevation survey shall be conducted to assure proper installation

END OF SECTION

IRRIGATION SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnish final design and all labor, materials and equipment for the proper installation of an irrigation system to service the designated areas as indicated on the drawings. Irrigation system is to be designed based on the preliminary design layout provided. Contractor shall submit final irrigation design drawings and calculations to be reviewed by the Owner's Representative and Landscape Architect.

1.02 SYSTEM PERFORMANCE REQUIREMENTS

A. System Design: The system designer/installer shall design the system utilizing the following general guidelines:

1. The system layout shall provide 100% coverage of ballfield outfield lawn as indicated on the drawings.
2. Each zone indicated shall consist of necessary rotor spray heads and one electric valve in a valve box installed flush with grade. Each field shall also have two (2) quick couple valves each of which shall also be installed in a valve box in locations indicated on plan.
3. Booster pump assembly shall be provided if required to maintain pressure to provide proper operation of the system.
4. All inside piping shall be copper as specified.
5. System shall comply with local codes and requirements, including meter (if required) and RPZ backflow preventer.
6. Provide gate valves as required to isolate parts of the total system for the purpose of leak detection and repair.
7. The system shall be a smart system with a weather sensitive controller and soil moisture gauge.

B. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties, unless otherwise indicated:

1. Pressure Piping: 200 psi
2. Circuit Piping: 150 psi
3. Drain Piping: 100 psi

1.03 SUBMITTALS

A. Product Data: Include pressure rating, rated capacity, settings, and electrical data of selected models for the following:
1. Piping
2. RPZ Backflow Preventer

3. Water regulators.
4. Water hammer arresters.
5. Valves. Include aboveground and underground; general-duty, manual and automatic control, and quick-coupler types.
6. Valve boxes.
7. Sprinklers.
8. Weather and Moisture Sensor.
9. Specialties.
10. Controllers.

B. Final Irrigation Design Drawings: Final irrigation design is to be prepared and drawn by the Irrigation Contractor in the form of an "Final Irrigation Design Drawing." The Irrigation Design Drawing shall be clearly and neatly drawn on a reproducible base of the original landscape design; this reproducible base shall be provided by the Landscape Architect. Irrigation Contractor shall submit the Irrigation Design Drawing to the Owner and Landscape Architect for their review before any work under this Contract may begin.

The Owner and Landscape Architect will review the Final Irrigation Design Drawing submittal for compliance with all the requirements of the contract documents. The Owner and Landscape Architect may accept the Final Irrigation Design Drawing as submitted; may mark-up minor corrections, and accept the Final Irrigation Design Drawing as marked-up; or may reject the Final Irrigation Design Drawing, and require that it be resubmitted.

All components of the irrigation system shall be shown, including sleeving, piping, automatic and manual valves, hose bibs and / or quick coupler valves, drip tubing, heads, controllers, drains, ancillary equipment, and weather and moisture sensor locations. All components shall be labeled with the component type, manufacturer, and model, or shall be symbols referenced to a legend or key. All components shall be shown with dimensions to reference points. Approval of Irrigation Design Drawing shall precede commencement of any work:

C. As – Built Drawing: Irrigation Contractor shall record and submit an "As-Built Drawing" which records actual installed conditions. The As - Built Drawing shall be clearly and neatly drawn on a reproducible original landscape design; this reproducible base shall be provided by the Landscape Architect. Irrigation Contractor shall submit the As-Built Drawing to the Owner and Landscape Architect before work under this contract will be considered for Acceptance.

All components of the system shall be shown with dimensions to reference points, as indicated above under "Final Irrigation Design Drawing." Submittal, review, and approval by the Owner and Landscape Architect of the As - Built Drawing shall precede Application for Final Payment by the Contractor.

D. Test Reports: Provide results of Hydrostatic Test and Pressure and Flow Test as indicated in Part 3 of the specifications.

E. Maintenance Data: Submit three (3) bound copies of Maintenance Data

Operating Instructions and Parts Lists. Maintenance data shall include but not be limited to the following:

1. RPZ Backflow Preventers.
2. Water Regulators.
3. Automatic control valves.
4. Sprinklers.
5. Weather and Moisture Sensors.
6. Specialties.
7. Controllers.

1.04 QUALITY ASSURANCE

A. All construction shall be in accordance with the SUDAS Standard Specifications and Plans (most recent edition) except where modified herein.
B. Manufacturer's Instructions: Adhere to manufacturer's instructions for product handling, assembly, installation, and maintenance.
C. System Designer/Installer: Experienced in design, layout and installation of irrigation systems as a primary business for a minimum of ten (10) years.
D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
E. Comply with requirements of utility supplying water and authorities having jurisdiction for preventing backflow and back siphonage.
F. Comply with ASTM F 645, "Guide for Selection, Design, and Installation of Thermoplastic Water Pressure Piping Systems."
G. Comply with NFPA 70, "National Electrical Code," for electrical connections between wiring and electrically operated dev.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves according to the following:

1. Do not remove end protectors unless necessary for inspection; then, reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off ground or pavement in watertight enclosures when outdoor storage is necessary. Winterize if necessary prior to acceptance of the project.

C. Deliver piping with factory-applied end caps. Maintain end caps through

shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

D. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

E. Protect flanges, fittings, and specialties from moisture and dirt.

F. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.06 PROJECT CONDITIONS

A. The approximate location of the water line and electric services is indicated on the drawings and will be available to the Irrigation Contractor for the purpose of the automatic irrigation system. It is the responsibility of the Irrigation Contractor to coordinate the location of the waterline and electrical service with the General Contractor.

B. Irrigation System is to operate under the water pressure and flow rates prevailing at the project site. Irrigation Contractor shall be responsible for determining these parameters, and shall design the irrigation system in accordance with the existing or anticipated conditions.

C. Insurance on irrigation materials or equipment stored or installed is the responsibility of the Irrigation Contractor. Such insurance shall cover fire, theft, and vandalism. Should the Irrigation Contractor elect not to provide such insurance the Owner shall in no way be responsible for any losses incurred by the aforementioned acts. The Irrigation Contractor is responsible for all costs incurred in replacing damaged or stolen materials or equipment prior to Substantial Completion of the Work.

D. Obtain all required permits and pay all required fees at no additional cost to the Owner. Any penalties imposed due to failure to obtain permits or pay fees are the responsibility of the Irrigation Contractor.

E. Existing Site Improvements: Perform Work in a manner that avoids damage to existing site improvements. The Irrigation Contractor is responsible for any damage of mechanical nature as well as damage resulting from leaks in the irrigation system whether due to negligence or otherwise.

F. Test water conditions: It shall be the responsibility of the Irrigation Contractor to measure or analyze the existing or anticipated water pressure at the tap and design the irrigation system accordingly.

In the event water pressure is insufficient to operate the system at an adequate design pressure and flow, the Irrigation Contractor shall be responsible for designing, specifying, supplying, and installing a booster pump capable of increasing the pressure and flow as required. Booster pump shall be operated by a magnetic starter connected to the pump start switch located in the irriga-

tion control clock, unless otherwise detailed or specified. If a booster pump is required, the Owner shall provide adequate electrical service for the pump.

The cost of the booster pump will be agreed to prior to installation, is an addition to the contract price, and will be paid for by the Owner.

G. Sleeves for irrigation piping and wiring shall be installed by the General Contractor.

It shall be the Irrigation Contractor's responsibility to submit the Irrigation Design Drawing, showing these sleeves, in a timely manner, such that the General Contractor is able to install sleeves within an appropriate sequence of work, i.e., without undoing, damaging, or otherwise compromising work that has already been installed.

H. Coordinate and schedule all Work with Owner, General Contractor, and / or Landscape Contractor, as appropriate.

I. Damages resulting from irrigation installation to work of other trades must be repaired at the expense of the Irrigation Contractor in a timely fashion.

J. Make minor adjustments to system layout as may be required and requested at no additional cost to the Owner.

K. Keep Project Site clean and orderly at all times during construction.

1.07 SEQUENCING AND SCHEDULING

A. Maintain uninterrupted water service to building during normal working hours. Arrange for temporary water shutoff with Owner.

B. Coordinate lawn sprinkler piping with landscaping.

C. Coordinate lawn sprinkler piping with utility work.

1.08 SPECIAL WARRANTY REQUIREMENTS

A. Repair unsatisfactory conditions promptly at no cost to the Owner.
B. Emergency repairs may be made by the Owner, General Contractor, or Landscape Contractor, as appropriate, without relieving the Irrigation Contractor of any warranty obligations.
C. Repair settling of backfilled trenches occurring during the warranty period, including restoration of damaged plantings, paving, or improvements resulting from settling of trenches or repair operations.
D. Respond to Owner's request for repair work within five (5) working days. If Irrigation Contractor does not respond in this time frame, Owner may proceed with any necessary repairs at the Irrigation Contractor's expense.

PART 2 PRODUCTS

2.01 GENERAL

A. Specific requirements concerning the various materials and the arrangements in which they are to be installed are outlined in this Performance Specification.

B. Quality and Size

1. Material specified by name and / or model number in the Specifications or detailed drawings are used for the purpose of identification of materials and to ensure specific use of that material in the construction of the system. No substitutions will be permitted without approval (See Substitutions).

2. All materials used in the system must be new and without flaws or defects of any type and be the best quality available.

2.02 PIPE AND FITTINGS

A. All PVC pipe from sizes three (3) inches and above shall be Class 160, SDR 26, unplasticized rigid polyvinylchloride (PVC) pipe with integral bell and rubber ring gasket unless otherwise specified. Pipe from sizes two and one - half (2 1/2) to one and one - quarter (1 1/4) inch shall be Class 160, solvent weld PVC pipe. Pipe sizes one (1) and three - quarters (3/4) inch shall be Class 200, solvent weld PVC pipe. One - half (1/2) inch pipe shall be Class 315 solvent weld PVC pipe. All pipe shall be supplied in standard twenty (20) foot lengths and shall be from one of the following manufacturers:

1. Certainteed Corporation
2. Crestline
3. Dura.

All pipe that is exposed or not below grade shall be Schedule 80 PVC.

B. Fittings for integral bell with rubber ring gasket pipe shall be of the gasket type and shall be epoxy coated steel fittings as manufactured by The Pierce Corporation, Eugene, Oregon. Fittings for solvent weld pipe shall be Schedule 40 PVC fittings rated for 200 psi (ASTM D-3139) as manufactured by Lasco Plastic Pipe Fittings, Orlando, Florida.

C. All pipe fittings size three (3) inches and greater shall be Ductile iron with restrained joints such as megalug or approved equal. All fittings two and one - half (2 1/2) inches and under shall be Schedule 40 solvent weld PVC.

D. Solvent weld PVC pipe, if and when used in construction of this system, shall be rigid PVC pipe and shall be assembled using appropriate PVC pipe cleaner / primer and solvent cement in accordance with the manufacturer's recommendations.

E. All solvent weld fittings shall conform to Schedule 40 or Schedule 80 PVC dimensions and specifications for solvent weld fittings, as manufactured by Plastiline, Inc.

F. Expansion joints shall be installed every three hundred (300) feet of solvent weld piping.

G. Runs of pipe over twenty (20) feet in length must be installed with standard twenty (20) foot length sections. Unnecessary joints or couplings are not acceptable.

H. PVC Pipe Couplings Located Within Sleeves: PVC pipe couplings four (4) inches and smaller shall be solvent weld. PVC pipe couplings six (6) inches and larger shall be mechanical joints. Upon exiting sleeves, pipe solvent weld or integral bell and rubber gasket, as described in Section 2-02-A, must be adhered to.

2.03 ELECTRIC WIRING

A. 120 Volt AC Wiring: 120 volt service to controller shall consist of three wires: one black, one white, and one ground. Electrical service is to be provided by the General Contractor unless otherwise directed by Owner. It is the Irrigation Contractors responsibility to coordinate the location of electrical service to be provided for controller.

B. Splices in controller wiring shall be waterproof using 3M-DBY wire connectors.

C. Control Wiring shall be 24volt solid wire Underwriter's Laboratory (UL) approved for direct burial in ground. Minimum wire size shall be fourteen (14) gauge. All control wiring and wiring connections from the controller to the valves is included in this Contract.

2.06 SPRINKLER HEADS

A. Rotor Sprinkler Head: Sprinkler shall be of the rotor type designed for in - ground installation. Sprinkler shall be capable of covering a maximum of sixty-five (65) feet radius with psi between 30 - 90 and flow of 2.9 – 21.7 GPM.

Nozzle shall be fully adjustable to 360 deg. Nozzle shall elevate four (4) inches when in operation. Retraction shall be achieved by a heavy duty stainless steel spring. Nozzle piston shall have a smooth external surface operation in a resilient guide.

The body of the sprinkler shall be constructed of non - corrosive heavy duty Cycolac. A filter screen shall be in the nozzle piston. All sprinkler parts shall be removable through the top of the unit by removal of a threaded cap.

B. Approved manufacturer:

1. Hunter Irrigation, Co.
2. Rainbird Sprinkler Mfg. Co.

3. Toro Co.

2.07 AUTOMATIC CONTROLLER

A. Controller location(s) must be easily accessible for maintenance. Provide for the possibility of making minor timing adjustments to the controller in the field.

B. Provide electromechanical controllers capable of fully automatic as well as manual operation of the system. Controller housing is to be a wall mounted, weatherproof, lockable metal cabinet.

C. Provide controller which operates on a minimum of 120 volts AC power input and is capable of operating 24 volt AC electric remote control valves, with a reset circuit breaker to protect from overload. Irrigation Contractor is responsible for connection of 120 V AC power to controller.

D. Each station shall have a time setting which can be set for variable timing in increments from six (6) to sixty (60) minutes, or set to omit the station from the irrigation cycle.

E. Controller features:
1. Large LCD display with easy to navigate softkey user interface
2. Hot-swappable modules, no need to power down the controller to add/remove modules
3. Dynamic station numbering eliminates station numbering gaps
4. Weather Sensor input with override switch
5. Master valve/pump start circuit
6. English or Spanish language with a simple turn of the dial
7. Non-Volatile (100- year) program memory
8. Standard 10kV surge protection
9. Front panel is removable and programmable under battery power
10. Controller must be constructed so that all internal parts are accessible through the controller door without disturbing the cabinet installation.

F. Water Management Features:
1. SimulStations™ are programmable to allow up to 2 stations to operate at the same time
2. Water Windows by program
3. Cycle+Soak™ by station
4. Rain Delay
5. Programmable Station Delay by program
6. Normally Closed Master Valve programmable by station
7. Weather Sensor programmable by station to prevent or pause watering
8. Program Seasonal Adjust
9. Global Monthly Seasonal Adjust

G. Approved manufacturer:
1. Hunter Irrigation Co.

2. Rainbird Sprinkler Mfg. Co.
3. Toro Co.

2.08 BACKFLOW PREVENTER

A. The Backflow Preventer shall be a reduced pressure backflow preventer and shall consist of two independently operation, spring loaded, "Y" pattern check valves and one hydraulically dependent differential relief valve.

B. Mainline valve body and caps including relief valve body and cover shall be bronze. Check valve and relief valve components shall be constructed so they may be serviced without removing the valve body from the line. Shut-off valves and test cocks shall be full ported ball valves.

C. The backflow preventer shall be rated to 175 PSI water working pressure.

D. The backflow preventer shall meet the requirements of ASSE Standard 1014:AWWA Standard Code C506-78; and USC Foundation of Cross Connection Control and Hydraulic research, Sixth Edition. Backflow Preventer shall be tested by an Iowa license Cross Connection Inspector.

E. The backflow preventers shall be Model 825Y Reduced Pressure Backflow Preventers, U.L. approved, manufactured by Febco Sales, Fresno, California, or approved equal. Review for conformance with local codes.

2.09 VALVE BOXES

A. Valve Access Boxes shall be constructed of a combination of polyolefin and fibrous inorganic components (Superflexon Plastic) which is chemically inert and normally unaffected by moisture, corrosion and the effects of temperature change. Valve Boxes shall have a tensile strength of 3,400 psi. For the automatic control valves, the Valve Box Base shall be #170101 and Valve Box Lid shall be #17314 as manufactured by Ametek Plymouth Products Division, Sheboygan, Wisconsin, of approved equal. The lids and boxes will be green for turfed areas and brown for mulched areas.

B. Approved manufacturer:

1. Ametek
2. Rainbird Sprinkler Mfg. Co.
3. Toro Co.

2.10 SLEEVES: Class l60 PVC Pipe Type ll20 or 1220, installed by the General Contractor.

2.11 QUICK COUPLING VALVES: Two (2) per field.

A. Quick Coupling Valves (QCVs) will be used for manual access to the pressurized main line so that a hose can be attached and used for hand watering. QCVs shall be constructed of brass with a spring loaded seal that will keep the valve in a closed position until the key is inserted into the valve. Valve shall also have a

hinged aluminum cap to prevent any debris getting into the internal mechanism of the valve. QCVs shall be installed on a triple elbow swing joint in a valve box.

B. QCV keys shall be of the single lug variety. Attached to the key will be a hose swivel adapter sized to the hose commonly used on the project. Irrigation Contractor to contact Owner's maintenance personnel to determine hose type. Key and swivel shall both be constructed of brass.

C. Approved manufacturer:
1. Hunter Irrigation Co.
2. Rainbird Sprinkler Mfg. Co.
3. Toro Co.

2.12 CONTROL VALVES:

A. Automatic Control Valve shall be female pipe inlet and female pipe outlet connection. The diaphragm shall be of rubber construction to retain flexibility and provide maximum sealing throughout its area.

B. The valve shall have a manual flow control, with a hand-operated, rising-type flow control stem with control wheel/handle. All parts shall be serviceable without removing valve from the line.

C. 18" solenoid lead wires shall be attached to a 24 VAC, 50/60 cycle solenoid with waterproof molded coil. The valves shall be held normally closed by internal water pressure.

D. Approved manufacturer:

1. Hunter Irrigation Co.
2. Rainbird Sprinkler Mfg. Co.
3. Toro Co.

2.13 CONTROL WIRING

A. The irrigation control wire shall be a minimum of 14 gauge, single conductor, low energy circuit cable. A single 12-gauge single conductor white control wire shall be utilized as the common wire and connected in series to each valve. Zone wire shall be red, yellow, or orange in color.

2.14 SURGE PROTECTION EQUIPMENT

A. Provide General Electric Lightning Arrestor No. GL 15 CC B 007 for controllers not equipped with primary surge protection.

B. Irrigation Contractor is responsible for determining whether the abovementioned surge protection equipment is provided in the controller as a "built - in" unit or if it must be supplied and installed separately.

2.15 ISOLATION VALVES

A. Provide all gate valves for isolation purposes, allowing full diameter opening when in full open position.

B. Manually operated valves shall be the same size as the line.

C. Valves three (3) inches or smaller shall be brass construction, threaded, and rated for two hundred (200) psi WOG.

D. Valves four (4) inches or larger shall be cast iron fitted with a rubber ring, slab - type gasket.

2.16 RAIN SENSOR

A. The rain sensor shall employ an electro-mechanical actuating device designed to cause a circuit interrupt that temporarily disables the irrigation controller during periods of significant rainfall. The device shall automatically restore the controller to a normal operating condition after a period of time subsequent to the rainfall. The device shall be suitable to be wired – normally closed (N.C.) – in series with the valve common; and, shall include a short-lead to allow wiring normally open (N.O.) when necessary. The device shall be of rugged construction to withstand the elements, including exposure to sunlight. The device shall include a U.L. listed, 3A @ 125/250 VAC rated electrical switch. The device shall be of sufficient capacity to be used with a maximum of three 24 VAC, 7 VA solenoid valves per station, plus one master valve.

The rain sensor shall incorporate a provision that allows the installer to select from several rainfall settings. The setting increments shall be displayed in both English and metric units. The device shall include a vent ring to help control drying time of the mechanical components.

B. Approved manufacturer:
1. Rainbird Sprinkler Mfg. Co.
2. Hunter
3. Toro Co.

3.17 SOIL MOISTURE SENSOR

A. The Soil Moisture Sensor shall be a smart watering control device for use with a standard 24-Volt AC irrigation controller. It shall take digital readings every 10 minutes of soil Volumetric Water Content (VWC) utilizing advanced Time Domain Transmissometry (TDT) digital signal processing that delivers accurate readings independent of soil temperature and electrical conductivity. It shall consist of a 304 stainless steel digital Soil Moisture Sensor and a User Interface. In operation, the Soil Moisture Sensor shall only allow a programmed watering cycle when the soil moisture drops below a set moisture threshold. When the moisture is above that threshold, the Soil Moisture Sensor shall suspend the normal watering cycle by interrupting the common line to the valve solenoids. Features shall include automatic setting of soil moisture threshold with increase/ decrease adjustment as well as bypass mode. User interface shall enable instant readings of soil

moisture, temperature and electrical conductivity plus review of 7-cycle watering history.

B. Approved manufacturer:
   1. Hunter Irrigation Co.
   2. Rainbird Sprinkler Mfg. Co.
   3. Toro Co.

2.18 MISCELLANEOUS SYSTEM COMPONENTS: Provide risers, reducers, couplings, adapters, fittings, and ancillary equipment as necessary to complete the irrigation system.

PART 3 EXECUTION

3.01 WATER SUPPLY

A. Supply shall be from a line determined by Owner. The connection to this line, for irrigation purposes, is the responsibility of the irrigation contractor.

3.02 INSTALLATION OF BACKFLOW PREVENTER

A. The backflow preventer shall be installed on K Copper pipe so as to provide a minimum clearance of 12 inches from finish grade. One 2" union shall be installed on each side of the backflow preventer to allow for removal for service. Backflow shall be installed in location approved by the Owner.

3.03 INSTALLATION OF MAIN AND LATERAL PIPING

A. All sprinkler main lines shall be installed by open trench method using either a chain type trencher or hand excavated. Trenches shall be excavated so as to provide sufficient depth and width to permit proper handling and installation of pipe and fittings. Excavate the trench deep enough to provide a minimum of 18" of cover over the pipe. Ensure that the bottom of the trench is clean and smooth with all rock, loose soil and organic matter removed. Trench bottom must provide a smooth and continues bearing surface to support the pipe.

B. When preparing pipe of installation, pipe shall be cut clean and square with all burrs removed prior to solvent welding. Pipe must be free of all dust, dirt, moisture, grease, oil or any other foreign material.

C. Pipe shall be joined by solvent welding method using a quality primer and cement applied according to the manufacturer's recommendation. Excess solvent shall be wiped cleaned from the pipe and fittings.

D. Sprinkler lateral piping may be installed by either open trench method or with an approved vibratory plow. Where the open trench method is employed, the above specifications that in both the open trench method and the vibratory plow method, the minimum depth of cover for the lateral lines shall be 10".

E. Where the vibratory plow method is used, the mole or bullet of the plow, which

precedes the pipe and is used to form the opening for the pipe shall not be less than 1" larger diameter than the outside diameter of the pipe. Starting and finishing holes shall be of sufficient size to allow for proper connection of the required fittings.

F. For polyethylene pipe, the insert fittings are to be clamped with stainless steel clamps. All fittings are to be double clamped securely over the barbs on fittings.

3.04 IDENTIFICATION

A. Detectable Warning Tape will be over all pipes. The tape will be placed so that it is 6" above the top of the pipe. polyethylene film warning tape manufactured for making and identifying underground utilities, 4" wide and 5 mils thick minimum continuously inscribed with Irrigation detectable by metal detector when tape is buried up to 2'-6" deep.

3.05 INSTALLATION OF AUTOMATIC RAIN SENSOR

A. A rain check sensor shall be installed on each sprinkler system controller. The rain sensor shall be installed where it is exposed to rainfall from all directions.

B. The 14-gauge wire attached to the rain sensor shall be run all the way back into the sprinkler controller. A Glen Hilton switch shall be installed to each controller and sensor. The toggle switch is to be utilized as a bypass switch for the rain sensor and shall be labeled “ON” and “BYPASS” to reflect when the system is operable or when the system’s scheduled program has been interrupted by the rain sensor.

3.06 INSTALLATION OF CONTROL VALVES

A. The automatic control valves are to be installed at the locations indicated on the shop drawings. All PVC shall conform to the Section 1. PVC Piping and Fittings. Schedule 80 toe-nipples are to be used on the upstream and downstream sides of the valve. Valves shall be assembled so that they fit comfortably and properly in the valve boxes allowing sufficient room for service. Every effort should be made to install the valves, and valve boxes, in a location where they will not interfere with foot traffic or the maintenance of the landscape.

3.07 INSTALLION OF SPRINKLER HEADS

A. Sprinkler heads shall be installed flush and level with existing grades. Where sprinkler heads are installed along curbs or sidewalks, heads are to be placed 4" from the curb or sidewalk to allow for mechanized trimming. Where sprinkler heads are installed in plant beds, the sprinkler heads must be installed 4" from the edge of plant bed areas. Soil around sprinkler head shall be tightly compacted.

B. All lines are to be flushed clean of debris prior to the installation of any rotary sprinkler head. Sprinkler heads are to be adjusted so that spray arc does not

swing out into roadways or against buildings. Radius is also to be adjusted so that the sprinkler stream does not throw into roadways or against buildings.

C. All heads shall be thoroughly flushed prior to installation of sprinkler nozzles. All spray nozzles are to be adjusted for arc and radius of throw. Care shall be taken in nozzles selection to minimize overthrow to sidewalks, planted areas, and paved areas.

3.08 INSTALLATION OF QUICK COUPLE VALVES

A. Quick coupler valves are to be installed plumb in a 10" round valve box (see Valve Box for product) The quick coupler valves are to be secured with a 36" x 5/8" epoxy coated rebar driven into stable ground. The quick coupler valve and rebar are to be secured together with three separate heavy duty stainless hose clamps. All quick coupler valves shall be mounted on a prefabricated triple swing joint assembly. The swing joint assembly shall be model 5806-01-012 manufactured by Spears Manufacturing Company, or approved equal.

3.09 INSTALLATION OF CONTROL WIRING

A. Every other solenoid valve should have a spare control wire running from the irrigation controller. The spare wires should be marked at both termination points. The irrigation control wires are to be bundled and taped together at five-foot intervals. An expansion loop shall be provided every 100 feet, at every 90-degree angle, and at each valve location. Where irrigation control wiring is installed by itself, the minimum depth of cover shall be 24". Under no circumstance shall the control wires be pulled through the ground. If a vibratory plow is utilized to install control wire, the plow must be used with a wire or cable-laying blade, which allows for cable installation without pulling the wire through the ground. Where the irrigation control wire is installed in a common trench with the sprinkler main piping, the control wire is to be installed first and covered with two inches of clean soil. The sprinkler main piping shall then be installed above the control wiring.

B. Splicing is not permissible unless approved on the shop drawings. If splicing has been approved all splices shall be waterproof with Scotch DBY Splice Kits. Should splices be required other than at valves locations, those splices must be installed in a valve box and noted on the As Built Plans. Under no circumstances shall splices be buried. Splice Kits shall be Scotch DBY Direct Bury Splice Kit as manufactured by Electric Products Division/3M, St. Paul, MN.

3.10 INSTALLATION OF VALVE BOX

A. Each automatic control valve shall be installed in a valve box. A minimum of two valve boxes shall be stacked. The valve boxes shall be installed so that the valve is centered in the box allowing sufficient room for servicing of the valves. Clearance between the highest part of the valve and the bottom of the valve box lid shall be 2" minimum. The lid must not be too deep for convenient service. Clearance between the top of the piping and the bottom of the valve box shall be a minimum of 1". The valve box must not rest on the pipe. Each valve

box is to be installed flush and plumb with the existing soil grade. As a part of the valve box installation 3 to 4 inches of 2 to 1 inch stone, free of fines should be placed so that the top of the stone is 2" below the valve.

3.11 SLEEVES

A. Sleeves shall be twice the nominal size of the pipe to be carried within, unless noted differently. Sleeves for control wire only shall be 2" diameter, placed alongside (or above) each sleeve for the mainline.

B. Under walks, paving and where indicated on drawings, install Schedule 40 PVC (ASTM D-1785) for sleeves 4" diameter and smaller. Sleeves 6" and larger shall be Class 200 PVC. Tape ends of sleeves and mark sleeve locations with above grade stakes with appropriate annotation, i.e. "irrigation sleeves". Stakes shall be protected. Do not backfill over sleeve locations behind back of curbs or along walk edges, until work has been completed.

3.12 HYDROSTATIC TESTING

A. The test shall consist of pressurizing the mainline piping system to a minimum of 150 PSI for a period of two hours.

B. During the test, the piping system shall maintain 150 PSI with an allowable pressure drop of not more than 5 PSI, if any deficiencies in the piping system are found, the piping or fittings shall be repaired or replaced at no additional cost to the owner.

3.13 PRESSURE AND FLOW TESTING

A. A test will be taken of the static pressure on the upstream and downstream sides of the RPZ valve. A pressure reading is to be taken at each zone while each zone is running. The flow rate is to be recorded from the water meter at each running zone for a 5-minute period. This information shall be recorded on the As-Built drawings.

3.14 AS BUILT DRAWINGS

A. Upon completion of the installation the contractor will submit an As-Built drawing of the completed project. The drawing will show the accurate location of all valves, quick couplers, mainline, wire splices, backflow devices, and controllers. The drawing shall also show the approximate location of sprinkler heads and lateral lines. Each controller shall be labeled on the plan alphabetically starting with A and the zones controlled by that controller shall be labeled A-1, A-2, A-3...etc.

3.15 DEMONSTRATION

A. Demonstrate to Owner's maintenance personnel operation of equipment, sprinklers, specialties, and accessories. Review operating and maintenance information. Provide 7 days notice to all parties in advance of each demonstration.

3.16 OPERATIONAL TESTING

A. Perform operational testing after backfill is completed and sprinkler heads are adjusted to final position.

B. Demonstrate to the Owner and the Landscape Architect that system meets coverage requirements and that automatic controls function properly.

C. Coverage requirements are based on operation of one circuit at a time, unless noted differently.

3.17 TRAINING

A. Contractor shall be responsible for the training of as many personnel as the Owner shall deem necessary.

B. Contractor shall be responsible for one closing and one opening of the system during the appropriate times of the year as part of the training of the Owner's personnel.

C. Contractor training shall include general trouble-shooting and operation of the system with reference to head, valve, and controller operation.

3.18 CLEAN UP

A. Remove debris, resulting from work of this Section, from the site.

3.19 ADJUSTMENT

A. After completion of grading, seeding or sodding, if applicable, contractor shall return to the jobsite to perform any final adjustments to the system which might be deemed necessary.

B. Maintenance shall include, in addition to initial start-up, one winterization and one Spring start-up. Re-set heads twice, as directed, if necessary.

3.20 COMMISSIONING

A. Starting Procedures: Follow manufacturer's written procedures. If no procedures are prescribed by manufacturers, proceed as follows:

1. Verify that specialty valves and their accessories are installed and operate correctly.
2. Verify that specified tests of piping are complete.
3. Verify that sprinklers and devices are correct type.

4. Verify that damaged sprinklers and devices are replaced with new materials.
5. Verify that potable-water supply connections have backflow preventers.
6. Energize circuits to electrical equipment and devices.
7. Adjust operating controls.

B. Operational Tests: Measure and record water flow rate and area coverage at each sprinkler. Adjust to achieve indicated values.

END OF SECTION

LANDSCAPE BOULDERS

PART 1 – GENERAL

1.01 Description

A. General: Labor and materials for natural stone stairs, steppers, seat stones and outcropping for playground area as shown on the drawings. Landscape Boulders shall be pre-approved before delivery by the Consultant.

1.02 Related Sections:

SUDAS Standard Specifications
Engineered Wood Fiber Safety Surfacing

1.03 Performance Requirements:

A. General: Deliver to the site and place landscape boulders in conformance with the Contract Documents and under the direction of the Engineer.

1.04 Submittals:

A. General: Submit the following in accordance with the Specifications;

1. Product data and source for each type of stone including name and location of quarry.
2. Submit photos of representative examples of stone at quarry or holding yard prior to delivery of the stone. The Engineer reserves the option to tour the quarry and select the stone at their option.
3. Samples of stone (consisting of stones not less than 12 inches square) for verification purposes of form, color, grade, finish, type, and variety of stone required. Include 2 or more stones in each set of samples showing the full range of variations in appearance characteristics to be expected in the completed work. Deliver samples to the site for review by the Engineer and the Engineer.

1.05 Quality Assurance

A. All construction shall be in accordance with the SUDAS Standard Specifications and Plans (most recent edition) except where modified herein.

B. Single-Source Responsibility for Limestone Products: Obtain limestone from a single quarry with resources to provide materials of consistent quality in appearance and physical properties, including the capacity to place the material without delaying the progress of the work. Weathered granite is open to sourcing subject to Engineer's approval and conformance to these specifications.

C. Information on the Contract Documents establishes the requirements for both aesthetic effects and performance of the stone. Aesthetic effects relative to the formal characteristics are indicated by dimensions, arrangement, alignment, and profiles of components and assemblies as they relate to sight lines and relationships to one another and to adjoining construction; performance is indicated by criteria subject to verification either by preconstruction or field test, if applicable.

D. Do not modify intended aesthetic effects, except with the Engineer's approval, and
only to the extent exclusively needed to comply with the performance requirements. Where modifications are proposed, submit comprehensive explanatory data for review.

E. Installer Qualifications: Installer shall have the means and methods capable of completing the work.

1.06 Delivery Storage and Handling

A. Deliver materials to the project site in undamaged condition.

B. Store and handle the stone and related materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breakage, chipping, or other causes

C. Do not use pinch or use wrecking bars.

D. Lift with wide-belt-type slings where possible; do not use wire rope or ropes containing tar or other substances that might cause staining.

PART 2 - PRODUCTS

2.01 Materials

A. Stones shall be pre-selected at the supplier’s yard and shall be free from cracks, flaking and deterioration.

2.02 Stone

A. Stone Steps and Outcropping:
1. Weathered Limestone in color range of buff to light brown
2. Size: 36” to 48” wide, x 24” to 36” depth x 6” to 8” height
3. Stone shall be smooth and free of cracking and flaking
4. The portion of exposed stone and within 6” of daylight shall be free of machine marks and abrasion.

B. Seat Stones:
1. Weathered Limestone in color range of buff to light brown
2. Size: 36” to 48” long, x 12” to 18” depth x 30” to 36” height
3. Stone shall be smooth and free of cracking and flaking.
4. The portion of stone above and within 4” below grade line shall be free of machine marks and abrasion.

C. Playground Stepper Boulders:
1. Weathered Granite in color range of pink, purple, grey, brown and red
2. Size: 24” to 30” wide, x 18” to 24” depth
3. Boulders shall be free from cracking and flaking.
4. The top 12” from crown of boulder shall be smooth and free of machine marks.

D. Levelling Base Material

1. The leveling and setting base material shall be modified subbase (IA DOT gradation No. 14), or a concrete levelling base, or as shown on the Construction Drawings.

PART 3 – EXECUTION

3.01 Examination

A. Examine the areas to receive the boulder placement, and the conditions under which the boulders will be installed, with the Installer present, for compliance with the requirements for installation and other conditions affecting the performance of the placement. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 Preparation

A. Protect the stonework during setting as follows:

B. Prevent staining of the stone from caulking or paving materials. Immediately remove such materials from the stone without damage to the latter.

C. Protect boulders from damage from construction machines and materials.

D. Clean stone surfaces that have become dirty and stained prior to setting. Remove soil, stains, and foreign materials. Clean stones by thoroughly scrubbing stones with fiber brushes followed by a thorough drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh filler or abrasives.

3.03 Placement

A. Set the stones to comply with the requirements indicated on the Drawings and the final shop drawings.

B. Broken, chipped, stained, or otherwise damaged stone shall be replaced until the methods and results are acceptable to the Engineer.

3.04 Protection

A. Provide final protection and maintain conditions to ensure that no damage occurs to the stonework until Substantial Completion is approved.

3.06 Cleanup

A. Remove all metal, wood, and concrete debris, protective wrappings and coverings, and shipping materials from the project site. Remove all residues, repair all stains, scuffs, abrasions, and marks from the finished product prior to requesting inspection. Fully restore all areas of the site that were impacted by the installation activities per SUDAS Standard Specifications for landscape planting.

END OF SECTION

NATIVE SEEDING AND LANDSCAPING

PART 1 – GENERAL

1.1 SUMMARY

A. Section covers: All native landscaping work indicated on drawings or otherwise required for completion of project. Work includes, but is not limited to, the following:
   1. Soil preparation prior to seeding native vegetation.
   2. Short Grass Prairie Seeding
   3. Flood Plain Seeding
   4. No Mow Fescue Seeding
   5. Live Fascine Bank Stabilization

B. Related Section: The following contains requirements related to this Section:
   1. Athletic Field Seeding

1.2 SUBMITTALS

A. Qualifications Statements: Indicating background and capabilities of firm and relevant educational and professional experience of key personnel. Installer shall list at least five references for native landscaping and streambank bio-engineering projects completed by the firm in the past five years similar in type and size as this Project. Each reference will include the name of the firm for which the installation was performed, address of project site, and name and current telephone number of contact person.

B. Planting Schedule: Indicating anticipated seeding dates for each area of site, fully coordinated with all landscape, construction and earthwork activities.

~~C.~~ Materials: Prior to delivery of any materials to the site, submit to the Owner's Representative and Landscape Architect a complete list of all seed to be used during this portion of the work. Include complete data on source, quantity and quality. This submittal shall in no way be construed as permitting substitution for specific items described on the plans or in these specifications unless approved in writing by the Owner's Representative.

D. Equipment: Prior to commencement of any work, submit to Owner's Representative and Landscape Architect a written description of all mechanical equipment and intended uses during execution of the work.

E. "As-built" Plans: After the work is complete submit to the Owner's Representative "as-built" plans including a listing of all species installed, and quantities installed. Mark in red ink on original planting plan any field changes or deviations from original plans.

F. Native Seeding and Landscaping Management Program: Describing maintenance and management practices to be performed during first four years following installation to ensure proper establishment.

G. Species list for woody cuttings to be used in live fascines. List shall include classification, botanical name, common name, harvest location, and plant health

1.3 QUALITY ASSURANCE

A. construction shall be in accordance with the SUDAS Standard Specifications and Plans (most recent edition) except where modified herein

B. Installer Qualifications: The work shall be performed by a single firm specializing in native seeding, landscaping and bio-engineering work, with a minimum of five years of experience in seeding native grasses, wildflowers and fescue. Firm shall have a verifiable record of successful installations similar in type and size to that indicated for this Project.

C. Installer's Field Supervisor: Installer shall assign one full-time supervisor, thoroughly familiar with the types and operation of equipment being used, who shall be present at all times during execution of this portion of the work. Said supervisor shall direct all work performed under this section.

D. Standards: All materials used during this portion of the work shall meet or exceed applicable federal, state, county and local laws and regulations. All seed shall be free from insects and disease. Species shall be true to their scientific name as specified.

E. Observations: Owner will retain qualified Prairie Specialist to observe the prairie areas at end of first, second and fourth growing seasons after provisional acceptance to determine if seeding and planting work meets or exceeds stated performance criteria. Installer shall pay for Prairie Specialist fee and expenses.

F. Woody Cutting Inspection: vegetation cutting will be inspected by the Owner's Representative for species, size and health at the site prior to installation. Cutting not meeting the specified requirements will be reject are to be removed from the site.

G. Establishment of Native Seed Areas: Maintain native seed areas as required until final acceptance. Water plantings as required to maintain an adequate supply of moisture within root zone without over-watering. During the first growing season, mow weeds on a regular basis to keep weeds in check. Use flail-type mowers that deposit mowed material uniformly over mowed area. Sickle bar and rotary-type mowers are unacceptable. All stubble from first-year mowings shall be left in place at end of season as an insulating blanket during the winter; do no mow prairie level to the ground at end of first season. Perform other maintenance as required.

PART 2 – PRODUCTS

2.1 PLANT MATERIALS

A. Sources: All mesic prairie and fescue seed shall have a biologic origin within 300 miles of the Project site.

B. Seed Mixes: Shall be provided according to the respective Plant Lists below, proportioned by weight and planted at the per-acre rates indicated. All grass species shall be supplied as pure live seed. Submit to Owner's Representative lab germination test results. Species shall be true to their scientific name as specified.

1. Plant List: Mesic Prairie Seed Mix

SCIENTIFIC NAME	COMMON NAME	UNCES/ACRE
Andropogon scoparius	Little bluestem grass	64.00
Asclepias syriaca	Common milkweed	1.00
Aster laevis	Smooth blue aster	2.50
Aster novae-angliae	New England aster	2.50
Bouteloua curtipendula	Side-oats grama	64.00
Coreopsis lanceolata	Sand coreopsis	2.50
Desmodium canadense	Showy tick trefoil	2.50
Echinacea purpurea	Purple Coneflower	4.00
Elymus canadensis	Canada wild rye	32.00
Heliopsis helianthoides	False sunflower	2.50
Hordeum vulgare	Seed barley	960.00
Monarda fistulosa	Wild bergamot	4.00
Oenothera biennis	Common evening primrose	1.00
Panicum virgatum	Switch grass	16.00
Penstemon digitalis	Bearded foxglove	2.50
Ratibida pinnata	Yellow coneflower	4.00
Rudbeckia hirta	Black-eyed Susan	8.00
Rudbeckia triloba	Brown-eyed Susan	2.50
Solidago rigida	Stiff goldenrod	2.50
Solidago speciosa	Showy goldenrod	2.50
Tradescantia ohiensis	Spiderwort	2.50
Verbena stricta	Hoary vervain	1.00

2. Plant List: Fescue Mix – Provide certified seed mix of Festuca varieties, proportioned by weight, with minimum percentages of purity, germination, and maximum percentage of weed seed, comparable to the following:

Proportion	Name	Min. Pct. Germ.	Min. Pct. Pure Sd.	Max. Pct. Weed Sd.
25 pct.	Hard Fescue	85	98	0.50
25 pct.	Chewings Fescue	85	98	0.50
25 pct.	Sheep Fescue	85	98	0.50
15 pct.	Dawson Red Fescue	85	98	0.50
10 pct.	Creeping Red Fescue	85	98	0.50

C. Seeding Rates:
   1. Mesic Prairie Seed Mix: Seed prairie mix at a rate of 74 pounds per acre.
   2. Fescue Mix: Seed fescue mix at a rate of 250 pounds per acre.

PART 3 – EXECUTION

3.1 SOIL PREPARATION

A. Topsoil: Refer to Section 02900, Paragraph 2.2 B, for information about on-site topsoil test results and to specification Section 02318 for environmental test requirements. Coordinate with Landscape Contractor any amendment applications indicated by tests and topsoil placement for native vegetation areas.
   1. Topsoil shall be placed in lifts uniformly over all native vegetation areas to provide a minimum topsoil thickness of 12 inches.

B. Soil Preparation: Following topsoil placement, till or perform other operations necessary to ensure a proper growing medium for specified native grasses, wildflowers and fescue. Prior to seeding and planting, check compaction of topsoil (0-12" depth) and subsoil (12-18" depth).
   1. Soils shall not have a measured compaction greater than five pounds per square inch, as measured by Lang or Cone penetrometer, at time of seeding or planting unless otherwise stated on plans or in specifications. If penetrometer readings are greater than five pounds per square inch, disc, rotovate, and/or chisel plow said areas as necessary to reduce compaction.
   2. Re-check soil compaction as described above after tillage. Repeat treatment until penetrometer readings are less than five pounds per square inch.
   3. The Contractor shall submit a written report including test locations and penetrometer readings at Owner's Representative's request.
   4. Remove all foreign matter larger than one inch in any dimension from areas to be seeded and/or planted.
   5. After soil preparation is complete, clean up any remaining materials, debris, trash, etc. Repair any damages caused during soil preparation work. Avoid driving over prepared areas to minimize additional compaction.

C. Observation: After completion of soil preparation work, Installer shall schedule with the Owner's Representative an observation of soil preparation for final acceptance.

D. Final Acceptance: Soil preparation work shall be considered 100% complete after Owner's Representative has observed the work and Installer has performed all remedial clean-up and repair work as may be required as a result of observation.

3.2 NATIVE SEEDING

A. Seeds shall have proper stratification and/or scarification to break seed dormancy for spring planting. All legumes shall be inoculated with proper rhizobia at appropriate time prior to planting.

B. Seeding shall be conducted in early spring as soon as the soil is free of frost and in a workable condition, but no later than July 1. Fall dormant seeding will not be permitted without prior written approval of Owner's Representative.

C. All seed shall be preferentially installed with a rangeland-type grain drill or no-till planter, such as by Truax, or equivalent approved in writing by Owner's Representative. If soil is too wet or other conditions prohibit use of preferred planters, a mechanical broadcast seeder, such as by Cyclone, shall be used. Hand broadcasting of seed may also be employed. Immediately following broadcast seeding, said areas shall be rolled or dragged perpendicular to the slope.

D. Within 24 hours of seeding, spread and crimp straw for erosion control onto all seeded areas at a rate of 2,000 pounds per acre. Straw shall be clean, weed-free, threshed straw of wheat, rye, oats, or barley.

E. If area to be seeded was treated with herbicide, seeding shall occur no less than 14 days after herbicide application.

F. Keep site free of debris. After seed installation is complete, clean up any remaining materials, debris, trash, etc.; remove any tools, equipment, and all debris generated by Installer; and repair any damages caused during completion of seeding work. Avoid driving over seeded areas to minimize disturbance.

G. Observation: After completion of seeding, Installer shall schedule with Owner's Representative an observation of seeding work for provisional acceptance.

H. Provisional Acceptance: Seeding work shall be considered 90% complete after all seed and mulch has been installed, Owner's Representative has observed the work, and Installer has performed all remedial clean-up, removal and repair work as may be required as a result of observation.

I. Final Acceptance of Native Seeding: Seeding work shall be considered 100% complete after Installer has met or exceeded performance criteria below, and completed all clean-up, removal, and repair work as may be required.
   1. Seeded areas will meet or exceed the following performance criteria, as determined by Prairie Specialist, by end of first growing season after provisional acceptance:
      a. Seventy-five percent (75%) overall plant cover,
      b. No area of 10 square feet or larger with less than 50% plant cover,

2. Installer shall guarantee seeded areas will meet or exceed the following performance criteria, as determined by Prairie Specialist, by end of second growing season after provisional acceptance:
    a. Eighty percent (80%) overall plant cover,
    b. No area of 10 square feet or larger with less than 50% plant cover,
    c. Five percent (5%) cover by planted native grass/sedge species,
    d. Ten percent (10%) cover by planted forb species, and
    e. Representative individual live plants of 25% of species observed.
3. Installer shall guarantee seeded areas will meet or exceed the following performance criteria, as determined by Prairie Specialist, by end of fourth growing season after provisional acceptance:
    a. Ninety-five (95%) overall plant cover,
    b. No area of 10 square feet or larger with less than 50% plant cover,
    c. Twenty percent (20%) cover by planted native grass/sedge species,
    d. Forty percent (40%) cover by planted forb species, and
    e. Representative individual live plants of 50% of species observed.

J. Harvesting of Woody Cuttings and Stakes: Cuttings for live fascines shall be harvested from local sources of selected species. Species of plants foreign to the ecosystem environment at the work site shall only be imported if they pose minimal threat to interfering with the native vegetation, are accepted by regulatory and environmental management, and are able to survive at the specific site. Unless otherwise stated below, cuttings shall be 19 to 38 mm 0.75 to 1.5 inches in diameter and at least 1 m 3 feet in length. Stakes Poles with a diameter of 50 to 75 mm 2 to 3 inches and minimum length of 1.5 m 5 feet shall be used for insertion into armored stream bank structures. Stakes and cuttings shall be cut from healthy plants and shall be as straight as possible. Plants for harvest shall be a minimum of one-year-old, preferable 2 to 5 years in age. Suckers or current year growth shall not be used. All cuts shall be clean and free of splits or excessive peeling of bark. At least two bud scars shall be visible on the cutting and stake above the surface of the ground or structure when installed. Stakes with deviations or curvatures greater than 13 mm 0.5 inch from vertical per 200 mm 1-foot of length will not be accepted. All branches emanating from the stake shall be trimmed as close as possible to the surface of the stake without damage to the bark. The bottom end of the stake shall be cut at an angle of 60 degrees to the horizontal. The top of the stake shall be cut normal to its length. Live cuttings shall be harvested from branches and shall include the growth tips of the branch. The butt of the cutting shall be cut at an angle to the vertical to aid in placing into soil. If trunks of vegetation remain after cutting, these trucks shall have a sufficient number of healthy branches remaining to allow survival.

K. Dead Wood Stakes shall be 100 percent biodegradable materials and shall be designed to safely and effectively secure erosion control blankets, coir logs, fascines, and other bioengineered structures for temporary or permanent applications. The biodegradable stakes shall be fully degradable by biological activity [within 2 years]. The stakes must exhibit ample rigidity to enable being driven into hard ground, with sufficient flexibility to resist shattering.

L. Sealing of Harvest Cuts: All harvest cuts on trunks or branches of the host vegetation shall be trimmed of loose wood or bark and sealed with an approved sealant to prevent desiccation and disease or infestation at the end of the workday without exception.

M. Time of Planting: Woody plants and nursery stock should be planted in the dormant season. These plants are dormant when buds are set in the fall after the first hard freeze until the time when the buds begin to swell in the early spring. If planting cannot be done during the dormant season, then the cuttings may be stored in a cold environment at -2 degrees C (28 degrees F) until planting is possible.

N. Transportation of Harvested Vegetation: All freshly harvested and prepared live woody vegetation shall be immediately submerged in clean uncontaminated water and shall not be allowed to dry out. Cut vegetation shall be transported to the work staging area submerged in water. If site conditions prohibit direct access to storage bins filled with water, then the freshly cut live vegetation shall be wrapped in cloth, which is thoroughly saturated with water, and shall be transported to a storage bin filled with water within no more than one hour from the time of cutting.

Live vegetation shall be transported from the staging area to the work site in containers fully covered with clean water. Vegetation shall be removed from the containers and immediately placed in the ground. In the event that access to the installation site is limited, vegetation shall be removed from the soaking tanks and wrapped in bundles that are completely covered with at least three layers of saturated highly absorbent cloth or saturated biodegradable paper product with high saturated strength. The cloth and bundles shall be placed in plastic liners for greater ease in transportation to the work site.

Cut vegetation shall not be left uninstalled at the work site and exposed to air or heat or excessive cold for any reason. Dead cuttings and stakes shall not be soaked unless the design requires this vegetation to be flexible. Cut live vegetation that is exposed to air for longer than 15 minutes during harvesting, transportation, installation, or which were not collected or transported as specified above shall not be accepted. Damaged live vegetation shall not be accepted and shall be replaced.

O. Soaking of Live Woody Vegetation: a. All harvested live vegetation shall be soaked in clean water for 3 to 5 days before installation into the ground. The live vegetation shall be placed in clean, leak proof, large plastic storage containers or similar, which are at least 300 mm 12 inches longer in length than the cut vegetation. Reused or new metal drums or drums used for the containment of hazardous wastes or chemicals shall not be used. The containers shall be placed in organized lines in a shaded location separated by a sufficient distance to allow access of a vehicle to the containers for the placement and removal of the vegetation. Each container shall be given a unique identification number or series of numbers and letters that shall be clearly visible at the end of the container that shall be approached for the placement or the removal of vegetation. The identification numbers shall be

recorded and referenced in relation to the contained vegetation for quality control and construction purposes.

The water levels in the containers shall be checked twice daily and water shall be added as needed to ensure the containers are filled with sufficient water to completely cover the contained vegetation with a minimum of 50 mm 2 inches of water. Rust proof weights or clean cobbles or boulders may be used to weight down the vegetation and retain it under the water surface. These weights shall not crush or damage the vegetation. Water in the containers shall be completely replaced with fresh and clean water every 3 days without exception.

P. Horizontal Fascines. All trenches shall be installed parallel to the direction of the bank contours. All trenches shall be 450 mm 18 inches wide and not more than 50 mm 2 inches deeper than the diameter of the fascine bundles.

1. A key trench shall be excavated at the toe of the bank and at the location shown on the drawings and shall extend the full length of the working area. Trenches up slope of the key trench shall be the same length as the key trench. Trenches shall be spaced 1.2 m 4 feet apart. A trench shall be installed at the toe and at two feet below the crest of the bank regardless of spacing interval. These trenches shall extend the full length of the work site. All trenches shall be keyed into the bank slope and filled for a distance of 1 m 3 feet with large natural stone at the up stream and down stream ends of the trenches.
2. The fascine bundle shall be placed in the center of the trench with at least 50 mm 2 inches of the bundle exposed above the top of the existing grade of the stream bank. The junction between the ends of adjacent fascine bundles in the same trench shall be interwoven with each other for a distance of 300 mm 1-foot. The fascine bundle shall be anchored in the trench with live and dead stakes that are at least 50 mm 2 inches in diameter at the top, 700 mm 2.5 feet in length, and tapered from the top to the base. The stakes shall be driven vertically through the fascine until flush with the top of the bundle starting 1-foot from the end of each fascine and spaced every 1 m 3 feet thereafter. A terminal stake shall be driven 300 mm one-foot from the end of the fascine regardless of spacing interval. Stakes shall not be driven through or within 150 mm 6 inches of the binders. Live stakes shall be driven into the slope on the downhill side of the fascine bundle at an angle not to exceed 45 degree from vertical. The stakes shall be placed at the midpoint between the anchor stakes shall contact the underside of the fascine, but shall not penetrate the fascine. At least 75 mm 3 inches of these downhill live stakes shall extend above the ground surface. Soil shall be placed and lightly tamped into place around the fascine and brushed into the voids in the fascine until only the top of the bundle is partially exposed. The top of the backfill shall slope towards the back of the fascine trench to prevent overtopping by runoff and to retain water and sediment.

Q. Mixing of Live Vegetation: Vegetation of a specific species shall not be commingled with another species during cutting, soaking, or transportation

R. Watering Live Fascines: Irrigation of the structure shall be started immediately after installing erosion control products and vegetation. Water shall be applied to supplement rainfall at a sufficient rate to ensure moist soil conditions to a minimum 300 mm 12-inch depth. Run-off and puddling shall be prevented. Watering trucks shall not be driven over turf areas, unless otherwise directed. Watering of other adjacent areas or plant material not related to work efforts shall be as specified by the Owners Representative. Water shall be applied to trenches immediately before placement of live vegetation. Water shall be placed on the completed structure at the end of each day, as needed to control dust and to prevent excessive drying of vegetation, and at the completion of the structure. The structure shall be irrigated after installation for 3 months until the end of the first year growing season.3 times per week and shall be sufficient to support the survival and growth of planted vegetation. Irrigation shall never exceed limits that could impair the stability of the structure and shall be adjusted to compensate for additions or deficits to soil moisture caused by precipitation or evaporation.

S. Final Acceptance of Live Fascines: The work site shall be inspected by the Owner's Representative prior to final acceptance of work. A punch list noting deficiencies shall be compiled and provided to the Contractor. Final acceptance of work shall not be provided until all defects or deficiencies are corrected. Final Acceptance shall occur only after all corrective actions and supplemental viable plantings are complete and the structure meets performance standards and all contract requirements.

END OF SECTION

PLAYGROUND EQUIPMENT

PART 1 - GENERAL

1.01 Description: Furnish all labor, materials and equipment required to install the play equipment and structures as indicated on the drawings or as approved and specified herein. The work shall include any incidentals required to provide a finished job.

1.02 Related Sections:

Cast-In-Place Concrete (SUDAS)
Play Area Engineered Wood Safety Surfacing

1.03 Reference Safety Guidelines and Standards: All materials and equipment shall conform to the current issue of the "*Handbook for Public Playground Safety*" published by the Consumer Product Safety Commission (C.P.S.C.) and ASTM F1487-07. The manufacturer and installation contractor shall be responsible for correcting any product violations of the C.P.S.C. Guidelines and ASTM F1487-07, to the satisfaction of the Engineer, should they be found after installation. ADA Accessibility Guidelines (ADAAG) Section 15.6 Play Areas.

1.04 Quality Assurance: Contractor shall have the means and methods capable of completing the work. The Contractor shall be a Manufacturer Certified Installer and shall hold current National Playground Safety Institute Certification for Playground Safety Inspectors.

A. All construction shall be in accordance with the SUDAS Standard Specifications and Plans (most recent edition) except where modified herein.

B. Manufacturer's Instructions: Adhere to manufacturer's instructions for product handling, assembly, installation, and maintenance.

C. Manufacturer’s original factory finish must be intact for the installation to be considered satisfactory. On-site touch-up will not be accepted.

1.05 Submittals: The Contractor/Manufacturer’s Representative shall submit for approval prior to delivery scaled drawings of each specified component including dimensioned plans, color charts, erection drawings, installation details, parts list, and technical data for correct assembly of all components, clamp details, and anchoring details.

PART 2 - PRODUCTS

2.01 General:

A. Site Specificity of Design - Equipment selection is based on specific program requirements, physical constraints within the site, and public input.

2.02 Play Equipment:

A. Play Structures, Swings and Seesaw

1. Landscape Structures Inc.- Delano MN
2. See Plans for equipment list, and model numbers. Color specification will be provided by the Engineer, from standard manufacturer's options, upon product submittal.

B. Hill Slides

3. Columbia Cascade "Timberform", Portland OR
4. See drawings for equipment list, and model numbers. Color specification will be provided by the Engineer, from standard manufacturer's options, upon product submittal.

2.03 Finishes:

A. Polyester (Powder) Coating - The polyester coating shall be uniformly applied by the electrostatic method to a thickness of three to five mils. Promptly after application of the powder, the coating shall be oven-cured at 400 degrees Fahrenheit. The color(s) of the polyester coating shall be as selected by the Engineer from the manufacturer's standard and/or custom color selection charts.

B. Vinyl - The vinyl coating shall be oven-cured poly-vinyl chloride plastisol with a minimum thickness of 1/8". The coating shall contain ultraviolet inhibitors and mold resistors. The color(s) of the vinyl coating shall be as selected by the Engineer from the manufacturer's standard and/or custom color selection charts.

C. Galvanized Finish - All components calling for a galvanized finish shall be hotdipped galvanized to the manufacturer's standard after fabrication. All galvanized surfaces shall be free of burs, splinters, and sharp edges.

D. Wood Preservation - All wood components shall be untreated or pressure-treated with a child-safe formulation suitable for use in playground equipment as approved by the Park Engineer. Wood preservatives containing toxic chemicals such as arsenic, pentacholorphenol, or creosote shall not be permitted. The wood preservative shall not change the color of the wood to which it is applied. The wood shall be pressure-impregnated by the closed cylinder vacuum pressure method of the American Wood Preserver's Association (AWPA) and shall comply with SPR's Design Standard for Wood Use in Parks.

2.04 Additional Hardware: Additional hardware shall be provided in sufficient quantity to complete assembly of the play equipment. All hardware shall be non-ferrous or if ferrous material is used shall be galvanized, electrostatic zinc plated or polyester powder coated in accordance with the approved manufacturer's standard. Provide the Engineer with any

and all maintenance and repair supplies installation manuals, tool kits and materials shipped with each product for the Owner’s inventory.

PART 3 - EXECUTION

3.01 Examination of work area - Examine the areas and conditions under which work of this Section will be performed. Verify safety zones of all equipment before setting posts in concrete footings. Do not proceed until conditions detrimental to proper and timely completion of the work have been satisfactorily corrected and thus meet the manufacturer's instructions and the requirements as described above. Beginning work constitutes acceptance of conditions as satisfactory.

3.02 Installation of Compound Structures and Independent Activities:

A. Conform strictly to manufacturer's instructions using all appropriate materials, tools, and accessories as required. The installer shall layout all equipment prior to construction to insure compliance with safety zone clearances.

B. Provide all concrete footings as required to properly place the equipment components. It is the Contractor’s responsibility to adjust drainage pipe or other new utility locations to accommodate the equipment footings.

C. Install Wear Mats under all swings and slide exits per Section 32 18 16.13 - Engineered Wood Safety Surfacing and per the plans and details.

3.03 Protection: During construction of the play equipment structures, provide PVC web fence material in sufficient quantities and wrap the structures to prevent public access onto the equipment. Maintain the fencing wrap after completion of the play equipment and safety surfacing installation through Physical Completion of the project.

3.04 Inspection: Following the Engineer’s inspection of the completed play equipment installation, perform repairs as necessary to meet or exceed the Engineer’s requirements for fit and finish and the specifications and guidelines as referenced in 1.03 Safety Guidelines and Standards, above.

END OF SECTION

SAFETY SURFACING

PART 1 - GENERAL

1.01 Description: Furnish all labor, equipment and materials to install (or blow in) the Engineered Wood Fiber Safety Surfacing (EWFSS) as shown on the plans and details or as otherwise specified.

1.02 Related Sections:
Cast-In-Place Concrete (SUDAS)
Earthwork (SUDAS)
SUBDRAIN, HDPE, PERF, 4" DIA.
ENGINEERING FABRIC (SUDAS)
BEAM CURB, PCC

1.03 Quality Assurance:

A. All construction shall be in accordance with the SUDAS Standard Specifications and Plans (most recent edition) except where modified herein.

B. Manufacturer's Instructions: Strictly adhere to the manufacturer's instructions regarding product handling, sub-base preparation, surfacing system application and all other aspects of the surfacing installation.

C. The contractor shall have personnel, facilities and equipment for the specified work.

D. Special Requirements:

1. The engineered wood safety surface products shall meet or exceed the current Consumer Products Safety Commission 200-g Guideline and ASTM F2075. The Contractor shall submit two copies (2) of the manufacturer's independent test results showing conformance. Reports shall be for the exact depth that is specified to be installed.
2. Warranties: Provide the manufacturer's five-year materials warranty for all safety surfacing systems materials.
3. Disabled Accessibility (ADA): Provide testing date showing products meet the requirements of the most current Americans with Disabilities Act.

1.04 Submittals:

A. Not less than 6 days prior to the intended use of the materials, the Contractor shall submit the full documentation of the specific product literature, illustrating it's compliance with this section.

B. The contractor shall submit to the Engineer, for approval, material samples that are to be used and the proposed methods of application and procedures that are to be followed.

C. Submit the test results for impact attenuation in accordance with ASTM F1292-01.

PART 2 - PRODUCTS

2.01 General:

A. The EWFSS shall have fall or shock attenuation not to exceed 200g and 1000 HIC for an eight-foot (8') height as per ASTM F1292-01.

B. The EWFSS shall be constructed of random sized manufactured wood fiber material, specifically designed to be accessible play area safety surfacing materials.

C. Engineering Fabric Required under all EWFSS. Minimum 3” overlap at all seams.

D. Sub-surface drainage is required and play area containment areas shall be installed with the sub-grade surface sloping (2% min.) towards the drainage trenches.

2.02 Recommended Manufacturers:

A. “Wood Carpet" - as manufactured by Zeager Brothers, Inc.

B. “Sof’Fall - as manufactured by Sof’Fall, Inc.

C. “GT-Impax” - as manufactured by GameTime, Inc.

D. “Fibar” – as manufactured by Fibar Playground Surfaces

E. Or, approved equal.

2.03 Wear Mats & Anchors: Ware mats are required under all swing seats and at the exit points of all slides. Wear mats shall be installed per manufacturer’s specifications and recommendations. They shall also be made from recycled materials to the greatest extent possible. Provide (1) 4’ x 6’ x 2” mat at each swing seat and (1) 3’ x 4’ x 2” mat at each slide exit.

A. Recommended Manufacturers:

1. “Dynacushion Play Mats” by

2. "Duckbill Anchors" by Foresight Products
3. Or approved equals.

2.04 Drainage, Drainage Matrix, Liners and Geo-textile Fabric: Refer to Storm Drainage Utility and the Civil drawings for drainage design, for construction details included in these Contract Documents.

PART 3 - EXECUTION

3.01 EWFSS Installation: The contractor shall strictly conform to the manufacturer's instructions using all appropriate accessories as required. Install surfacing to the compacted depth specified on the Drawings, allowing for settling and compaction of approximately 25%. Install surfacing carefully to avoid contamination of wood fiber material with dirt, gravel or other materials.

3.02 Wear Mat Installation: Coordinate with the installation of the engineered wood safety surfacing and set the mat depth to approximately six inches below finished grade. Bury mat halfway down into the safety surfacing material with 6" of cover. Install mats with (4) Duckbill anchors per mat.

3.03 Drainage Matrix Installation: Install drainage matrix products per manufacturer's instructions, using all appropriate accessories, as required.

3.04 Inspection: Examine the areas and conditions under which the work of this section will be completed. Do not proceed until conditions detrimental to the proper and timely completion of the work have been satisfactorily corrected and thus meet the manufacturer's instructions. Beginning of work constitutes the acceptance of site conditions as satisfactory.

3.05 Cleanup: Sweep and/or rake wood materials away from all paved surfaces and remove it from all surrounding turf or planted areas.

END OF SECTION

SITE FURNISHINGS

PART 1 – GENERAL

1.01 Description of Work included shall include but not be limited to the following list.

A. Provide all labor, materials and equipment necessary to supply and install the following Site Furnishings:

1. Bike Racks
2. Park Benches
3. Trash Receptacles
4. Flagpoles

1.02 Related Sections:

Cast-In-Place Concrete (SUDAS)
Athletic Field Furnishings

1.03 Quality Assurance:

A. All construction shall be in accordance with the SUDAS Standard Specifications and Plans (most recent edition) except where modified herein.

B. Manufacturer's Instructions: Adhere to manufacturer's instructions for product handling, assembly, installation, and maintenance.

C. Manufacturer's original factory finish must be intact for the installation of the furnishing to be considered satisfactory. On-site touch-up will not be accepted.

1.04 Submittals: For each Product Specified, submit the following for approval prior to delivery:

A. Manufacturer's product data.

B. Manufacturer's installation instructions.

PART 2 - PRODUCTS

2.01 General:

A. Comply with SUDAS Standard Specifications and Manufacturer's recommendations at all times. Where these may be in conflict, the more stringent requirements shall prevail.

B. All products shall be supplied as specified, or approved equal.

2.02 Bike Racks:

A. Bicycle Racks shall be the following:

1. Square "U" Rack, Model U200 by Madrax Inc. Waunakee, WI. Made of 2" Square steel tube, 3/8" thick with base plate for surface mount installation. Powdercoat finish. Color to be selected from manufacturers standard colors.
2. Or, approved equal.

2.03 Benches:

A. Benches shall be the following:

1. Victor Stanley Classic Series, Model #C-324 (with back). Ductile iron frame with recycled plastic slats. Surface mount installation. Color to be selected from manufacturers standard powdercoat and recycled plastic options.
2. Or, approved equal.

2.04 Trash Receptacles:

A. Trash Receptacle shall be:

1. Victor Stanley "Greensites Collection" (Model #RTH-36), Tubular steel frame with recycled plastic slats. With heavy duty plastic liner. Surface mount installation. Color to be selected from manufacturers standard powdercoat and recycled plastic options.
2. Or, approved equal.

2.05 Flagpoles:

A. Flagpole for American Flag shall be:

1. Flagpole Warehouse "Illuminator Series" (Model #ILIH30), 30' tall aluminum flagpole with satin finish. Flagpole shall have internal halyard and beacon feature with two high intensity 12 volt LED bulbs. Include a 5' x 8' American Flag.
2. Or, approved equal.

B. Flagpole for State and Local Flag shall be:

3. Flagpole Warehouse "Illuminator Series" (Model #ILIH25), 25' tall aluminum flagpole with satin finish. Flagpole shall have internal halyard. Include a 4' x 6' Iowa Flag. Local 4' x 6' Flag shall be provided by the Jurisdiction.

4. Or, approved equal.

2.06 Other Furnishings Installation Materials: Other materials required for product installation which may not be supplied or shipped by the manufacturer or otherwise specified for fabricated items include the following;

A. Concrete for Direct Burial Footings: Concrete for direct burial post footings shall conform to the SUDAS Standard Specifications (most recent edition).

B. Anchoring Devices for Bolt-down, Surface Installation: Where the manufacturer does not provide a specification for anchoring, use only approved stainless steel wedge anchors as follows;

1. Size to the largest standard diameter that the manufacturer's pre-made hole will accommodate without force, typically 5/8".
2. Size to ¾ of the actual depth of concrete to support the installation. Use 2¾" length on standard concrete flatwork.

PART 3 - EXECUTION

3.01 Examination: Verify installation conditions as satisfactory to receive work of this Section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

3.02 Direct Burial Installations:

A. All below-grade steel components scheduled for direct burial installation shall be coated in an approved manner prior to installation, typically either factory powder coating or hot-dipped galvanized.

B. Provide footing excavations sized per measured plans provided with the Contract Drawings, manufacturers printed assembly and installation instructions, or as directed by the Engineer, typically 12" diameter x 18" depth for most installations under 100 lbs/footing.

C. Coring and Saw-cutting:

1. All products scheduled for direct burial installation within new paved areas are to be installed prior to paving.
2. In the event that paving is installed prior to site furnishings scheduled for direct burial installation, saw-cutting will not be approved as a means of penetrating pavements. Coring, to the specified size of the footing, is the only method that may be considered.
3. Do not core completed work of the Contract to accomplish product installation without prior approval of the Engineer.

4. Where site furnishings are scheduled for installation in existing pavement of any type or where the Engineer has approved coring of pavement installed as part of the work of the Contract, the Contractor shall insure an adequate supply of clean water and continuously flush and clean cuttings from pavement surfaces to remain.

D. Concrete footings shall be neatly and evenly crowned slightly above adjacent finished grade where adjacent finished grade is generally level, matching adjacent finished grade where adjacent finished grade is sloped, or level to the bottom of base aggregate where installation in paved areas is scheduled.

E. Remove all concrete slurry from surrounding surfaces and site furnishings prior to request for inspection.

3.03 Surface Installations:

A. Surface installations shall be made only upon approved concrete surfaces.

B. Use only manufactured approved anchoring devices.

C. Where the manufacturer does not provide a specification for anchoring, use only approved stainless steel wedge anchors as follows;

1. Do not proceed with anchor installation until concrete pavement has had a minimum of 14 days cure time under normal conditions. Where weather conditions are beyond the range of normal, do not proceed with anchor installation without the approval of the Engineer.
2. Size to the largest standard diameter that the manufacturer's pre-made hole will accommodate without force, typically 5/8".
3. Size for embedment of ¾ of the actual depth of concrete to support the installation, in no case less than 2½". Allow for depth of nut plus 3-5 threads protrusion above finished installation.
4. Do not over drill beyond 1/8" the depth necessary to accommodate the anchor.
5. Torque to 80-85% of the anchor manufacturers recommended maximum.
6. Provide at least one anchor for every bolt location hole for any site furnishing.

3.04 Installation of Manufactured Items: Install all equipment in accordance with Specifications, Drawings and manufacturer's directions. Where these may be in conflict, the more stringent requirements govern.

3.05 Installation of Fabricated Items: All fabricated items shall be installed consistent with the measured plans provided in the Contract Drawings utilizing materials

3.06 Cleanup: Remove all metal, wood, and concrete debris, protective wrappings and coverings, and shipping materials from the project site. Remove all residues, repair all stains, scuffs, abrasions, and marks from the finished product prior to requesting inspection. Fully restore all areas of the site that were impacted by the installation activities per SPR Standard Specifications.

END OF SECTION

SPORTSFIELD LIGHTING

FIELD LIGHTING OPTION A: Lighting System with HID (Metal Halide) Light Source

FIELD LIGHTING OPTION B: Lighting System with LED Light Source

PART 1 – GENERAL

1.1 SUMMARY

A. Work covered by this section of the specifications shall conform to the contract documents, engineering plans as well as state and local codes.

B. The purpose of these specifications is to define the lighting system performance and design standards for Cubby Park, West Branch, Iowa. For the Field Lighting Option A (Option A) the manufacturer/contractor shall supply a lighting system using a HID (Metal Halide) light source. For Field Lighting Option B (Option B) the manufacturer/contractor shall supply a lighting system using a LED light source. The manufacturer /contractor shall supply lighting equipment to meet or exceed the standards set forth in these specifications.

C. There is a bid Option A to supply lighting equipment using a HID light source. There is a bid Option B to supply lighting equipment using a LED light source. All bidders must provide both bid Options.

D. The sports lighting will be for the following fields:

1. (3) Baseball/Softball Fields

E. The primary goals of this sports lighting project are:
1. Guaranteed Light Levels: Selection of appropriate light levels impact the safety of the players and the enjoyment of spectators. Therefore, light levels are guaranteed to not drop below specified target values for a period of 25 years.
2. Life-cycle Cost: In order to reduce the operating budget, the preferred lighting system shall be energy efficient and cost effective to operate. All maintenance costs shall be eliminated for the duration of the warranty.
3. Control and Monitoring: To allow for optimized use of labor resources and avoid unneeded operation of the facility, OWNER requires a remote on/off control system for the lighting system. Fields should be proactively monitored to detect luminaire outages over a 25-year life cycle. All communication and monitoring costs for 25-year period shall be incidental to the bid.
4. Environmental Light Control: It is the primary goal of this project to minimize spill light to adjoining properties and glare to the players, spectators and neighbors.

1.2 BID OPTION B: LED LIGHTING PERFORMANCE

A. Performance Requirements: Playing surfaces shall be lit to an average target illumination level and uniformity as specified in the chart below. Lighting calculations shall be developed and field measurements taken on the grid spacing with the minimum number of grid points specified below. Appropriate light loss factors shall be applied and submitted for the basis of design. Average illumination level shall be measured in accordance with the IESNA LM-5-04 (IESNA Guide for Photometric Measurements of Area and Sports Lighting Installations). Illumination levels shall not to drop below desired target values in accordance to IES RP-6-15, Page 2, Maintained Average Illuminance and shall be guaranteed for the full warranty period.

Area of Lighting	Average Target Illumination Levels	Maximum to Minimum Uniformity Ratio	Grid Points	Grid Spacing
200'/210'/200' Field - Infield	50 Footcandles	2.0:1.0	25	20' X 20'
200'/210'/200' Field - Outfield	30 Footcandles	2.5:1.0	77	20’ X 20’
265'/275'/265' Field - Infield	50 Footcandles	2.0:1.0	25	20' X 20'
265'/275'/265' Field - Outfield	30 Footcandles	2.5:1.0	142	20’ X 20’
180'/210'/180' Field - Infield	50 Footcandles	2.0:1.0	25	20' X 20'
180'/210'/180' Field - Infield	30 Footcandles	2.5:1.0	68	20’ X 20’

B. Hours of usage: Designs shall be based on the following hours of usage

Area of Lighting	Annual Usage Hours	25 year Usage Hours
Baseball	300	7,500

C. Color: The lighting system shall have a minimum color temperature of 5700K and a CRI of 75.

D. Mounting Heights: To ensure proper aiming angles for reduced glare and to provide better playability, minimum mounting heights shall be as described below. Higher mounting heights may be required based on photometric report and ability to ensure the top of the field angle is a minimum of 10 degrees below horizontal.

# of Poles	Pole Designation	Pole Height
10	A1, A2, A3, A4, A5, A6, B1, B2, C1, C2	60’
4	B3, B4, B5, B6	70’

1.2 BID OPTION A: HID (METAL HALIDE) LIGHTING PERFORMANCE

A. Performance Requirements: Playing surfaces shall be lit to an average target illumination level and uniformity as specified in the chart below. Lighting calculations shall be developed and field measurements taken on the grid spacing with the minimum number of grid points specified below. Average illumination level shall be measured in accordance with the IESNA LM-5-04 (IESNA Guide for Photometric Measurements of Area and Sports Lighting Installations). Illumination levels shall not to drop below desired target values in accordance to IES RP-6-15, Page 2, Maintained Average Illuminance and shall be guaranteed for the full warranty period. Hours of usage shall comply with the following:

Area of Lighting	Annual Usage Hours	25 Year Usage Hours
Baseball	**300**	**7,500**

B. Mounting Heights: To ensure proper aiming angles for reduced glare and to provide better playability, minimum mounting heights shall be as described below. Higher mounting heights may be required based on photometric report and ability to ensure the top of the field angle is a minimum of 10 degrees below horizontal.

# of Poles	Pole Designation	Pole Height
10	A1, A2, A3, A4, A5, A6, B1, B2, C1, C2	60’
4	B3, B4, B5, B6	70’

C. Lighting Methodology: There are two methods that will be considered for calculation of the lighting designs for this project. The approved Lighting Method #1 (Musco), automated timed power adjustments, as described in C.1 utilizes methodology that adjusts light levels through a series of programmed adjustments. The alternate Lighting Method #2 (Non-Musco), continuous depreciating light, as described in C.2 uses continuous lamp lumen depreciation which is recovered by relamping and cleaning lenses of the luminaires. Computer models shall reflect initial design lumens, end of life design lumens, recoverable light loss factor (RLLF of .69), and the Coefficient Utilization (CU) for the design. Both methods must be at or above target illumination levels throughout the 25 years of the contract/warranty provided by the manufacturer. A +/- 10% design/testing allowance is **not** permitted in the design logic.

1. Basis of Design: Lighting Method #1: Automated Timed Power Adjustments (Musco):

   a. Approved Musco’s Green Generation Lighting® sports lighting system shall use automated timed power adjustments to achieve a lumen maintenance control strategy as described in the IESNA Lighting Handbook 10th Edition, Lighting Controls Section page 16-8: "Lumen maintenance involves adjusting lamp output over time to maintain constant light output as lamps age and dirt accumulation reduces luminaire output. With lumen maintenance control, either lamps are dimmed when new, or the lamp's current is increased as the system ages."

   b. Manufacturers, not pre-approved, bidding an automated timed power adjustment system must provide an independent test report certifying the system meets the lumen maintenance control strategy above and verifying the field performance of the system for the duration of the useful life of the lamp based on lamp replacement hours. Report shall be signed by a licensed professional engineer with outdoor lighting experience. If report is not provided at least 10 days prior to bid opening, the manufacturer shall provide the initial and maintained designs called for in this specification under Lighting Method #2: Alternate Manufacturers, section 1.2.C.2.

   c. Project References: Non-approved manufacturers bidding any form of Automated Timed Power Adjustment light system must provide a minimum of ten (10) project references within the state of Iowa that have been completed within the last 12 months utilizing this exact technology. Manufacturer will include project name,

project city, and if requested, contact name and contact phone number for each reference.

Area of Lighting	Average Target Illumination Levels	Maximum to Minimum Uniformity Ratio	Grid Points	Grid Spacing
200'/210'/200' Field - Infield	50 Footcandles	2.0:1.0	25	20' X 20'
200'/210'/200' Field - Outfield	30 Footcandles	2.5:1.0	77	20' X 20'
265'/275'/265' Field - Infield	50 Footcandles	2.0:1.0	25	20' X 20'
265'/275'/265' Field - Outfield	30 Footcandles	2.5:1.0	142	20' X 20'
180'/210'/180' Field - Infield	50 Footcandles	2.0:1.0	25	20' X 20'
180'/210'/180' Field - Infield	30 Footcandles	2.5:1.0	68	20' X 20'

2. Lighting Method #2 – Continuous Depreciating Light (Non-Musco):

   a. The manufacturer bidding Lighting Method #2 must provide a complete submittal package for approval as outlined in Submittal Information at the end of this section at least 10 days prior to bid.

   b. The lighting system shall use continuous lamp lumen depreciation which is recovered by relamping and cleaning lenses of the luminaires. Manufacturer shall provide computer models for initial illumination level and target illumination levels on the field over 25 years. The specified maximum Recoverable Light Loss Factor (RLLF) .69 and maintenance/group relamping schedule shall be provided in accordance with recommendations in the Leukos Abstract Volume 6, Number 3, January 2010, page 183-201: "Light Loss Factors for Sports Lighting", and presented at the 2009 IESNA Annual Conference

1500 Watt Metal Halide Luminaire RLLF Requirements

Lamp Replacement Interval (hours)	Recoverable Light Loss Factor (RLLF)
2,100	.69

   c. Independent Test Report: If lamp replacement interval is greater than 3,000 hours for 1500 watt lamps, manufacturer shall supply an independent test report with lumen depreciation over proposed lamp life, initial lumens, and end of life lumens.

   d. Based on anticipated hours of usage listed below, Method #2 systems would require the following minimum group lamp replacements over the 25 years.

Area of Lighting	25 Year Usage Hours	25 Year Group Relamps Required
Baseball	7,500	3

Area of Lighting	Average Initial Illumination Levels	Average Target Illumination Levels	Maximum to Minimum Uniformity Ratio	Grid Points	Grid Spacing
200'/210'/200' Field - Infield	72.5 Footcandles	50 Footcandles	2.0:1.0	25	20' X 20'
200'/210'/200' Field - Outfield	43.5 Footcandles	30 Footcandles	2.5:1.0	77	20’ X 20’
265'/275'/265' Field - Infield	72.5 Footcandles	50 Footcandles	2.0:1.0	25	20' X 20'
265'/275'/265' Field - Outfield	43.5 Footcandles	30 Footcandles	2.5:1.0	142	20’ X 20’
180'/210'/180' Field - Infield	72.5 Footcandles	50 Footcandles	2.0:1.0	25	20' X 20'
180'/210'/180' Field - Infield	43.5 Footcandles	30 Footcandles	2.5:1.0	68	20’ X 20’

e. Revised Electrical Distribution: Manufacturer shall provide revised electrical distribution plans to include changes to service entrance, panel, and wire sizing if increased power is required which exceeds specified design loads.

1.3 ENVIRONMENTAL LIGHT CONTROL

A. Light Control Luminaires: All luminaires shall utilize spill light and glare control devices including, but not limited to, internal shields, louvers and external shields. No symmetrical beam patterns are accepted.

1.4 LIFE CYCLE COSTS

A. Manufacturer shall submit 25-year life cycle cost calculation as outlined in the required submittal information for Bid Option A.
Bid Option A (HID Metal Halide)- Lamp replacement schedule per charts below:

Lighting Method 1 Lamp Replacement	Lighting Method 2 Lamp Replacement
5,000 hour intervals	2,100 hour intervals

B. Preventative and Spot Maintenance: Manufacturer shall provide all preventative and spot maintenance, including parts and labor for 25 years from the date of equipment

shipment. Individual outages shall be repaired when the usage of any field is materially impacted. Owner agrees to check fuses in the event of a luminaire outage.

PART 2 – PRODUCT

2.1 SPORTS LIGHTING SYSTEM CONSTRUCTION

A. Manufacturing Requirements: All components shall be designed and manufactured as a system. All luminaires, wire harnesses, ballast (Option A), driver (Option B), and other enclosures shall be factory assembled, aimed, wired and tested.

B. Durability: All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed carbon steel shall be hot dip galvanized per ASTM A123. All exposed aluminum shall be powder coated with high performance polyester or anodized. All exterior reflective inserts shall be anodized, coated, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All exposed hardware and fasteners shall be stainless steel of 18-8 grade or better, passivated and coated with aluminum-based thermosetting epoxy resin for protection against corrosion and stress corrosion cracking. Structural fasteners may be carbon steel and galvanized meeting ASTM A153 and ISO/EN 1461 (for hot dipped galvanizing), or ASTM B695 (for mechanical galvanizing). All wiring shall be enclosed within the cross-arms, pole, or electrical components enclosure.

C. System Description: Lighting system shall consist of the following:

1. Galvanized steel poles and cross-arm assemblies.
2. Non-approved pole technology:
    a. Square static cast concrete poles will not be accepted.
    b. Direct bury steel poles which utilize the extended portion of the steel shaft for their foundation will not be accepted due to potential for internal and external corrosive reaction to the soils and long term performance concerns.
3. Pre-stressed concrete base embedded in concrete backfill allowed to cure for 12-24 hours before pole stress is applied. Alternate may be an anchor bolt foundation designed such that the steel pole and any exposed steel portion of the foundation is located a minimum of 18 inches above final grade. The concrete for anchor bolt foundations shall be allowed to cure for a minimum of 28 days before the pole stress is applied unless shorter cure time approved by structural engineer of record.
4. All luminaires shall be constructed with a die-cast aluminum housing or external hail shroud to protect the luminaire reflector system.
5. Manufacturer wills remote all drivers and ballasts and supporting electrical equipment in aluminum enclosures mounted approximately 10 feet above grade. The enclosures shall be touch-safe and include ballast, capacitor and fusing with indicator lights on fuses to notify when a fuse is to be replaced for each luminaire. Disconnect per circuit for each pole structure will be located in the enclosure. Integral ballast fixtures will not be accepted.
6. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.
7. All luminaires, visors, and cross-arm assemblies shall withstand 150 mph winds and maintain luminaire aiming alignment
8. Control cabinet to provide remote on-off control and monitoring of the lighting system. Cabinet shall be constructed of aluminum and be rated NEMA Type 4. Communication method shall be provided by manufacturer. Cabinet shall contain custom configured contactor modules for 30, 60, and 100 amps, labeled to match

field diagrams and electrical design. Manual off-on-auto selector switches shall be provided.

9. Lightning Protection: Manufacturer shall provide integrated lightning grounding via concrete encased electrode grounding system as defined by NFPA 780 and be UL Listed per UL 96 and UL 96A. If grounding is not integrated into the structure, the manufacturer shall supply grounding electrodes, copper down conductors, and exothermic weld kits. Electrodes and conductors shall be sized as required by NFPA 780. The grounding electrode shall be minimum size of 5/8 inch diameter and 8 feet long, with a minimum of 10 feet embedment. Grounding electrode shall be connected to the structure by a grounding electrode conductor with a minimum size of 2 AWG for poles with 75 feet mounting height or less, and 2/0 AWG for poles with more than 75 feet mounting height.

D. Safety: All system components shall be UL listed for the appropriate application.

2.2 ELECTRICAL

A. Electric Power Requirements for the Sports Lighting Equipment:
   1. Electric power: 480 Volt, 3 Phase
   2. Maximum total voltage drop: Voltage drop to the disconnect switch located on the poles shall not exceed three (3) percent of the rated voltage.

B. Energy Consumption:

   1. LED Light Source. The average kW consumption for the field lighting system shall be 78.5 kW.

   2. HID (Metal Halide) Light Source: The average kW consumption for the field lighting system shall be 93.8kW. The max kW consumption for the field lighting system shall be 102.0 kW.

2.3 STRUCTURAL PARAMETERS

A. Wind Loads: Wind loads shall be based on the 2015 International Building Code. Wind loads to be calculated using ASCE 7-10, an ultimate design wind speed of 115 mph and exposure category C.

B. Pole Structural Design: The stress analysis and safety factor of the poles shall conform to 2009 AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (LTS-5).

C. Foundation Design: The foundation design shall be based on soil parameters as outlined in the geotechnical report. If a geotechnical report is not available, foundation design shall be based on soils that meet or exceed those of a Class 5 material as defined by 2012 IBC Table 1806.2.

D. Foundation Drawings: Project specific foundation drawings stamped by a registered engineer in the state of Iowa are required. The foundation drawings must list the moment, shear (horizontal) force, and axial (vertical) force at ground level for each pole. These drawings must be submitted at time of bid to allow for accurate pricing.

2.4 CONTROL SYSTEM

A. Remote Lighting Control System: System shall allow owner and users with a security code to schedule on/off system operation via a web site, phone, fax or email up to ten years in advance. Manufacturer shall provide and maintain a two-way TCP/IP communication

link. Trained staff shall be available 24/7 to provide scheduling support and assist with reporting needs.

The owner may assign various security levels to schedulers by function and/or fields. This function must be flexible to allow a range of privileges such as full scheduling capabilities for all fields to only having permission to execute “early off” commands by phone. Scheduling tool shall be capable of setting curfew limits.

Controller shall accept and store 7-day schedules, be protected against memory loss during power outages, and shall reboot once power is regained and execute any commands that would have occurred during outage.

B. Remote Monitoring System: System shall monitor lighting performance and notify manufacturer if individual luminaire outage is detected so that appropriate maintenance can be scheduled. The controller shall determine switch position (manual or auto) and contactor status (open or closed).

C. Management Tools: Manufacturer shall provide a web-based database and dashboard tool of actual field usage and provide reports by facility and user group. Dashboard shall also show current status of lamp outages, control operation and service. Base Bid: Scheduling including relamping operations completed and scheduled. Mobile application will be provided suitable for IOS, Android and Blackberry devices.

Hours of Usage: Manufacturer shall provide a means of tracking actual hours of usage for the field lighting system that is readily accessible to the owner.

1. Cumulative hours: shall be tracked to show the total hours used by the facility
2. Current lamp hours: shall be tracked separately to reflect the amount of hours on the current set of lamps being used, so relamping can be scheduled accurately.

D. Communication Costs: Manufacturer shall include communication costs for operating the controls and monitoring system for a period of 25 years.

PART 3 – EXECUTION

3.1 SOIL QUALITY CONTROL

A. It shall be the Contractor’s responsibility to notify the Owner if soil conditions exist other than those on which the foundation design is based, or if the soil cannot be readily excavated. Contractor may issue a change order request / estimate for the Owner’s approval / payment for additional costs associated with:

1. Providing engineered foundation embedment design by a registered engineer in the State of Iowa for soils other than specified soil conditions.

2. Additional materials required to achieve alternate foundation;

3. Excavation and removal of materials other than normal soils, such as rock, caliche, etc.

3.2 DELIVERY TIMING

A. Delivery Timing Equipment On-Site: The equipment must be on-site 6 – 8 weeks from receipt of approved submittals and receipt of complete order information.

3.3 FIELD QUALITY CONTROL

A. Illumination Measurements: Upon substantial completion of the project and in the presence of the Contractor, Project Engineer, Owner's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with IESNA LM-5-04.

Alternate Bid: For Lighting Method 1, Timed Power Adjustment systems, light levels must be measured and exceed the specified target levels. For Lighting Method 2, light levels must be measured and meet the specified initial light levels.

B. Field Light Level Accountability

1. Light levels are guaranteed not to fall below the target maintained light levels for the entire warranty period of 25 Years.
2. The contractor/manufacturer shall be responsible for an additional inspection one year from the date of commissioning of the lighting system and will utilize the owner's light meter in the presence of the owner.
3. The contractor/manufacturer will be held responsible for any and all changes needed to bring these fields back to compliance for light levels and uniformities. Contractor/Manufacturer will be held responsible for any damage to the fields during these repairs.

C. Correcting Non-Conformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including footcandles and uniformity ratios are not in conformance with the requirements of the performance specifications and submitted information, the Manufacturer shall be required to make adjustments to meet specifications and satisfy Owner.

3.4 25-YEAR WARRANTY

A. Each manufacturer shall supply a signed warranty covering the entire LED or HID system for 25 years OR for the maximum hours of coverage based on the estimated annual usage, whichever occurs first. Warranty shall guarantee light levels will not fall below target maintained levels. Manufacturer shall maintain specifically-funded financial reserves to assure fulfillment of the warranty for the full term. Warranty may exclude fuses, storm damage, vandalism, abuse and unauthorized repairs or alterations.

1. BID OPTION A (Metal Halide): A +/- 10% design/testing allowance will not be allowed. Warranty shall also cover: lamp replacements, system energy consumption, monitoring, maintenance and control services, spill light control, and structural integrity.

2. BID OPTION A (Metal Halide): Group lamp replacements for Method 1 systems (Time Powered Adjustment) must occur at end of useful life of lamp as stated by manufacturer. Group lamp replacements for Method 2 systems (Continuous Depreciating Light) must relamp every 2,100.

B. Maintenance: Manufacturer shall monitor the performance of the lighting system, including on/off status, hours of usage and lamp outage for 25 years from the date of equipment shipment. Parts and labor shall be covered such that individual lamp/ luminaire outages shall be repaired when the usage of any field is materially impacted. Owner agrees to check fuses in the event of a luminaire outage.

PART 4 – DESIGN APPROVAL

4.0 PRE-BID SUBMITTAL REQUIREMENTS

A. Basis of Design: Musco's Green Generation Lighting® sports lighting system is the basis of design. All manufacturers must provide a complete submittal package for approval as outlined in Submittal Information at the end of this section at least 14 days prior to bid. Special manufacturing to meet the standards of this specification may be required. An addendum will be issued prior to bid listing any approved lighting manufacturers and designs. Listed Manufacturers:

BID OPTION B: LED

1. Musco's Light Structure System with TLC for LED is the basis of design.

BID OPTION A: HID (Metal Halide):

1. Method 1: Time Powered Adjustment - Musco's Green Generation Lighting® sports lighting system with a metal halide light source is the listed "Lighting Method 1" product.

2. Method 2: Continuous Depreciating Light – Once approved will be listed in an addendum as the approved "Lighting Method 2" product.

B. All listed manufacturers shall submit the information at the end of this section at least 14 days prior to bid. An addendum will be issued prior to bid; listing approved lighting manufacturers and the design method to be used.

C. Bidders are required to bid only products that have been approved by this specification or addendum by the owner or owner's representative. Bids received that do not utilize an approved system/design, will be rejected.

REQUIRED SUBMITTAL INFORMATION FOR ALL MANUFACTURERS 14 DAYS PRIOR TO BID

All items listed below are mandatory, shall comply with the specification and be submitted according to pre-bid submittal requirements. Complete the Yes/No column to indicate compliance (Y) or noncompliance (N) for each item. ***Submit checklist below with submittal****.*

Yes / No	Tab	Item	Description
	A	Letter/ Checklist	Listing of all information being submitted must be included on the table of contents. List the name of the manufacturer's local representative and his/her phone number. Signed submittal checklist to be included.
	B	Equipment Layout	Drawing(s) showing field layouts with pole locations
	C	On Field Lighting Design	Lighting design drawing(s) showing: a. Field Name, date, file number, prepared by b. Outline of field(s) being lighted, as well as pole locations referenced to the center of the field (x & y), Illuminance levels at grid spacing specified c. Pole height, number of fixtures per pole, horizontal and vertical aiming angles, as well as luminaire information including wattage, lumens and optics d. Height of light test meter above field surface. e. Summary table showing the number and spacing of grid points; average, minimum and maximum illuminance levels in foot candles (fc); uniformity including maximum to minimum ratio, coefficient of variance (CV), coefficient of utilization (CU) uniformity gradient; number of luminaries, total kilowatts, average tilt factor; light loss factor.
	D	Off Field Lighting Design – (LED Only)	Lighting design drawing showing initial spill light levels along the 100' boundary line (defined on bid drawings) in footcandles. Light levels shall be taken at 30-foot intervals along the boundary line. Readings shall be taken with the meter orientation at both horizontal and aimed towards the most intense bank of lights.
	E	Environmental Light Control Design – (LED	Environmental glare impact scans must be submitted showing the maximum candela from the field edge on a map of the surrounding area until 500 candela

		Only)	or less is achieved.
	G	Performance Guarantee	Provide performance guarantee including a written commitment to undertake all corrections required to meet the performance requirements noted in these specifications at no expense to the owner. Light levels must be guaranteed to not fall below target levels for warranty period.
	H	Structural Calculations	Pole structural calculations and foundation design showing foundation shape, depth backfill requirements, rebar and anchor bolts (if required). Pole base reaction forces shall be shown on the foundation drawing along with soil bearing pressures. Design must be stamped by a structural engineer in the state of Iowa, if required by owner. (May be supplied upon award).
	I	Control & Monitoring System	Manufacturer of the control and monitoring system shall provide written definition and schematics for automated control system to include monitoring.
	J	Electrical Distribution Plans	Manufacturer bidding an alternate product must include a revised electrical distribution plan including changes to service entrance, panels and wire sizing, signed by a licensed Electrical Engineer in the state of Iowa.
	K	Warranty	Provide written warranty information including all terms and conditions.
	L	Project References	Manufacturer to provide a list of ten (10) projects where the technology and specific fixture proposed for this project has been installed. Reference list will include project name, project city, installation date, and if requested, contact name and contact phone number.
	M	Product Information	Complete bill of material and current brochures/cut sheets for all product being provided.
	N	Delivery	Manufacturer shall supply an expected delivery timeframe from receipt of approved submittals and complete order information.
	O	Non-Compliance	Manufacturer shall list all items that do not comply with the specifications. If in full compliance, tab may be omitted.
	P	Life-cycle Cost Calculation	Document life-cycle cost calculations as defined in the specification. Identify energy costs for operating the luminaires. Maintenance cost for the system must be included in the warranty. All costs should be based on 25 Years. (complete table(s) below)

25-Year Life Cycle Operating Cost: Base Bid - LED			
a.	**Luminaire energy consumption** _____ luminaires x _____ kW demand per luminaire x 0.07 kWh rate x 300 annual usage hours x 25 years		
b.	**Demand charges, if applicable**	+	
c.	**Cost for maintenance, not covered, for 25 years** Assume 7.5 repairs at $500 each if not included with the bid	+	
	TOTAL 25 -Year Life-cycle Operating Cost	=	

25-Year Life Cycle Operating Cost: Alternate Bid - HID (Metal Halide)			
a.	**Luminaire energy consumption** _____ luminaires x _____ kW demand per luminaire x 0.07kWh rate x 300 annual usage hours x 25 years		
b.	**Demand charges, if applicable**	+	
c.	**Cost for maintenance, not covered, for 25 years** Assume 7.5 repairs at $500 each if not included with the bid	+	
	TOTAL 25 -Year Life-cycle Operating Cost	=	

The information supplied herein shall be used for the purpose of complying with the specifications for Cubby Park Improvements. By signing below I agree that all requirements of the specifications have been met and that the manufacturer will be responsible for any future costs incurred to bring their equipment into compliance for all items not meeting specifications and not listed in the Non-Compliance section.

Manufacturer: _____ **Signature:** _____

Contact Name: _____ **Date:** _____/_____/_____

Contractor: _____ **Signature:** _____

SPORTSFIELD SOIL PREPARATION

PART 1 - GENERAL

1.1 Description

A. Labor and materials to prepare sports field turf including topsoil and amendments, and grading. Sportsfield turf shall be limited to that portion within the ballfield fencing.

1.2 Related Sections:

1. SUDAS Section 2010.
2. SUDAS Section 9010
3. Irrigation System
4. Sportsfield Subdrainage

1.3 Submittals

A. Product Data: For each type of product indicated.

1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

C. Qualification Data: For qualified landscape Installer.

D. Product Certificates: For **soil amendments and fertilizers**, from manufacturer.

E. Material Test Reports: For **existing in-place surface soil**.

F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required initial maintenance periods.

1.4 Quality Assurance

A. construction shall be in accordance with the SUDAS Standard Specifications and Plans (most recent edition) except where modified herein

B. Installer Qualifications:

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.

2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

3. Personnel Certifications: Installer's **field supervisor** shall have certification in one of the following categories from the Professional Landcare Network:

    a. Certified Landscape Technician - Exterior, with **installation** specialty area(s), designated CLT-Exterior.

    b. Certified Turfgrass Professional, designated CTP.

    c. Certified Turfgrass Professional of Cool Season Lawns, designated CTP-CSL.

4. Maintenance Proximity: Not more than **two** hours' normal travel time from Installer's place of business to Project site.

5. Pesticide Applicator: State licensed, commercial.

C. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

D. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; **sodium absorption ratio;** deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.

2. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from Architect. A minimum of **three** representative samples shall be taken from varied locations for each soil to be used or amended for seeding purposes.

3. Report suitability of tested soil for turf growth.

    a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory seeding soil suitable for healthy, viable turf.

b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

E. Preinstallation Conference: Conduct conference at Project site.

1.5 Delivery, Storage and Handling

A. Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

3. Accompany each delivery of bulk fertilizers, and soil amendments with appropriate certificates.

1.6 Project Conditions

A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.7 Maintenance Service

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Seeded Turf: 90 days from date of planting completion.

a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

B. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

1. **=See Supplemental Specifications for seed mixture.**

2.2 Inorganic Soil Amendments

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve.

2. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.

3. Provide lime in form of ground **dolomitic limestone**.

B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.

G. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

2.3 Organic Soil Amendments

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through **3/4-inch** sieve; soluble salt content of **5 to 10** decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: **50 to 60** percent of dry weight.

2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

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

2.4 Fertilizers

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

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

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

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

2.5 Seed Bed Preparation

A. Soil Amendments: Amend existing, in-place surface soil as deemed necessary by Contractor's turf grow-in manager. Contractor and/or turf grow-in manager shall verify suitability of existing surface soil to produce viable planting soil. Remove stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix surface soil with the soil amendments **and fertilizers** to produce viable planting soil. Amendments may include, but are not limited to: compost, lime, sulfur, sand, phosphate, nitrogen.

2.6 Mulches

A. dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

B. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

2.7 Pesiticids

A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

PART 3 - EXECUTION

3.1 Examination

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.

3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 Preparation

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

3.3 Turf Area Preparation

A. Limit turf subgrade preparation to areas to be planted.

B. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:

1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.

2. Loosen surface soil to a depth of at least **6 inches**. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top **4 inches** of soil. Till soil to a homogeneous mixture of fine texture.

a. Apply **superphosphate** fertilizer directly to surface soil before loosening.

3. Remove stones larger than **1/2 inch** in any dimension and sticks, roots, trash, and other extraneous matter.

4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

C. Finish Grading: The topsoil material on the sports field shall be finish graded with a 2 mm GPS, Total Station or laser guided device, that allows accuracy to +/- 1/8 inch of design grade. All other natural grass areas shall be graded to within +/-0.1 ft of design grade. Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

D. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

E. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 Seeding

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

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

2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate of **5 to 8 lb/1000 sq. ft.**

C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

3.5 Mulching

A. Hydromulching: Mix specified fiber mulch in water, using equipment specifically designed for hydromulching application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mulching shall be done immediately after seeding according to manufacturer’s specifications and installation procedures for areas as indicated on the plan documents.

2. Mulching shall be performed the same day of seeding; coordinate work to ensure all areas seeded are mulched by end of work day.

3. Mulched areas shall be maintained as specified by manufacturer and as necessary for compliance with state and local soil erosion and sediment control standards.

3.6 4. Mulching shall consist of stabilizing the area with an overspray application of hydraulic mulch. The hydraulic mulch shall be applied as a slurry of 750 lb (850 kg) of mulch and 1,000 gal (9,500 L) of water per acre (hectare) by an approved hydraulic mulch applicator. The hydraulic mulch slurry shall be agitated a minimum of five minutes before application and shall be agitated during application.Turf Maintenance

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.

2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Coordinate athletic field seeding with installation of irrigation system. Do not seed until irrigation system is fully functional to water newly seeded areas. Apply additional water by hand for areas not covered by irrigation system. Maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.

2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow athletic field turf a height of 2 inches.

D. Turf Postfertilization: Apply slow release organic fertilizer after initial mowing and when grass is dry.

1. Milorganite fertilizer **36 lb / 2500 sq. ft.** of turf area.

3.7 Satisfactory Turf

A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding **90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.**

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.8 Pesticide Application

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.9 Clean up and Protection

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION

SPORTSFIELD SUBDRAINAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Subdrain installation including materials and installation.

1.2 QUALIFICATIONS

A. Contractor shall have the means and methods capable of completing the work.

PART 2 PRODUCTS

2.1 MATERIALS

1. Drain tile shall be perforated, high density polyethylene material with sizes as indicated on Plans. Laterals shall be 2" diameter Turf Flow as manufactured by Hancor.
2. All fittings must work with the 2" diameter tile for a hard connection to the perimeter drain.

    a. Sand backfill shall be a 1-2 mm coarse graded sand and shall bridge the tile perforations. Contractor to verify sand gradation is appropriate for perforations.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas to receive underdrains for:

1. Completion of excavation to elevations and slopes indicated.
2. Obstructions which would interfere with subdrainage system installation.

B. Begin work only when conditions are corrected to the satisfaction of the Engineer.

3.2 INSTALLATION

A. General

1. All equipment shall utilize turf -type flotation tires to minimize rutting and compaction.
2. Begin at the outlet and proceed continuously upgrade.
3. Slope of pipe shall be set to provide a constraint depth as shown on the plans.
4. Minimum laying depth is a minimum of 12" from ground surface to flowline of tile, unless otherwise specified. Avoid new irrigation system.
5. Construct subdrains in accordance with the details shown on the Plans.
6. Place drain tile with perforations facing downwards.
7. Utilize trenching equipment capable of trenching at 3" width, while

simultaneously removing spoils and installing 2" diameter pipe in one operation to ensure no spoils are remaining on the surface that may contaminate the trenches. This will require the use of a side wagon to capture the spoils. All equipment shall utilize turf-type flotation tires to minimize compaction and rutting.

8 Fill trenches to surface with specified sand while compacting at the same time to ensure no settling or sidewall cave-in occurs.

1. Upon completing mechanical trench compaction, flood all trenches adequately for additional settlement. Refill trenches to finished grade, allow for dirt removal of sod over trenches.

B. Joints

1. Complete joints in accordance with pipe manufacturer's instructions and per details shown on the plans.
2. All joints are to be constructed with manufactured fittings.
3. Blind ends to be capped.

SPORTSFIELD TURF GROW IN AND MAINTENANCE PLAN

PART 1 - GENERAL

1.1 Description

A. Labor and materials to grow in and maintain ballfield turf. Ballfield turf shall be limited to that portion within the ballfield fencing.

1.2 Related Sections:

1. SUDAS Section 1080
2. SUDAS Section 2010
3. SUDAS Section 9010
4. Irrigation System.
5. Sports field Subdrainage

1.3 Submittals

A. Product Data: For each type of product indicated.

1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.

B. Qualification Data: For qualified landscape Installer.

C. Product Certificates: For **fertilizers** from manufacturer.

D. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required initial maintenance periods.

1.4 Quality Assurance

A. Construction shall be in accordance with the SUDAS Standard Specifications and Plans (most recent edition) except where modified herein

B. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.

2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

3. Personnel Certifications: Installer's **field supervisor** shall have certification in one of the following categories from the Professional Landcare Network:

    a. Certified Landscape Technician - Exterior, with **installation** specialty area(s), designated CLT-Exterior.

    b. Certified Turfgrass Professional, designated CTP.

    c. Certified Turfgrass Professional of Cool Season Lawns, designated CTP-CSL.

4. Maintenance Punctuality: Installer shall be capable of on site assessment within 6 hours of receiving notice from owner of unsatisfactory conditions or performance.

5. Pesticide Applicator: State licensed, commercial.

1.5 Delivery, Storage and Handling

A. Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

3. Accompany each delivery of bulk fertilizers**,** and soil amendments with appropriate certificates.

1.6 Maintenance Service

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Seeded Turf: 90 days from date of planting completion.

    a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

PART 2 - PRODUCTS

2.1 Fertilizers

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

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

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

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

2.2 Pesticides

A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.3 Herbicides?

PART 3 - EXECUTION

3.1 Examination

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.

3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 Turf Maintenance

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.

2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Apply additional water by hand or portable sprinkler(s) for areas not covered by irrigation system. Maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.

2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow athletic field turf a height of 2 inches.

D. Turf Postfertilization: Apply slow release organic fertilizer after initial mowing and when grass is dry.

1. Milorganite fertilizer **36 lb / 2500 sq. ft.** of turf area.

3.3 Satisfactory Turf

A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding **90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.**

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.4 Pesticide Application

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

END OF SECTION

PART III – BUILDING SPECIFICATIONS

DIVISION 03 - CONCRETE

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. See Structural Notes on the Structural Drawings for additional specific information about the requirements for this project. Information on the structural drawings shall take precedence over provisions herein.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.
2. Section 321313 "Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

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

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, welded connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Construction Joint Layout:

1. Construction joints are not indicated in the drawings provide locations and types of joints to be used in each condition. Joint spacing not to exceed 10 feet in the short dimension and the maximum area between joints shall not exceed 400 square feet. Locate joints on structural lines, at corners of slabs, or concealed under walls whenever possible.
2. Construction joints are to be located as required to meet referenced standards.

E. Provide the following samples for review prior to ordering:

1. Vapor retarder

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Curing compounds.
6. Floor and slab treatments. (Where specified elsewhere.)
7. Bonding agents.
8. Adhesives.
9. Vapor retarders.

10. Semirigid joint filler.
11. Joint-filler strips.

B. Field quality-control reports, such as concrete testing reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Company to install poured concrete shall have at least 5 years of successful projects or company owner to have at least 10 years of successful project experience and lead concrete installer to have a minimum of 5 years of successful concrete placement.

B. Testing Agency- Owner is providing testing agency for concrete testing for this project. Contractor shall be responsible for notifying the testing agency 24 hours in advance of time of concrete pour so that testing personnel may be present. Concrete personnel shall cooperate with the Testing Agency to obtain samples and perform testing as required.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Where reinforcement has special coatings, provide special handling and storage to protect.

1.8 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
   1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
   2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
   3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and as follows:
   1. Maintain concrete temperature below at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
   2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
   1. ACI 301.
   2. ACI 117.

2.2 FORM-FACING MATERIALS

A. Under no conditions should forms which are dented or delaminated or which have a build-up of concrete on the surface be used for forming concrete. Surfaces which are exposed to view or which are to be waterproofed with these problems may be subject to partial or complete patching or complete removal and replacement due to form issues.

B. Smooth-Formed Finished Concrete: Unless otherwise specifically noted and specified, no decorative, textured, or patterned concrete forms are to be used on this project. Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints. Plywood, metal, or other approved panel materials.

1. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
   a. High-density overlay, Class 1 or better.
   b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
   c. Structural 1, B-B or better; mill oiled and edge sealed.
   d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
2. Overlaid Finnish birch plywood.

C. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

D. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

E. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.

F. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

G. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

H. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

I. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
   1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

J. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
   1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
   2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
   3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

C. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60 ASTM A 706/A 706M], deformed bars, assembled with clips.

D. Plain-Steel Wire: ASTM A 1064/A 1064M, as drawn.

E. Deformed-Steel Wire: ASTM A 1064/A 1064M.

F. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

G. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, flat sheet.

2.4 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
   1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.5 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:
1. Portland Cement: ASTM C 150/C 150M, Type I, gray.
2. Fly Ash: ASTM C 618, Class F or C.

C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C 260/C 260M.

E. Chemical Admixtures: To be allowed only when specifically noted in the Structural Drawings or by specific approval of the products by the Architect or Structural Engineer prior to use. Where use is anticipated include in concrete design mix and provide product information for review. Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

F. Set-Accelerating Corrosion-Inhibiting Admixture: To be allowed only when specifically noted in the Structural Drawings or by specific approval of the products by the Architect or Structural Engineer prior to use. Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.

G. Non-Set-Accelerating Corrosion-Inhibiting Admixture: To be allowed only when specifically noted in the Structural Drawings or by specific approval of the products prior to use. Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

H. Water: ASTM C 94/C 94M and potable.

2.6 FIBER REINFORCEMENT

A. Carbon-Steel Fiber: ASTM A 820/A 820M, Type 1, cold-drawn wire, deformed, size as shown on drawings.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Bekaert.
b. Euclid Chemical Company (The); an RPM company.
c. Nycon, Inc.
d. Propex.
e. Sika Corporation.

B. Other fiber types will be considered upon application for approval prior to bidding.

2.7 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A, except with maximum water-vapor permeance of .01 Perms. Include manufacturer's recommended adhesive or pressure-sensitive tape. 15 mils minimum thickness.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Raven Industries, Inc.
b. Stego Industries, LLC.

2.8 LIQUID FLOOR TREATMENTS

A. Concrete Sealer and Densifier: Concrete hardener and dust proofer that bonds chemically with the concrete to strengthen and harden floors that are porous, readily absorptive, and only moderately hard.
   1. Manufacturers:
      a. Master Builders MasterKure HD 300 WB (formerly Lapidolith)

B. Moisture Curing Option To be used for all concrete surfaces where chemical curing will interfere with later installations.
   1. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
   2. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
   3. Water: Potable.

2.9 RELATED MATERIALS

A. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 according to ASTM D 2240.

B. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
   1. Types I and II, nonload bearing or Types IV and V, load bearing as required for application, for bonding hardened or freshly mixed concrete to hardened concrete.

D. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

E. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.10 REPAIR MATERIALS

A. Repair Underlayment: (Repair materials are to be used only in very small and limited quantities in concealed areas unless noted otherwise or approved in advance.) Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
   1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
   2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
   3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
   4. Compressive Strength: Not less than [4100 psi (29 MPa) or at least equal by test to surrounding materials at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: (Overlay materials are only to be used in areas of existing construction and only where specifically noted in the drawings or approved in advance.) Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.
   1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
   2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
   3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
   4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).

B. Cementitious Materials: Use of fly ash, pozzolan, slag cement, and silica fume is allowed to reduce the total amount of portland cement, which would otherwise be used.
   1. Fly Ash: 25 percent.
   2. Combined Fly Ash and Pozzolan: 25 percent.
   3. Slag Cement: 50 percent.
   4. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
   5. Silica Fume: 10 percent.
   6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
   7. Combined Fly Ash or Pozzolans, Slag Cement, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

C. Admixtures: Allowed provided all admixtures to be used on a project are submitted with the mix design and approved by the structural engineer and soil testing agency. Use admixtures according to manufacturer's written instructions.
   1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
   2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
   3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.
   4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

D. Color Pigment: Where noted in the drawings, add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS- See structural drawings for additional information.

A. Footings: Normal-weight concrete.
   1. Minimum Compressive Strength: As indicated in the structural drawings but not less than 3000 psi at 28 days.
   2. Maximum W/C Ratio: 0.50 unless specifically approved by Structural Engineer or Testing Agency.
   3. Slump Limit: 4 inches for concrete without admixtures or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture plus or minus 1 inch.
   4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

B. Foundation Walls: Normal-weight concrete.
   1. Minimum Compressive Strength: As indicated in the structural drawings but not les than 4000 psi at 28 days.
   2. Maximum W/C Ratio: 0.45 unless specifically approved by Structural Engineer or Testing Agencey.
   3. Slump Limit: 4 inches for concrete without admixtures or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture plus or minus 1 inch.
   4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

C. Slabs-on-Grade: Normal-weight concrete.
   1. Minimum Compressive Strength: As indicated in the structural drawings but not less than 4000 psi at 28 days.
   2. Maximum W/C Ratio: 0.45.

3. Slump Limit: 4 inches for concrete without admixtures , or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture plus or minus 1 inch.
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.
5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

D. Building Walls: Normal-weight concrete.
1. Minimum Compressive Strength: Verify with structural drawings but not less than 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.45.
3. Slump Limit: 4 inches without admixtures or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture plus or minus 1 inch .
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

2.13 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M).

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
1. For all surfaces exposed to view, where painted, or where waterproofing requires: Class A, 1/8 inch for smooth-formed finished surfaces.
2. For surfaces concealed by furring or other finishes which are directly attached to concrete: Class B, 1/4 inch.
3. For permanently concealed walls where furring or concealment is not directly attached to the wall, buried walls not requiring waterproofing Class C, 1/2 inch and Class D, 1 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Unless otherwise noted or shown, chamfer exterior corners top and edges of the tops and sides of permanently exposed concrete where there is no other wall or ceiling surface flush with face of concrete wall.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEM INSTALLATION
A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS
A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for hours after placing concrete unless curing conditions allow forms to be removed sooner, but no less than 12 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.
C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces. Do not use forms where concrete laitance will affect structural integrity of the concrete, detract from appearance of the concrete or with adhesion of waterproofing, EIFS, or other cladding systems. The Architect reserves the right to reject exposed concrete walls damaged by the use of laitance covered or damaged forms.

3.4 SHORING AND RESHORING INSTALLATION
A. Comply with ACI 318 (ACI 318M) and ACI 301 (ACI 301M) for design, installation, and removal of shoring and reshoring.
1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
B. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

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

3.6 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
   1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

C. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

D. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
   1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
   2. Locate joints for beams, slabs, joists, and girders in the middle third of spans or as directed by the drawings. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
   3. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
   4. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
   1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks. Sawcut newly placed concrete slabs as soon as practical and in no case more than 24 hours after placement.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated
   1. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
   2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.8 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M).
   1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
   1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.

2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.9 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Applies to concrete surfaces not exposed to public view.
2. Where waterproofing or EIFS is to be applied, surface must not reduce adhesion of glues and mastics.
3. Below grade

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be painted or covered with a coating or covering material applied directly to concrete including spray texture materials.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture. Use float finish in areas indicated in the drawings or where concrete is to be covered with fluid applied or sheet waterproofing, built up membrane roofing, or sand be terrazzo. In all of these cases concrete contractor must coordinate surface requirements with covering product manufacturer's recommendations.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces to be covered with resilient flooring (VCT , LVT, and others), carpet, thin-set terrazzo, ceramic or quarry tile, paint, or another thin-film-finish coating systems.

2. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.
3. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:

D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, stoops,and other exterior, wet condition walking surfaces, and other areas elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.11 MISCELLANEOUS CONCRETE ITEM INSTALLATION

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

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

C. Equipment Bases and Foundations:
1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 4 inches (change thickness if required) high unless otherwise indicated, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required.
3. Minimum Compressive Strength: 4000 psi at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install anchor bolts that extend through concrete base and anchor into structural concrete substrate. Verify size, type, and coating required, if any, of anchor bolts.
6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.
8. See structural drawings for engineered foundations and equipment slabs.
9. Provide for all equipment noted in the architectural, mechanical, electrical, or structural drawings or for equipment which are not designed with an integral base.

3.12 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 (ACI 301M) for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
1. Moisture Curing: To be used wherever curing compounds are incompatible with finish floor or membrane adhesives, floor coatings, waterproofing membranes, or other covering materials. Keep surfaces continuously moist for not less than seven days with the following materials:

a. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and

a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

3.13 LIQUID FLOOR TREATMENT APPLICATION

A. Concrete Sealer and Densifier Penetrating Liquid Floor Treatment (Master Builders HD300WB formerly Lapidolith): Magnesium-flurosilicate concrete hardener and dust proofer that bonds chemically with the concrete to strengthen and harden floors that are porous, readily absorptive, and only moderately hard.

1 CONCRETE

a. After the first application, allow the floor to dry until no longer visibly wet.

b. If crystals develop during the second application, flush the surface liberally with clean water, preferably hot. At the same time, rapidly brush the floor with a stiff-bristled broom. Then mop up excess water and allow the surface to dry.

2. CONCRETE, POLISHED SHEEN

a. To achieve the appearance of a polished sheen from traffic, use 3 applications of Lapidolith®. The first is diluted 4 to 1 (water to Lapidolith®), the second is diluted 3 to 1, and the third is diluted 2 to 1 (see Yield section).

b. As the last application is drying, wait for the uniform appearance of white crystals. Flood the floor with water and buff with a commercial floor buffer using a 3M® or similar type of abrasive pad. Continue buffing until the floor acquires a patina or polish and the whiteness is gone.

c. The above recommendation is for dense, steel troweled floors. Older or more porous concrete may require less dilution or a lower coverage rate or more than 3 applications. CAUTION: unusually wet or oily environments will be more slippery with this surface treatment.

3.14 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color.

Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
5. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
6. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.16 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
   a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M.
   a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
   b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
   a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 24 hours of finishing.

3.17 PROTECTION OF LIQUID FLOOR TREATMENTS

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

END OF SECTION

DIVISION 04 – MASONRY

SECTION 042200 - CONCRETE UNIT MASONRY

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. Concrete masonry units.
  2. Mortar and grout.
  3. Steel reinforcing bars.
  4. Masonry-joint reinforcement.
- B. Related Requirements:
  1. Section 051200 "Structural Steel Framing" for installing anchor sections of adjustable masonry anchors for connecting to structural steel frame.
  2. Section 076200 "Sheet Metal Flashing and Trim" for exposed sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

1.3 DEFINITIONS
- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 ACTION SUBMITTALS
- A. Product Data: For each type of product.
- B. Shop Drawings: For the following:
  1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
  2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
  3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples for Initial Selection:
  1. Colored mortar.

1.5 INFORMATIONAL SUBMITTALS
- A. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
- B. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.
- C. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 DELIVERY, STORAGE, AND HANDLING
- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

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

1.7 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
   1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls, and hold cover securely in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
   1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
   2. Protect sills, ledges, and projections from mortar droppings.
   3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
   4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
   1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

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

2.2 PERFORMANCE REQUIREMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
   1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
   2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

2.3 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet (6 m) vertically and horizontally of a walking surface.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS
A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide square-edged units for outside corners unless otherwise indicated. (verify if you want rounded corners.)
(Add sections as required.)
B. CMUs: ASTM C 90.
1. Density Classification: Normal weight unless otherwise indicated.
2. Size (Width): Manufactured to dimensions 3/8 inch (10 mm) less-than-nominal dimensions.

2.5 MASONRY LINTELS
A. General: Provide one of the following:
B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.6 MORTAR AND GROUT MATERIALS
A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.
B. Hydrated Lime: ASTM C 207, Type S.
C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
D. Masonry Cement: ASTM C 91/C 91M.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
a. Cemex S.A.B. de C.V.
b. Essroc.
c. Holcim (US) Inc.
d. Lafarge North America Inc.
e. Lehigh Hanson; Heidelberg Cement Group.
E. Mortar Cement: ASTM C 1329/C 1329M.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
a. Lafarge North America Inc.
F. Aggregate for Mortar: ASTM C 144.
1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
G. Aggregate for Grout: ASTM C 404.
H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. BASF Corporation; Construction Systems.
   b. Euclid Chemical Company (The); an RPM company.
   c. Grace Construction Products; W.R. Grace & Co. -- Conn.

I. Water: Potable.

2.7 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      a. Dur-O-Wal; a Hohmann & Barnard company.
      b. Heckmann Building Products, Inc.
      c. Hohmann & Barnard, Inc.
      d. Wire-Bond.

C. Masonry-Joint Reinforcement, General: Ladder type complying with ASTM A 951/A 951M.

2.8 TIES AND ANCHORS

A. General: Ties and anchors shall extend at least 1-1/2 inches (38 mm) into masonry but with at least a 5/8-inch (16-mm) cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
   1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.
   2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 (Z180) zinc coating.
   3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

D. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

E. Partition Top Anchors: 0.105-inch- (2.66-mm-) thick metal plate with a 3/8-inch- (9.5-mm-) diameter metal rod 6 inches (152 mm) long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

2.9 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with Section 076200 "Sheet Metal Flashing and Trim" and as follows:
   1. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.

B. Application: Unless otherwise indicated, use the following:
   1. Where flashing is indicated to receive counterflashing, use metal flashing.
   2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
   3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge.
   4. Where flashing is fully concealed, use flexible flashing.

C. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.10 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.11 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
   1. Do not use calcium chloride in mortar or grout.
   2. Use portland cement-lime or mortar cement mortar unless otherwise indicated.
   3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Grout for Unit Masonry: Comply with ASTM C 476.
   1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
   2. Verify that foundations are within tolerances specified.
   3. Verify that reinforcing dowels are properly placed.
   4. Verify that substrates are free of substances that would impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Build chases and recesses to accommodate items specified in this and other Sections.

B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:
   1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
   2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
   3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:
   1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.

2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm).

C. Joints:
1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches (100 mm). Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
1. Install compressible filler in joint between top of partition and underside of structure above.
2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch (13-mm) clearance between end of anchor rod and end of tube. Space anchors 48 inches (1200 mm) o.c. unless otherwise indicated.
3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.

4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:
   1. Bed face shells in mortar and make head joints of depth equal to bed joints.
   2. Bed webs in mortar in all courses of piers, columns, and pilasters.
   3. Bed webs in mortar in grouted masonry, including starting course on footings.
   4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.

B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
   1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
   2. Wet joint surfaces thoroughly before applying mortar.
   3. Rake out mortar joints for pointing with sealant.

D. Rake out mortar joints at pre-faced CMUs to a uniform depth of 1/4 inch (6 mm) and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.

E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

F. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

G. Cut joints flush where indicated to receive waterproofing unless otherwise indicated.

3.6 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
   1. Space reinforcement not more than 16 inches (406 mm) o.c.
   2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
   3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
   1. Provide an open space not less than 1/2 inch (13 mm) wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
   2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
   3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

3.8 CONTROL AND EXPANSION JOINTS

A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry as follows using one of the following methods:
   1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.

2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.

3.9 LINTELS

A. Provide masonry lintels where shown and where openings of more than 12 inches (305 mm) for brick-size units and 24 inches (610 mm) for block-size units are shown without structural steel or other supporting lintels.
B. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

3.10 FLASHING

A. General: Install embedded flashing at ledges and other obstructions to downward flow of water in wall where indicated.
B. Install flashing as follows unless otherwise indicated:
   1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
   2. At lintels, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
   3. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches (38 mm) or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
   4. Install metal drip edges with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

3.11 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
   1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
   2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
   1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
   2. Limit height of vertical grout pours to not more than 60 inches (1520 mm).

3.12 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent

construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

3.13 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION

SPECIFICATIONS: **CUBBY PARK IMPROVEMENTS**
300 SCOTT DRIVE, WEST BRANCH, IOWA
ARCHITECT PROJECT #D0576.01/ENGINEER PROJECT #16-072

DIVISION 05 – METALS

SECTION 055000 - METAL FABRICATIONS

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. Steel framing and supports for countertops.
   2. Steel tube reinforcement for low partitions.
   3. Steel framing and supports for mechanical and electrical equipment.
   4. Steel framing and supports for applications where framing and supports are not specified in other Sections.
   5. Elevator machine beams, hoist beams, and divider beams.
   6. Steel shapes for supporting elevator door sills.
   7. Steel girders for supporting wood frame construction.
   8. Steel pipe columns for supporting wood frame construction.
   9. Metal ladders.
   10. Elevator pit sump covers.
   11. Metal bollards.
   12. Loose bearing and leveling plates for applications where they are not specified in other Sections.

B. Products furnished, but not installed, under this Section include the following:
   1. Loose steel lintels.
   2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
   3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

C. Related Requirements:
   1. Section 033000 "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
   2. Section 042000 "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.
   3. Section 051200 "Structural Steel Framing."

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:
   1. Nonslip aggregates and nonslip-aggregate surface finishes.
   2. Prefabricated building columns.
   3. Metal nosings and treads.
   4. Paint products.
   5. Grout.

B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
   1. Steel framing and supports for countertops.
   2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
   3. Elevator machine beams, hoist beams, and divider beams.
   4. Steel pipe columns for supporting wood frame construction.
   5. Metal ladders.
   6. Metal bollards.
   7. Loose steel lintels.

1.5 INFORMATIONAL SUBMITTALS
A. Welding certificates.
B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
C. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE
A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
B. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
   2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
   3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.7 FIELD CONDITIONS
A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design ladders and alternating tread devices.
B. Structural Performance of Aluminum Ladders: Aluminum ladders, including landings, shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
C. Structural Performance of Alternating Tread Devices: Alternating tread devices shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
   1. Uniform Load: 100 lbf/sq. ft. (4.79 kN/sq. m).
   2. Concentrated Load: 300 lbf (1.33 kN) applied on an area of 4 sq. in. (2580 sq. mm).
   3. Uniform and concentrated loads need not be assumed to act concurrently.
   4. Alternating Tread Device Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

2.2 METALS
A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
C. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.
D. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

E. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
F. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
G. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
H. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
I. Zinc-Coated Steel Wire Rope: ASTM A 741.
   1. Wire-Rope Fittings: Hot-dip galvanized-steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.
J. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
   1. Size of Channels: 1-5/8 by 1-5/8 inches (41 by 41 mm) or as indicated on the drawings.
K. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
L. Aluminum Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.
M. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.
N. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
O. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
P. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (extruded architectural bronze).
Q. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semired brass).
R. Nickel Silver Extrusions: ASTM B 151/B 151M, Alloy UNS No. C74500.
S. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
   1. Provide stainless-steel fasteners for fastening aluminum.
   2. Provide stainless-steel fasteners for fastening stainless steel.
   3. Provide stainless-steel fasteners for fastening nickel silver.
   4. Provide bronze fasteners for fastening bronze.
B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
C. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3 (ASTM A 325M, Type 3); with hex nuts, ASTM A 563, Grade C3 (ASTM A 563M, Class 8S3); and, where indicated, flat washers.
D. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593 (ASTM F 738M); with hex nuts, ASTM F 594 (ASTM F 836M); and, where indicated, flat washers; Alloy Group 1 (A1).
E. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
   1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
F. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
G. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
   1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
   2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy[Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).
H. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with

temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
   1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

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

F. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

2.5 FABRICATION, GENERAL

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

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

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

D. Form exposed work with accurate angles and surfaces and straight edges.

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

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

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

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

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

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

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

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

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
   1. Fabricate units from slotted channel framing where indicated.

2. Furnish inserts for units installed after concrete is placed.

C. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.
1. Unless otherwise indicated, fabricate from Schedule 40 steel pipe.
2. Unless otherwise indicated, provide 1/2-inch (12.7-mm) baseplates with four 5/8-inch (16-mm) anchor bolts and 1/4-inch (6.4-mm) top plates.

D. Galvanize miscellaneous framing and supports where indicated.

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

2.7 METAL LADDERS

A. General:
1. For elevator pit ladders, comply with ASME A17.1/CSA B44.

B. Steel Ladders:
1. Space siderails 16 inches (406 mm) apart unless otherwise indicated.
2. Siderails: Continuous, 3/8-by-2-1/2-inch (9.5-by-64-mm steel flat bars, with eased edges.
3. Rungs: 3/4-inch- (19-mm-) diameter steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
6. Galvanize ladders, including brackets.

2.8 ELEVATOR PIT SUMP COVERS

A. Fabricate from 1/8-inch (3.2-mm)rolled-steel floor plate with four 1-inch- (25-mm-) diameter holes for water drainage and for lifting.

B. Provide steel angle supports as indicated.

2.9 MISCELLANEOUS STEEL TRIM

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

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize miscellaneous steel trim.

2.10 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 40 steel pipe 1/4-inch (6.4-mm) wall-thickness rectangular steel tubing.
1. Where bollards are indicated to receive controls for door operators, provide cutouts for controls and holes for wire.
2. Where bollards are indicated to receive light fixtures, provide cutouts for fixtures and holes for wire.

B. Fabricate internal sleeves for removable bollards from Schedule 40 steel pipe or 1/4-inch (6.4-mm) wall-thickness steel tubing with an OD approximately 1/16 inch (1.5 mm) less than ID of bollards. Match drill sleeve and bollard for 3/4-inch (19-mm) steel machine bolt.

C. Prime bollards with zinc-rich primer.

2.11 LOOSE BEARING AND LEVELING PLATES

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

B. Prime plates with zinc-rich primer.

2.12 LOOSE STEEL LINTELS

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

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span, but not less than 8 inches (200 mm) unless otherwise indicated.

C. Galvanize and prime loose steel lintels located in exterior walls.

2.13 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.14 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.15 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
   1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
   1. Shop prime with universal shop primer indicated.

D. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
   1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

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

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

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

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

F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
   1. Cast Aluminum: Heavy coat of bituminous paint.
   2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

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

B. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
   1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

C. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.
   1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLING METAL BOLLARDS

A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
   1. Do not fill removable bollards with concrete.

B. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete. Fill annular space around bollard solidly with nonshrink grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch (3 mm) toward bollard.

C. Fill bollards solidly with concrete, mounding top surface to shed water.
   1. Do not fill removable bollards with concrete.

3.4 INSTALLING BEARING AND LEVELING PLATES

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

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.5 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

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

END OF SECTION

DIVISION 06 – WOOD, PLASTICS AND COMPOSITES

SECTION 061000 - 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.

B. See Structural Drawings for further information regarding specific project requirements.

1.2 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Framing with engineered wood products.
3. Wood blocking and nailers.
4. Wood furring.
5. Wood sleepers.
6. Plywood backing panels.

B. Related Requirements:

1. Section 061063 "Exterior Rough Carpentry."
2. Section 061533 "Wood Patio Decking" for elevated decks, including support framing.
3. Section 061600 "Sheathing" for sheathing, subflooring, and underlayment.
4. Section 061753 "Shop-Fabricated Wood Trusses" for wood trusses made from dimension lumber.

1.3 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal (38 mm actual) size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) size or greater but less than 5 inches nominal (114 mm actual) size in least dimension.

C. Exposed Framing: Framing not concealed by other construction.

D. OSB: Oriented strand board.

E. Timber: Lumber of 5 inches nominal (114 mm actual) size or greater in least dimension.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

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

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal (38-mm actual) thickness or less; 19 percent for more than 2-inch nominal (38-mm actual) thickness unless otherwise indicated.

C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. 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.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2.
   1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
   2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

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

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
   1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
   2. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
   3. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
   4. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
   5. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
   6. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

A. Non-Load-Bearing Interior Partitions: No. 2 grade.
   1. Application: All interior partitions.
   2. Species:
      a. Spruce-pine-fir; NLGA.

B. Load-Bearing Partitions: No. 2 grade.
   1. Application: Exterior walls and interior load-bearing partitions.
   2. Species:
      a. Spruce-pine-fir; NLGA.

C. Ceiling Joists: No. 2 grade.
   1. Species:
      a. Spruce-pine-fir; NLGA.

D. Joists, Rafters, and Other Framing Not Listed Above: No. 2 grade.
   1. Species:
      a. Spruce-pine-fir; NLGA.

E. Exposed Framing Indicated to Receive a Stained or Natural Finish: Hand-select material for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

2.4 ENGINEERED WOOD PRODUCTS

A. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.

B. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    a. Boise Cascade Corporation.
    b. Georgia-Pacific Building Products.
    c. Louisiana-Pacific Corporation.
    d. Weyerhaeuser Company.

C. Parallel-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    a. Louisiana-Pacific Corporation.
    b. Weyerhaeuser Company.

2.5 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.
7. Utility shelving.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.

C. Concealed Boards: 15 percent maximum moisture content and any of the following species and grades:

D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.6 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

2.7 FASTENERS

A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

2.8 METAL FRAMING ANCHORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. KC Metals Products, Inc.
2. Simpson Strong-Tie Co., Inc.

3. USP Structural Connectors.

B. Allowable design loads, as published by manufacturer, shall 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. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
   1. Use for interior locations unless otherwise indicated.

D. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.
   1. Use for wood-preservative-treated lumber and where indicated.

2.9 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to suit width of sill members indicated.

B. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.

D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.

E. Install shear wall panels to comply with manufacturer's written instructions.

F. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

G. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.

H. Do not splice structural members between supports unless otherwise indicated.

I. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
   1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.

J. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
   1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
   2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal (38-mm actual) thickness.
   3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. (9.3 sq. m) and to solidly fill space below partitions.
   4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet (6 m) o.c.

K. Sort and select lumber so that natural characteristics do 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.

L. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
   1. Use inorganic boron for items that are continuously protected from liquid water.
   2. Use copper naphthenate for items not continuously protected from liquid water.

M. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

N. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

O. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

P. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
   1. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

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

B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- (19-by-63-mm actual-) size furring horizontally and vertically at 24 inches (610 mm) o.c.

3.4 WALL AND PARTITION FRAMING INSTALLATION

A. General: Provide single bottom plate and double top plates using members of 2-inch nominal (38-mm actual) thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions and for load-bearing partitions where framing members bearing on partition are located directly over studs. Fasten plates to supporting construction unless otherwise indicated.

B. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.

C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
   1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal (89-mm actual) depth for openings 48 inches (1200 mm) and less in width, 6-inch nominal (140-mm actual) depth for openings 48 to 72 inches (1200 to 1800 mm) in width, 8-inch nominal (184-mm actual) depth for openings 72 to 120 inches (1800 to 3000 mm) in width, and not less than 10-inch nominal (235-mm actual) depth for openings 10 to 12 feet (3 to 3.6 m) in width.
   2. For load-bearing walls, provide double-jamb studs for openings 60 inches (1500 mm) and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated.

3.5 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SPECIFICATIONS: **CUBBY PARK IMPROVEMENTS**
300 SCOTT DRIVE, WEST BRANCH, IOWA
ARCHITECT PROJECT #D0576.01/ENGINEER PROJECT #16-072

DIVISION 06 – WOOD, PLASTICS AND COMPOSITES

SECTION 061600 – SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. See Structural Drawings for project specific requirements.

1.2 SUMMARY
- A. Section Includes:
  1. Wall sheathing.
  2. Roof sheathing.
- B. Related Requirements:
  1. Section 061000 "Rough Carpentry"
  2. Section 072500 "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.3 ACTION SUBMITTALS
- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
  1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
  2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
  3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
  4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 DELIVERY, STORAGE, AND HANDLING
- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
- A. Fire-Resistance Ratings: As tested according to ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 WOOD PANEL PRODUCTS
- A. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- B. Factory mark panels to indicate compliance with applicable standard.

2.3 PRESERVATIVE-TREATED PLYWOOD
- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
  1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.4 WALL SHEATHING
A. Plywood Sheathing: Exposure 1, Structural I sheathing.
1. Span Rating: Not less than 32/16.
2. Nominal Thickness: Not less than as indicated on the drawings.
B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1, Structural I sheathing.
1. Span Rating: Not less than 32/16.
2. Nominal Thickness: Not less than as indicated on the drawings.

2.5 ROOF SHEATHING
A. Plywood Sheathing: Exterior, Structural I sheathing.
1. Span Rating: Not less than 48/24.
2. Nominal Thickness: Not less than as indicated on the drawings.
B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1, Structural I sheathing.
1. Span Rating: Not less than 48/24.
2. Nominal Thickness: Not less than as indicated on the drawings.

2.6 FASTENERS
A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
B. Nails, Brads, and Staples: ASTM F 1667.
C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
D. Screws for Fastening Sheathing to Wood Framing: ASTM C 1002.
E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

2.7 MISCELLANEOUS MATERIALS
A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL
A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
C. Securely attach to substrate by fastening as indicated, complying with the following:
1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code and as indicated under special fastening provisions of the structural drawings.
D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Roof Sheathing:
    a. Nail to wood framing.
    b. Screw to cold-formed metal framing.
    c. Space panels 1/8 inch (3 mm) apart at edges and ends.

END OF SECTION

DIVISION 06 – WOOD, PLASTICS AND COMPOSITES

SECTION 061753 - SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. See Structural Drawings for project specific requirements.

1.2 SUMMARY
- A. Section Includes:
  1. Wood roof trusses.
  2. Wood girder trusses.

1.3 DEFINITIONS
- A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

1.4 ACTION SUBMITTALS
- A. Shop Drawings: Show fabrication and installation details for trusses.
  1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
  2. Indicate sizes, stress grades, and species of lumber.
  3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
  4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
  5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
  6. Show splice details and bearing details.

1.5 QUALITY ASSURANCE
- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
  1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
  2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program, complies with quality-control procedures in TPI 1, and involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING
- A. Handle and store trusses to comply with recommendations in SBCA BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
  1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
  2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
  3. Provide for air circulation around stacks and under coverings.
- B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal-plate-connected wood trusses.

B. Structural Performance: Metal-plate-connected wood trusses shall be capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.
   1. Design Loads: As indicated.
   2. Maximum Deflection under Design Loads:
      a. Roof Trusses: Vertical deflection of 1/360 of span.
      b. Floor Trusses: Vertical deflection of 1/480 of span.

C. Comply with applicable requirements and recommendations of TPI 1, TPI DSB, and SBCA BCSI.

2.2 DIMENSION LUMBER

A. Lumber: DOC PS 20 and applicable rules of any rules-writing agency certified by the American Lumber Standard Committee (ALSC) Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
   1. Factory mark each piece of lumber with grade stamp of grading agency.
   2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
   3. Provide dressed lumber, S4S.
   4. Provide dry lumber with 19 percent maximum moisture content at time of dressing.

B. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 061000 "Rough Carpentry."

2.3 METAL CONNECTOR PLATES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   1. Alpine Engineered Products, Inc.; a division of ITW Building Components Group, Inc.
   2. MiTek Industries, Inc.
   3. Truswal Systems Corporation.

B. General: Fabricate connector plates to comply with TPI 1.

C. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 (Z180) coating designation; and not less than 0.036 inch (0.9 mm) thick.
   1. Use for interior locations unless otherwise indicated.

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
   1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
   2. Where trusses are exposed to weather, in ground contact, made from pressure-preservative treated wood, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

2.5 METAL FRAMING ANCHORS AND ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   1. Simpson Strong-Tie Co., Inc.
   2. USP Structural Connectors.

B. Allowable design loads, as published by manufacturer, shall comply with 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. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
   1. Use for interior locations unless otherwise indicated.

D. Truss Tie-Downs: Bent strap tie for fastening roof trusses to wall studs below, 1-1/2 inches (38 mm) wide by 0.050 inch (1.3 mm) thick. Tie fastens to one side of truss, top plates, and side of stud below.

E. Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls, 1-1/4 inches (32 mm) wide by 0.050 inch (1.3 mm) thick. Clip is fastened to truss through slotted holes to allow for truss deflection.

F. Roof Truss Bracing/Spacers: U-shaped channels, 1-1/2 inches (38 mm) wide by 1 inch (25 mm) deep by 0.040 inch (1.0 mm) thick, made to fit between two adjacent trusses and accurately space them apart, and with tabs having metal teeth for fastening to trusses.

2.6 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 92 percent zinc dust by weight.

2.7 FABRICATION

A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.

B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.

C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly, with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
   1. Fabricate wood trusses within manufacturing tolerances in TPI 1.

D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

2.8 SOURCE QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections.
   1. Provide special inspector with access to fabricator's documentation of detailed fabrication and quality-control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards.
   2. Provide special inspector with access to places where wood trusses are being fabricated to perform inspections.

B. Correct deficiencies in Work that special inspections indicate do not comply with the Contract Documents.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wood trusses only after supporting construction is in place and is braced and secured.

B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.

C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.

D. Install and brace trusses according to TPI recommendations and as indicated.

E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.

F. Space trusses as indicated; adjust and align trusses in location before permanently fastening.

G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.

H. Securely connect each truss ply required for forming built-up girder trusses.

1. Anchor trusses to girder trusses as indicated.

I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
   1. Install bracing to comply with Section 061000 "Rough Carpentry."
   2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.

J. Install wood trusses within installation tolerances in TPI 1.

K. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.

L. Replace wood trusses that are damaged or do not comply with requirements.
   1. Damaged trusses may be repaired according to truss repair details signed and sealed by the qualified professional engineer responsible for truss design, when approved by Architect.

3.2 REPAIRS AND PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect wood trusses from weather. If, despite protection, wood trusses become wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

C. Repair damaged galvanized coatings on exposed surfaces according to ASTM A 780/A 780M and manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections to verify that temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package.

END OF SECTION

DIVISION 06 – WOOD, PLASTICS AND COMPOSITES

SECTION 062023 - INTERIOR FINISH 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. Interior trim, including non-fire-rated interior door and sidelight frames.
   2. Interior board paneling.
   3. Shelving.

B. Related Requirements:
   1. Section 061000 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view and for framing exposed to view.
   2. Section 099123 "Interior Painting" for priming and backpriming of interior finish carpentry.

1.3 DEFINITIONS

A. MDF: Medium-density fiberboard.

B. MDO: Plywood with a medium-density overlay on the face.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

B. Deliver interior finish carpentry materials only when environmental conditions comply with requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions comply with requirements specified for installation areas.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
   1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's Board of Review. Grade lumber by an agency certified by the American Lumber Standard Committee's Board of Review to inspect and grade lumber under the rules indicated.
   1. Factory mark each piece of lumber with grade stamp of grading agency.
   2. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by grading agency.

B. Softwood Plywood: DOC PS 1.

C. Hardboard: ANSI A135.4.
D. MDF: ANSI A208.2, Grade 130.
E. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
F. Melamine-Faced Particleboard: Particleboard complying with ANSI A208.1, Grade M-2, finished on both faces with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.
1. Color: White.

2.2 INTERIOR TRIM
A. Softwood Lumber Trim (unfinished):
1. Species and Grade: Clear White Pine, Grade A; NLGA, WCLIB, or WWPA.
2. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
3. Biscuit Jointing: Allowed for widths shown.
4. Face Surface: Saw textured.
B. Hardwood Lumber Trim for Transparent Finish (Stain or Clear Finish):
1. Species and Grade: Red oak, Clear; NHLA.
2. Finger Jointing: Not allowed.
3. Gluing for Width: Use for lumber trim wider than 6 inches (150 mm).
4. Veneered Material: Not allowed.
5. Face Surface: Surfaced (smooth).
6. Matching: Selected for compatible grain and color.
C. Lumber Trim for Opaque Finish (Painted Finish):
1. Species and Grade: Alder, aspen, basswood, cottonwood, gum, magnolia, soft maple, sycamore, tupelo, or yellow poplar, A Finish; NHLA.
2. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.

2.3 MISCELLANEOUS MATERIALS
A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
B. Low-Emitting Materials: Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
C. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
D. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Clean substrates of projections and substances detrimental to application.
B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.

B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
3. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2438 mm) for level and plumb. Install adjoining interior finish carpentry with 1/32-inch (0.8-mm) maximum offset for flush installation and 1/16-inch (1.5-mm) maximum offset for reveal installation.
4. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches (610 mm) long, except where necessary. Stagger joints in adjacent and related standing and running trim. Cope or Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.

1. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
2. Install trim after gypsum-board joint finishing operations are completed.
3. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 ADJUSTING

A. Replace interior finish carpentry that is damaged or does not comply with requirements. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.6 CLEANING

A. Clean interior finish carpentry on exposed and semiexposed surfaces. Restore damaged or soiled areas and touch up factory-applied finishes if any.

3.7 PROTECTION

A. Protect installed products from damage from weather and other causes during construction.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 072500 - WEATHER BARRIERS

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 SECTION INCLUDES
A. Weather barrier membrane
B. Seam Tape
C. Flashing
D. Fasteners

1.3 REFERENCES
A. ASTM International
1. ASTM C920; Standard Specification for Elastomeric Joint Sealants
2. ASTM C1193; Standard Guide for Use of Joint Sealants
3. ASTM D882; Test Method for Tensile Properties of Thin Plastic Sheeting
4. ASTM D1117; Standard Guide for Evaluating Non-woven Fabrics
5. ASTM E84; Test Method for Surface Burning Characteristics of Building Materials
6. ASTM E96; Test Method for Water Vapor Transmission of Materials
7. ASTM E1677; Specification for Air Retarder Material or System for Framed Building Walls
8. ASTM E2178; Test Method for Air Permeance of Building Materials
B. AATCC – American Association of Textile Chemists and Colorists
1. Test Method 127 Water Resistance: Hydrostatic Pressure Test
C. TAPPI
1. Test Method T-410; Grams of Paper and Paperboard (Weight per Unit Area)
2. Test Method T-460; Air Resistance (Gurley Hill Method)

1.4 SUBMITTALS
A. Refer to Section 01 33 00 Submittal Procedures.
B. Product Data: Submit manufacturer current technical literature for each component.
C. Samples: Weather Barrier Membrane, minimum 8-1/2 inches by 11 inch.
D. Quality Assurance Submittals
1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.
2. Manufacturer Instructions: Provide manufacturer's written installation instructions.
3. Manufacturer's Field Service Reports: Provide site reports from authorized field service representative, indicating observation of weather barrier assembly installation.
E. Closeout Submittals
1. Refer to Section [01 78 00 Closeout Submittals] [insert section number and title].
2. Weather Barrier Warranty: Manufacturer's executed warranty form with authorized signatures and endorsements indicating date of Substantial Completion.

1.5 QUALITY ASSURANCE
A. Qualifications
1. Installer shall have experience with installation of commercial weather barrier assemblies under similar conditions.
2. Installation shall be in accordance with weather barrier manufacturer's installation guidelines and recommendations.
3. Source Limitations: Provide commercial weather barrier and accessory materials produced by single manufacturer.

B. Pre-installation Meeting
   1. Refer to Section 01 31 19 Project Meetings.
   2. Hold a pre-installation conference, two weeks prior to start of weather barrier installation. Attendees shall include Contractor and Weather Barrier Manufacturer's Designated Representative.
   3. Review all related project requirements and submittals, status of substrate work and preparation, areas of potential conflict and interface, availability of weather barrier assembly materials and components, installer's training requirements, equipment, facilities and scaffolding, and coordinate methods, procedures and sequencing requirements for full and proper installation, integration and protection.

1.6 DELIVERY, STORAGE AND HANDLING
A. Refer to Section 01 60 00 Product Requirements.
B. Deliver weather barrier materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.
C. Store weather barrier materials as recommended by weather barrier manufacturer.

1.7 SCHEDULING
A. Review requirements for sequencing of installation of weather barrier assembly with installation of windows, doors, louvers and flashings to provide a weather-tight barrier assembly.
B. Schedule installation of weather barrier materials and exterior cladding within nine months of weather barrier assembly installation.

1.8 WARRANTY
A. Special Warranty
   1. Special weather-barrier manufacturer's warranty for weather barrier assembly for a period of ten (10) years from date of final weather barrier installation.
   2. Approval by weather barrier manufacturer for warranty is required prior to assembly installation.

PART 2 – PRODUCTS

2.1 MANUFACTURER
A. DuPont Building Innovations; 4417 Lancaster Pike, Chestnut Run Plaza 721, Wilmington, DE 19805; 1.800.44TYVEK (8-9835); http://construction.tyvek.com

2.2 MATERIALS
A. Basis of Design: High-performance, spunbonded polyolefin, non-woven, non-perforated, weather barrier is based upon DuPont™ Tyvek® CommercialWrap® and related assembly components.
B. Performance Characteristics:
   1. Air Penetration: 0.001 cfm/ft^2 at 75 Pa, when tested in accordance with ASTM E2178. Type I per ASTM E1677.
   2. Water Vapor Transmission: 28 perms, when tested in accordance with ASTM E96, Method B.
   3. Water Penetration Resistance: 280 cm when tested in accordance with AATCC Test Method 127.
   4. Basis Weight: 2.7 oz/yd^2, when tested in accordance with TAPPI Test Method T-410.
   5. Air Resistance: Air infiltration at >1500 seconds, when tested in accordance with TAPPI Test Method T-460.
   6. Tensile Strength: 38/35 lbs/in., when tested in accordance with ASTM D882, Method A.
   7. Tear Resistance: 12/10 lbs., when tested in accordance with ASTM D1117.
   8. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E 84. Flame Spread: 10, Smoke Developed: 10.

2.3 ACCESSORIES
A. Seam Tape: 3 inch wide, DuPont™ Tyvek® Tape for commercial applications.
B. Fasteners:
   1. Tyvek® Wrap Caps, as manufactured by DuPont Building Innovations: #4 nails with large 1-inch plastic cap fasteners.

C. Sealants
   1. Provide sealants that comply with ASTM C920, elastomeric polymer sealant to maintain watertight conditions.
   3. Products:
      a. Tremco 830
      b. Tremco Butyl
      c. Sealants recommended by the weather barrier manufacturer.

D. Adhesives:
   1. Provide adhesive recommended by weather barrier manufacturer.
   2. Products:
      a. Liquid Nails® LN-109
      b. Polyglaze® SM 5700
      c. Denso Butyl Liquid
      d. 3M High Strength 90
      e. SIA 655
      f. Adhesives recommend by the weather barrier manufacturer.

E. Primers:
   1. Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing.
   2. Products:
      a. 3M High Strength 90
      b. Denso Butyl Spray
      c. SIA 655
      d. Permagrip 105
      e. ITW TACC Sta' Put SPH
      f. Primers recommended by the flashing manufacturer

F. Flashing
   1. DuPont™ FlexWrap™, as manufactured by DuPont Building Innovations: flexible membrane flashing materials for window openings and penetrations.
   2. DuPont™ StraightFlash™, as manufactured by DuPont Building Innovations: straight flashing membrane materials for flashing windows and doors and sealing penetrations such as masonry ties, etc.
   3. DuPont™ StraightFlash™ VF, as manufactured by DuPont Building Innovations: dual-sided straight flashing membrane materials for brick mold and non-flanged windows and doors.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

3.2 INSTALLATION – WEATHER BARRIER

A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations.
B. Install weather barrier prior to installation of windows and doors.
C. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.
D. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level.
E. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer.
F. Window and Door Openings: Extend weather barrier completely over openings.
G. Overlap weather barrier
   1. Exterior corners: minimum 12 inches.
   2. Seams: minimum 6 inches.
H. Weather Barrier Attachment:

1. Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommended fasteners, space 12 -18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.
2. Attach weather barrier to masonry. Secure using weather barrier manufacturer recommended fasteners, spaced 12-18 inches vertically on center and 24 inches maximum horizontally. Weather barrier may be temporarily attached to masonry using recommended adhesive, placed in vertical strips spaced 24 inches on center, when coordinated on the project site.

I. Apply 4 inch by 7 inch piece of DuPont™ StraightFlash™ to weather barrier membrane prior to the installation cladding anchors.

3.3 SEAMING

A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.
B. Seal any tears or cuts as recommended by weather barrier manufacturer.

3.4 OPENING PREPARATION (for use with non-flanged windows – all cladding types)

A. Flush cut weather barrier at edge of sheathing around full perimeter of opening.
B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.5 FLASHING (for use with non-flanged windows – all cladding types)

A. Cut 9-inch wide DuPont™ FlexWrap™ a minimum of 12 inches longer than width of sill rough opening. Apply primer as required by manufacturer.
B. Cover horizontal sill by aligning DuPont™ FlexWrap™ edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.
C. Fan DuPont™ FlexWrap™ at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.
D. Apply 9-inch wide strips of DuPont™ StraightFlash™ at jambs. Align flashing with interior edge of jamb framing. Start DuPont™ StraightFlash™ at head of opening and lap sill flashing down to the sill.
E. Spray-apply primer to top 6 inches of jambs and exposed sheathing.
F. Install DuPont™ FlexWrap™ at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.
G. Coordinate flashing with window installation.
H. On exterior, install backer-rod in joint between window frame and flashed rough framing. Apply sealant at jambs and head, leaving sill unsealed. Apply sealants in accordance with sealant manufacturer's instructions and ASTM C 1193.
I. Position weather barrier head flap across head flashing. Adhere using 4-inch wide DuPont™ StraightFlash™ over the 45-degree seams.
J. Tape top of window in accordance with manufacturer recommendations.
K. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.

3.6 OPENING PREPARATION (for use with flanged windows)

A. Cut weather barrier in a modified "I-cut" pattern.
   1. Cut weather barrier horizontally along the bottom of the header.
   2. Cut weather barrier vertically 2/3 of the way down from top center of window opening.
   3. Cut weather barrier diagonally from bottom of center vertical cut to the left and right corners of the opening.
   4. Fold side and bottom weather barrier flaps into window opening and fasten.
B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.7 FLASHING (for use with flanged windows)

A. Cut 9-inch wide DuPont™ FlexWrap™ a minimum of 12 inches longer than width of sill rough opening.
B. Cover horizontal sill by aligning DuPont™ FlexWrap™ edge with inside edge of sill. Adhere to rough

opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.

C. Fan DuPont™ FlexWrap™ at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.
D. On exterior, apply continuous bead of sealant to wall or backside of window mounting flange across jambs and head. Do not apply sealant across sill.
E. Install window according to manufacturer's instructions.
F. Apply 4-inch wide strips of DuPont™ StraightFlash™ at jambs overlapping entire mounting flange. Extend jamb flashing 1-inch above top of rough opening and below bottom edge of sill flashing.
G. Apply 4-inch wide strip of DuPont™ StraightFlash™ as head flashing overlapping the mounting flange. Head flashing should extend beyond outside edges of both jamb flashings.
H. Position weather barrier head flap across head flashing. Adhere using 4-inch wide DuPont™ StraightFlash™ over the 45-degree seams.
I. Tape head flap in accordance with manufacturer recommendations.
J. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.

3.8 FIELD QUALITY CONTROL

A. Notify manufacturer's designated representative to obtain [required] periodic observations of weather barrier assembly installation.

3.9 PROTECTION

A. Protect installed weather barrier from damage.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION
SECTION 072600 - VAPOR RETARDERS

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. Polyethylene vapor retarders.
B. Related Requirements:
1. Section 033000 "Cast-in-Place Concrete" for under-slab vapor retarders for specification of underslab vapor retarders.
2. Section 072100 "Thermal Insulation" for vapor retarders integral with insulation products.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 POLYETHYLENE VAPOR RETARDERS
A. Polyethylene Vapor Retarders: ASTM D 4397, 6-mil- (0.15-mm) thick sheet, with maximum permeance rating of 0.1 perm (5.7 ng/Pa x s x sq. m).

2.2 ACCESSORIES
A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
B. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and has demonstrated capability to bond vapor retarders securely to substrates indicated.
C. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.

PART 3 - EXECUTION

3.1 PREPARATION
A. Clean substrates of substances that are harmful to vapor retarders, including removing projections capable of puncturing vapor retarders.

3.2 INSTALLATION OF VAPOR RETARDERS ON FRAMING
A. Place vapor retarders on side of construction indicated on Drawings.
B. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives, vapor retarder fasteners, or other anchorage system as recommended by manufacturer. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
C. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs and sealing with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Locate all joints over framing members or other solid substrates.
D. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.
E. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

3.3 PROTECTION
Protect vapor retarders from damage until concealed by permanent construction.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 074113.16 – STANDING-SEAM METAL ROOF PANELS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Standing seam steel roofing panels, including trim accessories.
   2. Adhesive roofing underlayment.

B. Related Sections: Section(s) related to this section include:
   1. Section 074213.53 "Metal Soffit Panels" for metal panels used in horizontal soffit applications.
   2. Section 077253 "Snow Guards" for prefabricated devices designed to hold snow on the roof surface, allowing it to melt and drain off slowly.

1.3 REFERENCES

A. General: Standards listed by reference form a part of this specification section. Standards listed are identified by issuing authority, abbreviation, designation number, title or other designation. Standards subsequently referenced in this Section are referred to by issuing authority abbreviation and standard designation.

B. ASTM International:
   1. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   2. ASTM A 792 - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
   3. ASTM A 1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
   4. ASTM D 2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
   5. ASTM D 4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
   6. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
   7. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
   8. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
   9. ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
   10. ASTM E 1680 - Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems

C. Factory Mutual (FM): FM Approval 4471: Class 1 Panel Roofs.

D. Underwriters Laboratories (UL):
   1. UL 263 - Fire Tests of Building Construction and Materials.
   2. UL 580 - Tests For Uplift Resistance of Roof Assemblies.
   3. UL 790 - Standard Test Methods for Fire Tests of Roof Coverings.
   4. UL 2218 - Impact Resistance of Prepared Roof Covering Materials.

E. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): "Architectural Sheet Metal Manual."

1.4 ACTION SUBMITTALS

A. Product Technical Data: For each type of product required, including manufacturer's preparation recommendations, storage and handling requirements, and recommended installation methods.
B. Shop Drawings: Showing methods of installation, plans, sections, elevations and details of roof and wall panels, specified loads, flashings, roof curbs, vents, sealants, interfaces with all materials not supplied by the metal panel system manufacturer, and identification of proposed component parts and their finishes. Do not proceed with fabrication prior to approval of shop drawings.
C. Qualifications Statements: For manufacturer and installer.

1.5 CLOSEOUT SUBMITTALS
A. Operation and Maintenance Data: For installed products including maintenance methods and precautions against cleaning materials and methods detrimental to finishes and performance.
B. Warranty: Warranty documents required in this section.

1.6 QUALITY ASSURANCE
A. Manufacturer Qualifications:
1. Provider of advanced installer training.
2. Minimum of ten years experience in manufacturing metal roof systems.
3. Provider of products produced in a permanent factory environment with fixed roll-forming equipment.
B. Installer Qualifications:
1. At least five years experience in the installation of structural standing seam steel roof panels.
2. Experience on at least five projects of similar size, type and complexity as this Project that have been in service for a minimum of two years with satisfactory performance of the roof system.
3. Employer of workers for this Project who are competent in techniques required by manufacturer for installation indicated and who shall be supervised at all times when material is being installed.

1.7 DELIVERY, STORAGE AND HANDLING
A. Delivery: Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact.
B. Storage: Store materials above ground, under waterproof covering, protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Provide proper ventilation of metal panel system to prevent condensation build-up between each panel and trim or flashing component. Store products in manufacturer's unopened packaging until ready for installation.
C. Handling: Exercise caution in unloading and handling metal panel system to prevent bending, warping, twisting and surface damage.

1.8 WARRANTY
A. Special Weather Tightness Warranty: Manufacturer's standard form Premier Plus Warranty for weather tightness in which manufacturer agrees to repair or replace panels that fail within specified warranty period.
1. Warranty Period: 20 years from date of Substantial Completion.
B. Special Exposed Panel Finish Warranty: Manufacturer's standard form (PVDF) Fluorocarbon System Warranty for film integrity, chalk rating and fade rating in which manufacturer agrees to repair or replace panels that show evidence of deterioration within specified warranty period.
1. Deterioration shall include but is not limited to:
a. Color fading of more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling or failure of paint to adhere to bare metal.
2. Warranty Period: Film integrity for 45 years and chalk and fade rating for 35 years from date of Substantial Completion.

C. Special Warranty: Installer's standard form in which installer agrees to repair or replace standing seam panels that fail due to poor workmanship or faulty installation within the specified warranty period.
1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 STANDING SEAM STEEL ROOF PANELS
A. General: Structural standing seam sheet steel panels complying with ASTM E330.
B. Basis of Design Product: Subject to compliance with requirements provide Metal Sales Manufacturing Corporation; Firestone UC-4 Panel.
C. Substitution Limitations: All other manufacturers: Submit substitution request in accordance with Section 012500 - "Substitution Procedures".
D. Product Options:
1. Panel Coverage: 17 inches.
2. Rib Height: 1 ¾ inches.
3. Material: Aluminum-zinc alloy-coated steel sheet, ASTM A 792, Class AZ50 coating designation, structural quality, Grade 50, 0.0236-inch (0.60-mm) minimum thickness.
4. Minimum Roof Slope Capability: 3:12.
5. Sealant: Factory-applied side lap sealant.
6. Attachment: Concealed clip designed for thermal movement.
7. Side Lap: Snap-together panel system.
8. Insulation Capacity: Accommodate blanket insulation 1/2 inch (12.7 mm) to 6 inches (152.4 mm) thickness.
9. Application: Applied over open framing or solid substrate.
10. Surface Finish: PVDF (Kynar 500 or Hylar 5000).
11. Color: To be selected from manufacturers full color range.
12. Fire Resistance Rating: Comply with UL 263 and UL 790 Class A Fire Resistance Rating.
13. Impact Resistance: Comply with UL 2218 Class 4.
14. Air Infiltration: Tested according to ASTM E 1680.
15. Water Infiltration: Tested according to ASTM E 1646.
16. Wind Uplift Resistance: Tested according to ASTM E 1592 and in compliance with UL 580, Class 90 Wind Uplift, Construction #240.
17. Uniform Static Air Pressure Difference: As tested in compliance with ASTM E330.

2.2 UNDERLAYMENT MATERIALS
A. High tensile strength polypropylene woven core fabric, coated on both sides with UV resistant polypropylene coating containing anti-oxidant additive, with slip-resistant non-woven fiber surface embedded in top of surface. Product based on SharkSkin Ultra SA. Substrate must be product acceptable to roofing manufacturer.
1. 12 month UV resistance.
2. Service temperatures between -50 degrees F and 280 degrees F.
3. Adhesive: High strength co-polymer adhesive layer on bottom side containing no VOC's.
a. SharkSkin Ultra SA.

2.3 SOURCE QUALITY CONTROL
A. Source: Obtain structural standing seam steel roof panels, trim and other accessories from a single manufacturer.
B. Quality Control: Obtain structural standing seam steel roof panels, trim and other accessories from a manufacturer capable of providing on-site technical support and installation assistance.

PART 3 EXECUTION

3.1 STRUCTURAL STANDING SEAM METAL ROOF PANEL INSTALLATION
A. General: Comply with panel manufacturer's installation instructions including but not limited to special techniques, interface with other work, and integration of systems.

B. Fasten metal roof panels to supports using proper fasteners as recommended by panel manufacturer.

3.2 ACCESSORY INSTALLATION

A. General: Install accessories using techniques recommended by manufacturer and which will assure positive anchorage to building and weather tight mounting. Provide for thermal movement. Coordinate installation with flashings and other components.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and the SMACNA "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and install units to true level. Install work with laps, joints, and seams that will be permanently watertight.

3.3 CLEANING

A. Remove temporary coverings and protection of adjacent work areas.

B. Repair or replace any installed products that have been damaged.

C. Clean installed panels in accordance with manufacturer's instructions prior to Owner's acceptance.

D. Remove and lawfully dispose of construction debris from Project site.

3.4 PROTECTION

A. Protect installed product and finish surfaces from damage during construction.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 076200 - SHEET METAL FLASHING AND TRIM

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. Formed roof-drainage sheet metal fabrications.
B. Related Requirements:
   1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.
   2. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

1.3 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
B. Shop Drawings: For sheet metal flashing and trim.
   1. Include plans, elevations, sections, and attachment details.
   2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
   3. Include identification of material, thickness, weight, and finish for each item and location in Project.
   4. Include details for forming, including profiles, shapes, seams, and dimensions.
   5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
   6. Include details of termination points and assemblies.
   7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
   8. Include details of roof-penetration flashing.
   9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
   10. Include details of special conditions.
   11. Include details of connections to adjoining work.
C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.
   1. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.
B. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.9 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.

    a. Color: As selected by Architect from full range of industry colors and color densities.

2. Exposed Coil-Coated Finish:
    a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

2.2 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
    a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.

b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane, polysulfide or silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.3 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

D. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

G. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

H. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

I. Do not use graphite pencils to mark metal surfaces.

2.4 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- (2400-mm-) long sections.

Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers gutter bead reinforcing bars and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.

1. Gutter Profile: Style J according to cited sheet metal standard.
2. Expansion Joints: Butt type with cover plate.
3. Accessories: Valley baffles.
4. Gutters with Girth 16 to 20 Inches (410 to 510 mm): Fabricate from the following materials:
   a. Aluminum: 0.040 inch (1.02 mm) thick.

B. Downspouts: Fabricate rectangular downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows.

1. Fabricated Hanger Style: Fig 1-35B according to SMACNA's "Architectural Sheet Metal Manual."
2. Fabricate from the following materials:
   a. Aluminum: 0.024 inch (0.61 mm) thick.

2.5 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

B. Drip Edges: Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

C. Eave, Rake Flashing: Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

D. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

E. Flashing Receivers: Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

F. Roof-Penetration Flashing: Fabricate from the following materials:
   1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch (0.71 mm)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
   1. Verify compliance with requirements for installation tolerances of substrates.
   2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
   3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners[, solder], protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
   1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
   2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

3. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
5. Torch cutting of sheet metal flashing and trim is not permitted.
6. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Coat concealed side of uncoated-aluminum sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.

D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Rivets: Rivet joints where necessary for strength.

3.3 ROOF-DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Hanging Gutters: Join sections with joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.
1. Fasten gutter spacers to front and back of gutter.
2. Anchor and loosely lock back edge of gutter to continuous eave or apron flashing.
3. Anchor gutter with gutter brackets spaced not more than 24 inches (600 mm) apart to roof deck, unless otherwise indicated, and loosely lock to front gutter bead.
4. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet (15.24 m apart. Install expansion-joint caps.

C. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints.
1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches (1500 mm) o.c.
2. Provide elbows at base of downspout to direct water away from building.
3. Connect downspouts to underground drainage system if specified.

D. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in elastomeric sealant compatible with the substrate.

E. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints minimum of 4 inches (100 mm) in direction of water flow.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch (75-mm) centers.

C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.

D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints minimum of 4 inches (100 mm). Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant unless otherwise indicated.

E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean off excess sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 077253 – RAIL TYPE SNOW GUARDS

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. Rail-type, seam-mounted snow guards.

1.3 ACTION SUBMITTALS
- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for snow guards.
- B. Shop Drawings: Include roof plans showing layouts and attachment details of snow guards.
  1. Include details of rail-type snow guards.
  2. Include calculation of number and location of snow guards based on snow load, roof slope, roof type, components, spacings, and finish.

PART 2 - PRODUCTS

2.1 RAIL-TYPE SNOW GUARDS
- A. Seam-Mounted, Rail-Type Snow Guards:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
     a. S-5! Attachment Solutions; Metal Roof Innovations, Ltd, S5 colorguard.
     b. Sno-Gem, Inc, iBeam.
     c. Firestone, compatible with UC-4 Panels
  2. Description: Snow guard rails fabricated from metal pipes, bars, or extrusions, anchored to brackets and equipped with one rail with color-matching inserts of material and finish used for metal roofing.
  3. Material and Finish: To match roofing color.

PART 3 - EXECUTION

3.1 EXAMINATION
- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, snow guard attachment, and other conditions affecting performance of the Work.
  1. Verify compatibility with and suitability of substrates including compatibility with existing finishes or primers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
- A. Clean and prepare substrates for bonding snow guards.
- B. Prime substrates according to snow guard manufacturer's written instructions.

3.3 INSTALLATION
- A. Install snow guards according to manufacturer's written instructions. Space rows as recommended by manufacturer for roof size and use location.
- B. Attachment for Standing-Seam Metal Roofing:
  1. Do not use fasteners that will penetrate metal roofing, or fastening methods that void metal roofing finish warranty.

2. Seam-Mounted, Rail-Type Snow Guards: Stainless-steel clamps attached to vertical ribs of standing-seam metal roof panels.

END OF SECTION

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 079200 - JOINT SEALANTS

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. Silicone joint sealants.
   2. Latex joint sealants.

B. Related Requirements:
   1. Section 321373 "Concrete Paving Joint Sealants" for sealing joints in paved roads, parking lots, walkways, and curbing.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Joint-Sealant Schedule: Include the following information:
   1. Joint-sealant application, joint location, and designation.
   2. Joint-sealant manufacturer and product name.
   3. Joint-sealant formulation.
   4. Joint-sealant color.

1.4 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:
   1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer[or are below 40 deg F (5 deg C)].
   2. When joint substrates are wet.
   3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
   4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.5 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
   1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
   2. Disintegration of joint substrates from causes exceeding design specifications.
   3. Mechanical damage caused by individuals, tools, or other outside agents.
   4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    a. GE Construction Sealants; Momentive Performance Materials Inc.

2.3 LATEX JOINT SEALANTS

A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. BASF Corporation; Construction Systems.
    b. Tremco Incorporated.

2.4 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. BASF Corporation; Construction Systems.
    b. Construction Foam Products; a division of Nomaco, Inc.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.5 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, 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. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
   1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
   2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
      a. Unglazed surfaces of ceramic tile.
      b. Exterior insulation and finish systems.
   3. Remove laitance and form-release agents from concrete.
   4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   1. Do not leave gaps between ends of sealant backings.
   2. Do not stretch, twist, puncture, or tear sealant backings.
   3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses in each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
   1. Remove excess sealant from surfaces adjacent to joints.
   2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
   3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application:
   1. Joint Locations:
      a. Isolation and contraction joints in cast-in-place concrete slabs.
      b. Tile control and expansion joints.
      c. Joints between different materials listed above.
      d. Other joints as indicated on Drawings.
      e. Construction joints in cast-in-place concrete.
      f. Control and expansion joints in unit masonry.
      g. Joints in dimension stone cladding.
      h. Perimeter joints between materials listed above and frames of doors, windows and louvers.
      i. Control and expansion.

END OF SECTION

DIVISION 08 – OPENINGS

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES/STORM RESISTANT DOORS

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 hollow-metal work.

B. Related Requirements:

1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers Standard Doors: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   1. Ceco Door; ASSA ABLOY.
   2. Curries Company; ASSA ABLOY.
   3. Republic Doors and Frames.
   4. Steelcraft; an Allegion brand.

B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Commercial Doors and Frames: NAAMM-HMMA 861. At locations indicated in the Door and Frame Schedule.
   1. Physical Performance: Level A according to SDI A250.4.
   2. Doors:
      a. Type: As indicated in the Door and Frame Schedule.
      b. Thickness: 1-3/4 inches (44.5 mm.)
      c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.30 mm), with minimum G60 ((Z180) or) A60 (ZF180) coating.
      d. Edge Construction: Continuously welded with no visible seam.
      e. Core: Polystyrene, Polyurethane, or Polyisocyanurate.
         1) Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (U-value) of not less than U.39 when tested according to ASTM C 1363.
   3. Frames:
      a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067 inch (1.7 mm), with minimum G60 ((Z180) or) A60 (ZF180) coating.
      b. Construction: Full profile welded.
   4. Exposed Finish: Prime.

2.3 INTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Commercial Doors and Frames: NAAMM-HMMA 861. At locations indicated in the Door and Frame Schedule.
   1. Physical Performance: Level A according to SDI A250.4.
   2. Doors:
      a. Type: As indicated in the Door and Frame Schedule.
      b. Thickness: 1-3/4 inches (44.5 mm.)
      c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.30 mm), with minimum G60 ((Z180) or) A60 (ZF180) coating.
      d. Edge Construction: Continuously welded with no visible seam.
      e. Core: Kraft-paper honeycomb, Polystyrene, Polyurethane or Polyisocyanurate.
   3. Frames:
      a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067 inch (1.7 mm), with minimum G60 ((Z180) or) A60 (ZF180) coating.
      b. Construction: Full profile welded.
   4. Exposed Finish: Prime.

2.4 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (51 mm) wide by 10 inches (254 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm), and as follows:
1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at finish floor surface.

2.5 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.

H. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.6 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:
1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch (0.66 mm), steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches (152 mm) apart. Spot weld to face sheets no more than 5 inches (127 mm) o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
2. Vertical Edges for Single-Acting Doors: Provide beveled or square edges at manufacturer's discretion.
3. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets.
4. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets.
5. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
   1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
   2. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
   3. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
   4. Jamb Anchors: Provide number and spacing of anchors as follows:
      a. Masonry Type: Locate anchors not more than 16 inches (406 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c., to match coursing, and as follows:
         1) Two anchors per jamb up to 60 inches (1524 mm) high.
         2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
         3) Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) high.
         4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 120 inches (3048 mm) high.
      b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
         1) Three anchors per jamb up to 60 inches (1524 mm) high.
         2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
         3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
         4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.
      c. Compression Type: Not less than two anchors in each frame.
      d. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.
   5. Head Anchors: Two anchors per head for frames more than 42 inches (1067 mm) wide and mounted in metal-stud partitions as recommended by manufacturer.
   6. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
      a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
      b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
   1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
   2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.
   1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
   2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
   3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
   4. Provide loose stops and moldings on inside of hollow-metal work.
   5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.7 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
   1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.8 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
B. Grout Guards: Formed from same material as frames, not less than 0.016 inch (0.4 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.
B. Hollow-Metal Frames: Install hollow-metal frames for doors, transoms, sidelites, borrowed lites, and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
   1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
      a. At fire-rated openings, install frames according to NFPA 80.
      b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
      c. Install frames with removable stops located on secure side of opening.
      d. Install door silencers in frames before grouting.
      e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
      f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
      g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.
   2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
      a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
   3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
   4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
   5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.

6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
    a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Steel Doors:
    a. Between Door and Frame Jambs and Head: 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).
    b. Between Edges of Pairs of Doors: 1/8 inch (3.2 mm) to 1/4 inch (6.3 mm) plus or minus 1/32 inch (0.8 mm).
    c. At Bottom of Door: [3/4 inch (19.1 mm)] [5/8 inch (15.8 mm)] plus or minus 1/32 inch (0.8 mm).
    d. Between Door Face and Stop: 1/16 inch (1.6 mm) to 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
B. Remove grout and other bonding material from hollow-metal work immediately after installation.
C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION

DIVISION 08 – OPENINGS

SECTION 083323 – OVERHEAD COILING COUNTER DOORS

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 SECTION INCLUDES
- A. Overhead Coiling Counter Doors, manually operated.

1.3 RELATED SECTIONS
- A. Section 06 20 00 - Finish Carpentry.
- B. Section 09 90 00 - Painting and Coating.

1.4 REFERENCES
- A. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- C. ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- D. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- E. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

1.5 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. Details of construction and fabrication.
  4. Installation methods.
- C. Shop Drawings: Include detailed plans, elevations, details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent construction.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.
- F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE
- A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
  1. Install in areas designated by Architect.
  2. Do not proceed with remaining work until workmanship and installation is approved by Architect.
  3. Refinish mock-up area as required to produce acceptable work.

1.7 DELIVERY, STORAGE, AND HANDLING
- A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.
C. Store materials in a dry, warm, ventilated weathertight location.

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.

1.9 COORDINATION
A. Coordinate Work with other operations and installation of adjacent finish materials to avoid damage to installed materials.

1.10 WARRANTY
A. Warranty: Manufacturer's limited door warranty for 2 years for all parts and components.

PART 2 PRODUCTS

2.1 MANUFACTURERS
A. Acceptable Manufacturer: Raynor Garage Doors www.raynor.com
B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 OVERHEAD COILING STEEL COUNTER DOORS
A. Stainless Steel Counter Doors: Raynor Dura Shutter
1. Wall Mounting Condition:
a. Between jambs mounting.
2. Curtain: Interlocking slats, Type F fabricated of 22 gauge stainless steel. Endlocks attached to alternate slats to maintain curtain alignment and prevent lateral slat movement.
3. Finish:
a. Slats and hood stainless steel with a No. 4 stainless steel finish.
b. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer.
4. Bottom Bar: Single stainless steel angle bottom bar.
5. Guides:
a. Stainless steel shapes.
6. Brackets: Steel plate to support counterbalance, curtain and hood.
7. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel.
8. Hood: Provided with intermediate support brackets as required and fabricated of:
a. Stainless steel.
9. Operation:
a. Manual push up. Provide Reach Hook

PART 3 EXECUTION

3.1 EXAMINATION
A. Verify opening sizes, tolerances and conditions are acceptable.
B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.
C. 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 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
E. Coordinate installation of electrical service with Section 26 05 00 - Common Work Results for Electrical. Complete wiring from disconnect to unit components.
F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 90 00 - Joint Protection.
G. Install perimeter trim and closures.

3.4 ADJUSTING
A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.
B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING
A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.
B. Remove labels and visible markings.
C. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION
A. Protect installed products until completion of project.

END OF SECTION

DIVISION 08 - OPENINGS

SECTION 083613 - SECTIONAL OVERHEAD DOORS

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

1.3 SECTION INCLUDES
- A. Insulated Sectional Overhead Doors.
- B. Non-Insulated Sectional Overhead Doors.
- C. Electric Operators and Controls.
- D. Operating Hardware, tracks, and support.

1.4 RELATED SECTIONS
- A. Section 03300 - Cast-In-Place Concrete: Prepared opening in concrete. Execution requirements for placement of anchors in concrete wall construction.
- B. Section 04810 - Unit Masonry Assemblies: Prepared opening in masonry. Execution requirements for placement of anchors in masonry wall construction.
- C. Section 05500 - Metal Fabrications: Steel frame and supports.
- D. Section 06114 - Wood Blocking and Curbing: Rough wood framing and blocking for door opening.
- E. Section 07900 - Joint Sealers: Perimeter sealant and backup materials.
- F. Section 16130 - Raceway and Boxes: Empty conduit from control station to door operator.
- G. Section 16150 - Wiring Connections: Electrical service to door operator.

1.5 REFERENCES
- A. ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.

1.6 DESIGN / PERFORMANCE REQUIREMENTS
- A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
  1. Design pressure of 20 lb/sq ft.
- B. Wiring Connections: Requirements for electrical characteristics.
  1. 115 volts, single phase, 60 Hz.
- C. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.7 SUBMITTALS
- A. Submit under provisions of Section 013000.
- 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.
- C. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- E. Operation and Maintenance Data.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
B. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.9 DELIVERY, STORAGE, AND HANDLING
A. Store products in manufacturer's unopened labeled packaging until ready for installation.
B. Protect materials from exposure to moisture until ready for installation.
C. Store materials in a dry, ventilated weathertight location.

1.10 PROJECT CONDITIONS
A. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

1.11 WARRANTY
A. Warranty: Manufacturer's limited door and operators System warranty for 10 year against delamination of polyurethane foam from steel face and all other components for 3 years or 20,000 cycles, whichever comes first.

PART 2 PRODUCTS

2.1 MANUFACTURERS
A. Acceptable Manufacturer: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com. E-mail: sales@overheaddoor.com.
B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 INSULATED SECTIONAL OVERHEAD DOORS
A. Insulated Steel Sectional Overhead Doors: 2" by Raynor Corporation or Haas. Units shall have the following characteristics:
1. Door Assembly: Metal/foam/metal sandwich panel construction, with PVC thermal break and weather-tight ship-lap design meeting joints.
a. Panel Thickness: 2 inches (51 mm).
b. Exterior Surface: Ribbed, textured.
c. Exterior Steel: .015 inch (.38 mm), hot-dipped galvanized.
d. End Stiles: 16 gauge with thermal break.
e. Spring Counterbalance: Sized to weight of the door, with a helically wound, oil tempered torsion spring mounted on a steel shaft; cable drum of diecast aluminum with high strength galvanized aircraft cable. Sized with a minimum 7 to 1 safety factor.
1) High cycle spring: 25,000 cycles.
f. Insulation: CFC-free and HCFC-free polyurethane, fully encapsulated.
g. Thermal Values: R-value of 17.50; U-value of 0.057.
h. Air Infiltration: 0.08 cfm at 15 mph; 0.08 cfm at 25 mph.
2. Finish and Color:
a. Two coat baked-on polyester:
1) Interior color, white.
3. Windload Design: Provide to meet the Design/Performance requirements specified.
4. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
5. Weatherstripping:
a. EPDM bulb-type strip at bottom section.
b. Flexible Jamb seals.

c. Flexible Header seal.

6. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
   a. Size:
      1) 2 inch (51 mm).
   b. Type:
      1) Standard Lift.
7. Electric Motor Operation: None

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until openings have been properly prepared.
B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
C. Verify electric power is available and of correct characteristics.
D. If 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 INSTALLATION

A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.
B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.
C. Anchor assembly to wall construction and building framing without distortion or stress.
D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
E. Fit and align door assembly including hardware.
F. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

3.4 CLEANING AND ADJUSTING

A. Adjust door assembly to smooth operation and in full contact with weatherstripping.
B. Clean doors, frames and glass.
C. Remove temporary labels and visible markings.

3.5 PROTECTION

A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.
B. Protect installed products until completion of project.
C. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

END OF SECTION

DIVISION 08 - OPENINGS

SECTION 087100 – DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:
   1. Swinging doors.
   2. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:
   1. Mechanical door hardware.
   2. Electromechanical door hardware.
   3. Cylinders specified for doors in other sections.

C. Related Sections:
   1. Division 08 Section “Door Hardware Schedule”.
   2. Division 08 Section “Hollow Metal Doors and Frames”.
   3. Division 08 Section “Access Control Hardware”.
   4. Division 28 Section “Access Control”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
   1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
   2. FEMA 361 2008 - Design and Construction Guidance for Community Safe Rooms.
   3. ICC 500 - ICC/NSSA Standard for the Design and Construction of Storm Shelters.
   4. ICC/IBC - International Building Code.
   5. NFPA 70 - National Electrical Code.
   6. NFPA 80 - Fire Doors and Windows.
   7. NFPA 101 - Life Safety Code.
   8. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:
   1. ANSI/BHMA Certified Product Standards - A156 Series
   2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
   1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
   2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
   3. Content: Include the following information:
      a. Type, style, function, size, label, hand, and finish of each door hardware item.
      b. Manufacturer of each item.
      c. Fastenings and other pertinent information.

d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware.
g. Door and frame sizes and materials.
h. Warranty information for each product.

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

C. Shop Drawings: Details of electrified access control hardware indicating the following:
1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
b. Complete (risers, point-to-point) access control system block wiring diagrams.
c. Wiring instructions for each electronic component scheduled herein.
2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Proof of Certification: Provide copy of manufacturer(s) official certification or accreditation document indicating proof of status as a qualified installer of Windstorm assemblies.

E. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

F. Informational Submittals:
1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

G. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

D. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

E. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

F. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

G. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

H. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the

Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
   1. Structural failures including excessive deflection, cracking, or breakage.
   2. Faulty operation of the hardware.
   3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:
   1. Ten years for mortise locks and latches.
   2. Five years for exit hardware.
   3. Twenty five years for manual surface door closer bodies.
   4. Two years for electromechanical door hardware.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

C. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

D. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

E. Provide Drip Edge over storage HM Door and Concessions Door.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.
   1. Quantity: Provide the following hinge quantity, unless otherwise indicated:
      a. Two Hinges: For doors with heights up to 60 inches.
      b. Three Hinges: For doors with heights 61 to 90 inches.
      c. Four Hinges: For doors with heights 91 to 120 inches.
      d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
   2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
      a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
      b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.
   3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:
   a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
5. Acceptable Manufacturers:
   a. Hager Companies (HA).
   b. McKinney Products (MK).

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
1. Acceptable Manufacturers:
   a. Ives (IV).
   b. McKinney Products (MK).
   c. Pemko Manufacturing (PE).

2.3 DOOR OPERATING TRIM

A. Door Push Plates and Pulls: ANS/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
5. Acceptable Manufacturers:
   a. Ives (IV).
   b. Rockwood Manufacturing (RO).
   c. Trimco (TC).

2.4 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
1. Acceptable Manufacturers:
   a. Corbin Russwin Hardware (RU).
   b. Sargent Manufacturing (SA).
   c. Schlage (SC).

C. Cylinders: Original manufacturer cylinders complying with the following:
1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
5. Keyway: Manufacturer’s Standard.

D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1, certified cylinders employing a utility patented and restricted keyway requiring the use of patented controlled keys. Provide bump resistant,

fixed core cylinders as standard with solid recessed cylinder collars. Cylinders are to be factory keyed where permanent keying records will be established and maintained.

1. Provide a 6 pin multi-level master key system comprised of patented controlled keys and security and high security cylinders operated by one (1) key of the highest level. Geographical exclusivity to be provided for all security and high security cylinders and UL437 certification where specified.
    a. Level 1 Cylinders: Provide utility patented controlled keyway cylinders that are furnished with patented keys available only from authorized distribution.
    b. Level 2 Cylinders: Provide utility patented controlled keyway and side bar locking incorporating unique angled bottom pins for geographical exclusivity. Cylinders constructed to provide protection against bumping and picking.
    c. Level 3 Cylinders: Provide utility patented controlled keyway and side bar locking incorporating unique angled bottom pins for geographical exclusivity. Cylinders to be UL437 certified and constructed to provide protection against bumping, picking, and drilling.
    d. Refer to hardware sets for specified levels.
2. Acceptable Manufacturers:
    a. Sargent Manufacturing (SA) - Degree Series.
    b. Corbin Russwin (RU) – Access 3 Series.

E. Keying System: Each type of lock and cylinders to be factory keyed.
1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. New System: Key locks to a new key system as directed by the Owner.

F. Key Quantity: Provide the following minimum number of keys:
1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

G. Construction Keying: Provide construction master keyed cylinders.

H. Key Registration List (Bitting List):
1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.5 MECHANICAL LOCKS AND LATCHING DEVICES

A. Multi-Point Locksets, Security: Three-point locking system device engineered for in-swinging door applications on windstorm safe shelter rooms. Extra heavy duty steel component construction securing the door to the frame at top, bottom and center latch positions. All three latching points are automatically activated when the device is locked.
1. Acceptable Manufacturers:
    a. Corbin Russwin Hardware (RU) - FE6800 Series.
    b. Sargent Manufacturing (SA) - FM7100 Series.
    c. Schlage (SC) – LM9300 Series.

B. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Grade 1 certified.
1. Furnish with solid cast levers, standard 2 3/4” backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt.
2. Locks are to be non-handed and fully field reversible.
3. Acceptable Manufacturers:
    a. Corbin Russwin Hardware (RU) – CL3300 Series.
    b. Sargent Manufacturing (SA) – 10 Line.
    c. Schlage (SC) – ND Series.

2.6 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:
1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.5.
4. Dustproof Strikes: BHMA A156.16.

2.7 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt and security type fasteners as required for proper installation.

B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.
1. Acceptable Manufacturers:
    a. Corbin Russwin Hardware (RU) - DC8000 Series.
    b. LCN Closers (LC) - 4040XP Series.
    c. Norton Door Controls (NO) – 9500 Series.
    d. Sargent Manufacturing (SA) - 281 Series.

2.8 ARCHITECTURAL TRIM

A. Door Protective Trim
1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
    a. Stainless Steel: 300 grade, 050-inch thick.

4. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
5. Acceptable Manufacturers:
    a. Ives (IV).
    b. Rockwood Manufacturing (RO).
    c. Trimco (TC).

2.9 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
1. Acceptable Manufacturers:
    a. Ives (IV).
    b. Rockwood Manufacturing (RO).
    c. Trimco (TC).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
1. Acceptable Manufacturers:
    a. Glynn Johnson (GJ).
    b. Rixson Door Controls (RF).
    c. Rockwood Manufacturing (RO).
    d. Sargent Manufacturing (SA).

2.10 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

D. Acceptable Manufacturers:
1. National Guard Products (NG).
2. Pemko Manufacturing (PE).
3. Reese Enterprises, Inc. (RE).

2.11 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.12 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. See Drawings for Hardware Sets

END OF SECTION

DIVISION 09 – FINISHES

SECTION 092900 - GYPSUM BOARD

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. Interior gypsum board.
  2. Texture finishes.
- B. Related Requirements:
  1. Section 093013 "Ceramic Tiling" for cementitious backer units installed as substrates for ceramic tile.

1.3 DELIVERY, STORAGE AND HANDLING
- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.4 FIELD CONDITIONS
- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
  1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD, GENERAL
- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

2.3 Gypsum Wallboard: INTERIOR GYPSUM BOARD
- A. A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  1. 1. American Gypsum.
  2. 2. Georgia-Pacific Gypsum LLC.
  3. 3. National Gypsum Company.
  4. 4. USG Corporation.
- B. B. Abuse-Resistant Gypsum Board: ASTM C 1629/C 1629M, Level 2. Product based on USG Fiberock Aquatough.
  1. 1. Core: 5/8 inch, Type X.
  2. 2. Long Edges: Tapered.
  3. 3. Mold Resistance: ASTM D 3273, score of 10.
- C. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. American Gypsum.
  - b. CertainTeed Corporation.
  - c. Georgia-Pacific Building Products.

d. National Gypsum Company.
2. Core: 5/8 inch (15.9 mm), Type X.
3. Long Edges: Tapered.

2.4 TRIM ACCESSORIES
A. Interior Trim: ASTM C 1047.
1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:
a. Cornerbead.
b. Bullnose bead.
c. LC-Bead: J-shaped; exposed long flange receives joint compound.
d. L-Bead: L-shaped; exposed long flange receives joint compound.
e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
f. Expansion (control) joint.
g. Curved-Edge Cornerbead: With notched or flexible flanges.

2.5 JOINT TREATMENT MATERIALS
A. General: Comply with ASTM C 475/C 475M.
B. Joint Tape:
1. Interior Gypsum Board: Paperless
C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use drying-type, all-purpose compound compatible for use with Aquatough.
4. Finish Coat: For third coat, use drying-type, all-purpose compound compatible for use with AquaTough.

2.6 AUXILIARY MATERIALS
A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
D. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."
E. Vapor Retarder: As specified in Section 072600 "Vapor Retarders."

2.7 TEXTURE FINISHES
A. Primer: As recommended by textured finish manufacturer.
B. Non-Aggregate Finish: Premixed, vinyl texture finish for spray application.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
a. CertainTeed Corporation.
b. National Gypsum Company.
c. United States Gypsum Company.
2. Texture: Orange peel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

I. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Wallboard Type: Vertical surfaces unless otherwise indicated. AquaTough

Single-Layer Application:

2. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
3. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
   a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
4. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
5. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

B. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to

framing members and offset face-layer joints one framing member, 16 inches (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.

2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.4 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
B. Control Joints: Install control joints at locations indicated on Drawings.
C. Interior Trim: Install in the following locations:
   1. Cornerbead: Use at outside corners.

3.5 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
   1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
   2. Level 5: At panel surfaces that will be exposed to view unless otherwise indicated.
      a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

3.6 APPLYING TEXTURE FINISHES

A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.
C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written instructions.

3.7 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

DIVISION 09 – FINISHES

SECTION 099123 - INTERIOR PAINTING

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 surface preparation and the application of paint systems on the following interior substrates:
   1. Steel and iron.
   2. Galvanized metal.
   3. Wood.
   4. Gypsum board.
   5. Spray-textured ceilings.
   6. ASJ insulation covering.

B. Related Requirements:
   1. Section 051200 "Structural Steel Framing" for shop priming structural steel.
   2. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
   3. Section 055113 "Metal Pan Stairs" for shop priming metal pan stairs.
   4. Section 055213 "Pipe and Tube Railings" for shop painting pipe and tube railings.
   5. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on interior wood substrates.

1.3 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
   1. Submit Samples on rigid backing, 8 inches (200 mm) square.
   2. Apply coats on Samples in steps to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Paint: 5> percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   1. Behr Process Corporation.
   2. Benjamin Moore & Co.
   3. Diamond Vogel Paints.
   4. PPG Architectural Finishes, Inc.
   5. Pratt & Lambert.
   6. Sherwin-Williams Company (The).
   7. Zinsser; Rust-Oleum Corporation.
B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
B. Material Compatibility:
   1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
C. Colors: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Concrete: 12 percent.
   2. Masonry (Clay and CMUs): 12 percent.
   3. Wood: 15 percent.
   4. Gypsum Board: 12 percent.
C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
D. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.
E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
F. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:
   1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
   2. Sand surfaces that will be exposed to view, and dust off.
   3. Prime edges, ends, faces, undersides, and backsides of wood.
   4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
   1. Use applicators and techniques suited for paint and substrate indicated.
   2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
   4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
   5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
   1. Paint the following work where exposed in equipment rooms:
      a. Equipment, including panelboards and switch gear.
      b. Uninsulated metal piping.
      c. Uninsulated plastic piping.
      d. Pipe hangers and supports.
      e. Metal conduit.
      f. Plastic conduit.
      g. Tanks that do not have factory-applied final finishes.
   2. Paint the following work where exposed in occupied spaces:
      a. Equipment, including panelboards.
      b. Uninsulated metal piping.
      c. Uninsulated plastic piping.
      d. Pipe hangers and supports.
      e. Metal conduit.
      f. Plastic conduit.
      g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
      h. Other items as directed by Architect.
   3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
   1. Contractor shall touch up and restore painted surfaces damaged by testing.
   2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Steel Substrates including interior structural mainframes, exposed steel structure:
   1. Quick-Drying Enamel System:
      a. Prime Coat: Primer, alkyd, quick dry, for metal or galvanized metal.
      b. Intermediate Coat: Alkyd, quick dry, matching top coat.
      c. Topcoat: Alkyd, quick dry, semi-gloss (Gloss Level 5).

B. Gypsum Board Substrates and Plaster:
   1. Latex System:
      a. Prime Coat: Primer sealer, latex, interior.
      b. Intermediate Coat: Latex, interior, matching topcoat.

c. Topcoat: Latex, interior, (Gloss level 3).

C. Gypsum Board Substrates and Plaster:
1. Epoxy System:
a. Prime Coat: Primer sealer, latex, interior.
b. Intermediate Coat: Epoxy, interior, matching topcoat.
c. Topcoat: Epoxy, interior, (Gloss level 5).

D. Gypsum Board Ceiling Substrates:
1. Latex System: Spray applied.
a. Prime Coat: Primer sealer, latex, interior.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, (Gloss level 1).

E. Insulation – Covering Substrates: Including pipe and duct coverings in all exposed areas outside mechanical or utility spaces.

END OF SECTION

SPECIFICATIONS: **CUBBY PARK IMPROVEMENTS**
300 SCOTT DRIVE, WEST BRANCH, IOWA
ARCHITECT PROJECT #D0576.01/ENGINEER PROJECT #16-072

DIVISION 10 – SPECIALTIES

SECTION 101423 - PANEL SIGNAGE

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. Room-identification signs.
B. Related Requirements:
1. Section 265219 "Emergency and Exit Lighting" for illuminated, self-luminous, and photoluminescent exit sign units.

1.3 DEFINITIONS
A. Accessible: In accordance with the accessibility standard.
B. Illuminated: Illuminated by lighting source integrally constructed as part of the sign unit.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Shop Drawings: For panel signs.
1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
1. Include representative Samples of available typestyles and graphic symbols.
D. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

1.5 CLOSEOUT SUBMITTALS
A. Maintenance Data: For signs to include in maintenance manuals.
B. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
a. Deterioration of finishes beyond normal weathering.
b. Deterioration of embedded graphic image.
c. Separation or delamination of sheet materials and components.
2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SIGNS
A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. ASI Sign Systems, Inc.
2. Best Sign Systems, Inc.
B. Room-Identification Sign : Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
1. Basis-of-Design Product: Best Sign Systems HC300.
2. Door Signs – 6” x 8” Pictogram with braille.
a. Type A: Door 106 – Door sign containing international symbol for men and wheelchair and word “MEN”.

b. Type B: Door 104 – Door sign containing international symbol for women and wheelchair and word "WOMEN".
c. Type C: Door 103 – Door sign containing international symbol for women and wheelchair and word "FAMILY".
d. Type D: Door 104 – Door sign containing international symbol for men and women and wheelchair and word "RESTROOMS".
e. Type C: Door 100 – Door sign containing the works, "CONCESSION"
f. Type D: Door 102- Door sign containing the words, "STORAGE"

3. Mounting: Surface mounted to wall with two-face tape or magnetic tape.
4. Text and Typeface: Accessible raised characters and Braille of typeface as selected by Architect from manufacturer's full range. Finish raised characters to contrast with background color, and finish Braille to match background color.

2.2 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
1. Use concealed fasteners and anchors unless indicated to be exposed.
B. Adhesive: As recommended by sign manufacturer.
C. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.
D. Magnetic Tape: Manufacturer's standard magnetic tape with adhesive on one side.

2.3 FABRICATION

A. Surface-Engraved Graphics: Machine engrave characters and other graphic devices into panel surface indicated to produce precisely formed copy, incised to uniform depth.
1. Engraved Opaque Acrylic Sheet: Fill engraved graphics with manufacturer's standard enamel.

2.4 GENERAL FINISH REQUIREMENTS

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.
B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
B. Room-Identification Signs and Other Accessible Signage: Install in locations on walls according to accessibility standard.

C. Mounting Methods:
1. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
2. Magnetic Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position.

3.3 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
B. Remove temporary protective coverings and strippable films as signs are installed.
C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION

DIVISION 10 – SPECIALTIES

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

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

1.2 SUMMARY
- A. Section Includes:
  1. Public-use washroom accessories.
  2. Underlavatory guards.
  3. Custodial accessories.
- B. Related Requirements:
  1. Section 088300 "Mirrors" for frameless mirrors.

1.3 COORDINATION
- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.4 ACTION SUBMITTALS
- A. Product Data: For each type of product.
  1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
  2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
  1. Identify locations using room designations indicated.

1.5 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For accessories to include in maintenance manuals.

1.6 WARRANTY
- A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, visible silver spoilage defects.
  2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 OWNER-FURNISHED MATERIALS
- A. Owner-Furnished Materials: None.

2.2 PERFORMANCE REQUIREMENTS
- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 PUBLIC-USE WASHROOM ACCESSORIES
- A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following (ASI is NOT APPROVED to bid):
   1. A & J Washroom Accessories, Inc.
   2. Bobrick Washroom Equipment, Inc. (Basis of Specification)
   3. Bradley Corporation.

C. Toilet Tissue (Roll) Dispensor: Provide one at each toilet.
   1. Basis of Design Product: Bobrick B686
   2. Description: Double Roll Dispensor.
   3. Mounting: Surface.
   4. Operation: Noncontrol delivery with theft-resistant spindle.
   5. Material and Finish: Stainless steel, No. 4 finish (satin).

D. Liquid-Soap Dispenser:
   1. Basis of Design Product: Bobrick B-42
   2. Description: Soap Dispensor.
   3. Mounting: Surface.
   4. Material and Finish: Stainless Steel, No. 4 finish (satin).

E. Grab Bar: Provide one full set at each ADA compliant stall in restrooms 105 and 106.
   1. Basis of Design Product: Bobrick B-6806.
   2. Mounting: Flanges with concealed fasteners.
   3. Material: Stainless steel, 0.05 inch thick.
      a. Finish: Smooth, No. 4 finish (satin).
   4. Outside Diameter: 1 1/2 inches.
   5. Configuration: 42” mounted horizontally, 36” mounted horizontally, 18” mounted vertically. Reference interior elevations on plans for mounting heights and locations.

F. Sanitary-Napkin Disposal Unit: Provide one at each women’s stall.
   1. Basis of Design Product: Bobrick B-270.
   2. Mounting: Surface.
   3. Door or Cover: Self-closing, disposal-opening cover.
   4. Receptacle: Removable.
   5. Material and Finish: Satin Stainless Steel.

G. Multi-fold Paper Towel Dispenser: Provide one per restroom location, mount adjacent to sink(s).
   1. Basis of Design Product: Bobrick B-262.
   2. Mounting: Surface.
   3. Minimum Capacity: 400 C-fold or 525 multifold towels.
   4. Material and Finish: Satin Stainless Steel.
   5. Lockset: Tumber Type.
   6. Refill Indicators: Pierced slots at sides or front.

H. Mirror: Provide per drawings at each lavatory
   1. Basis of Design: Bobrick B1658 Tempered Glass Channel Frame

2.4 UNDERLAVATORY GUARDS

A. Underlavatory Guard: Provide at all lavatories.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      a. Plumberex Specialty Products, Inc.
      b. Truebro by IPS Corporation.
   2. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
   3. Material and Finish: Antimicrobial, molded plastic, white.

2.5 CUSTODIAL ACCESSORIES

A. Source Limitations: Obtain custodial accessories from single source from single manufacturer.

B. Mop and Broom Holder:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      a. AJW Architectural Products.
      b. Bobrick Washroom Equipment, Inc.
      c. Bradley Corporation.
   2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
   3. Length: 36 inches (914 mm).
   4. Hooks: Four.
   5. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
   6. Material and Finish: Stainless steel, No. 4 finish (satin).
      a. Shelf: Not less than nominal 0.05-inch- (1.3-mm-) thick stainless steel.
      b. Rod: Approximately 1/4-inch- (6-mm-) diameter stainless steel.

2.6 MATERIALS
A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.
B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch (0.9-mm) minimum nominal thickness.
D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.
E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

2.7 FABRICATION
A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION
A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING
A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
B. Remove temporary labels and protective coatings.
C. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION

DIVISION 10 – SPECIALTIES

SECTION 104413 - FIRE PROTECTION CABINETS

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. Fire-protection cabinets for the following:
     a. Portable fire extinguishers.

1.3 ACTION SUBMITTALS
- A. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.
- B. Shop Drawings: For fire-protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
- C. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semirecessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function.

1.4 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.5 COORDINATION
- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
- A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 FIRE-PROTECTION CABINET
- A. Cabinet Type: Suitable for fire extinguisher.
  1. Larsen's Manufacturing (Cameo Series)
- B. Cabinet Construction: Nonrated
- C. Cabinet Material: Cold-rolled steel sheet
  1. Shelf: Same metal and finish as cabinet.
- D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
  1. Rolled-Edge Trim: 2 1/4" backbend depth.
- E. Cabinet Trim Material: Steel sheet.
- F. Door Material: Steel sheet.
- G. Door Style: Full acrylic bubble with frame.
- H. Door Glazing: Molded acrylic bubble.
  1. Acrylic Bubble Color: Clear, transparent.

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
   1. Provide projecting door pull and friction latch.
   2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

J. Accessories:
   1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.

K. Materials:
   1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
      a. Finish: Baked enamel or powder coat.
      b. Color: As selected by Architect from full range of industry colors and color densities.
   2. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet).

2.3 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
   1. Weld joints and grind smooth.
   2. Provide factory-drilled mounting holes.
   3. Prepare doors and frames to receive locks.
   4. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.
   1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
   2. Fabricate door frames of one-piece construction with edges flanged.
   3. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for cabinets to verify actual locations of piping connections before cabinet installation.

B. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire-protection cabinets in locations and at mounting heights indicated.

1. Fire-Protection Cabinets: 54 inches (1372 mm) above finished floor to top of cabinet.

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
   1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is inadequate for recessed cabinets, provide semirecessed fire-protection cabinets.
   2. Provide inside latch and lock for break-glass panels.
   3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SPECIFICATIONS: **CUBBY PARK IMPROVEMENTS**
300 SCOTT DRIVE, WEST BRANCH, IOWA
ARCHITECT PROJECT #D0576.01/ENGINEER PROJECT #16-072

DIVISION 12 – FURNISHINGS

SECTION 123216 - MANUFACTURED PLASTIC-LAMINATE-FACED CASEWORK

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 plastic-laminate-faced cabinets of stock design.
B. Related Requirements:
1. Section 061000 "Rough Carpentry" for wood blocking for anchoring casework.
2. Section 096513 "Resilient Base and Accessories" for resilient base applied to plastic-laminate-faced casework.
3. Section 123623.13 "Plastic-Laminate-Clad Countertops."

1.3 DEFINITIONS
A. Definitions in the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" apply to the work of this Section.
B. MDF: Medium-density fiberboard.
C. Hardwood Plywood: A panel product composed of layers or plies of veneer, or of veneers in combination with lumber core, hardboard core, MDF core, or particleboard core, joined with adhesive, and faced both front and back with hardwood veneers.

1.4 COORDINATION
A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that casework can be supported and installed as indicated.

1.5 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Show fabrication details, including types and locations of hardware. Show installation details, including field joints and filler panels. Indicate manufacturer's catalog numbers for casework.
C. Samples: For cabinet finishes.
D. Samples for Initial Selection: For cabinet finishes.
E. Samples for Verification: 8-by-10-inch (200-by-250-mm) Samples for each type of finish.

1.6 INFORMATIONAL SUBMITTALS
A. Qualification Data: For Installer.
B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.
C. Sample Warranty: For special warranty.

1.7 DELIVERY, STORAGE, AND HANDLING
A. Deliver casework only after painting, utility roughing-in, and similar operations that could damage, soil, or deteriorate casework have been completed in installation areas. If casework must be stored in other than installation areas, store only in areas where environmental conditions meet requirements specified in "Project Conditions" Article.
B. Keep finished surfaces covered with polyethylene film or other protective covering during handling and installation.

1.8 FIELD CONDITIONS
A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period. Maintain temperature and

relative humidity during the remainder of the construction period in range recommended for Project location by the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."

B. Established Dimensions: Where casework is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

C. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of casework that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Delamination of components or other failures of glue bond.
   b. Warping of components.
   c. Failure of operating hardware.
2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain plastic-laminate-faced cabinets from single manufacturer.

2.2 CASEWORK, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" for grades of casework indicated for construction, finishes, installation, and other requirements.
1. Grade: Premium.

B. Product Designations: Drawings indicate configurations of manufactured plastic-laminate-faced cabinets by referencing designations of Casework Design Series numbering system in Appendix A of the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."

2.3 CASEWORK

A. Design:
1. Flush overlay.

B. Grain Direction for Wood Grain Plastic Laminate:
1. Vertical on doors, horizontal on drawer fronts.

C. Exposed Materials:
1. Plastic Laminate: Grade HGL.
   a. Colors and Patterns: As selected by Architect from manufacturer's full range.
2. Unless otherwise indicated, provide specified edgebanding on all exposed edges.

D. Semiexposed Materials:
1. Plastic Laminate: Grade VGS unless otherwise indicated. Provide plastic laminate for semiexposed surfaces unless otherwise indicated.
   a. Provide plastic laminate of same grade as exposed surfaces for interior faces of doors and drawer fronts and other locations where opposite side of component is exposed.
2. Unless otherwise indicated, provide specified edgebanding on all semiexposed edges.

E. Concealed Materials:
1. Plastic Laminate: Grade BKL.

2.4 MATERIALS

A. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.

B. Hardwood Plywood: HPVA HP-1, particleboard core except where veneer core is indicated.

C. Softwood Plywood: DOC PS 1.

D. Particleboard: Straw-based particleboard complying with ANSI A208.1, Grade M-2, except for density.

E. Hardboard: ANSI A135.4, Class 1 Tempered.

F. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Formica Corporation.
   b. Wilsonart LLC.

G. Edgebanding for Plastic Laminate: Rigid PVC extrusions, through color with satin finish, 3 mm thick at doors and drawer fronts, 1 mm thick elsewhere.

H. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

I. Edgebanding for Thermoset Decorative Panels: PVC or polyester edgebanding matching thermoset decorative panels.

2.5 COLORS AND FINISHES

A. Wood Colors and Finishes: As selected by Architect from casework manufacturer's full range.

B. Thermoset Decorative Panel Colors, Patterns, and Finishes: As selected by Architect from casework manufacturer's full range.

C. Plastic-Laminate Colors, Patterns, and Finishes: As selected by Architect from plastic-laminate manufacturer's full range.

D. PVC Edgebanding Color: As selected from casework manufacturer's full range.

2.6 FABRICATION

A. Plastic-Laminate-Faced Cabinet Construction: As required by referenced quality standard, but not less than the following:
   1. Bottoms and Ends of Cabinets, and Tops of Wall Cabinets and Tall Cabinets: 3/4-inch (19-mm) particleboard.
   2. Shelves: 3/4-inch- (19-mm-) thick plywood or 1-inch- (25-mm-) thick particleboard.
   3. Backs of Cabinets: 1/2-inch- (12.7-mm-) thick particleboard or MDF where exposed, dadoed into sides, bottoms, and tops where not exposed.
   4. Drawer Fronts: 3/4-inch (19-mm) particleboard.
   5. Drawer Sides and Backs: 1/2-inch (12.7-mm) solid-wood or veneer-core hardwood plywood with glued dovetail or multiple-dowel joints.
   6. Drawer Bottoms: 1/4-inch (6.4-mm) hardwood plywood glued and dadoed into front, back, and sides of drawers. Use 1/2-inch (12.7-mm) material for drawers more than 24 inches (600 mm) wide.
   7. Doors 48 Inches (1200 mm) High or Less: 3/4 inch (19 mm) thick, with particleboard or MDF cores.
   8. Doors More Than 48 Inches (1200 mm) High: 1-1/8 inches (29 mm) thick, with particleboard cores.

B. Filler Strips: Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets.

2.7 CASEWORK HARDWARE AND ACCESSORIES

A. Hardware, General: Unless otherwise indicated, provide manufacturer's standard satin-finish, commercial-quality, heavy-duty hardware.
   1. Use threaded metal or plastic inserts with machine screws for fastening to particleboard except where hardware is through-bolted from back side.

B. Frameless Concealed Hinges (European Type): BHMA A156.9, Type B01602, 135 degrees of opening, self-closing. Provide two hinges for doors less than 48 inches (1220 mm) high, and provide three hinges for doors more than 48 inches (1220 mm) high.

C. Pulls: Solid stainless-steel or chrome-plated brass wire pulls, fastened from back with two screws. For sliding doors, provide recessed stainless-steel or chrome-plated flush pulls. Provide two pulls for drawers more than 24 inches (600 mm) wide.

D. Door Catches: Zinc-plated, nylon-roller spring catch or dual, self-aligning, permanent magnet catch. Provide two catches on doors more than 48 inches (1220 mm) high.

E. Drawer Slides: BHMA A156.9, Type B05091.
   1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-overtravel-extension type; zinc-plated, steel ball-bearing slides.

F. Drawer and Hinged Door Locks: Mortise type, five-pin tumbler, brass with chrome-plated finish, and complying with BHMA A156.11, Grade 1.
   1. Provide a minimum of two keys per lock and six master keys.
   2. Provide locks on all doors and drawers.

G. Adjustable Shelf Supports: Single-pin metal shelf rests complying with BHMA A156.9, Type B04013.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CASEWORK INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

B. Install casework level, plumb, and true; shim as required, using concealed shims. Where casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.

C. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16 inch (1.5 mm) of a single plane. Align similar adjoining doors and drawers to a tolerance of 1/16 inch (1.5 mm). Bolt adjacent cabinets together with joints flush, tight, and uniform.

D. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch (1.5 mm) of a single plane. Fasten to hanging strips, masonry, framing, wood blocking, or reinforcements in walls and partitions. Align similar adjoining doors to a tolerance of 1/16 inch (1.5 mm).

E. Fasten cabinets to adjacent cabinets and to masonry, framing, wood blocking, or reinforcements in walls and partitions to comply with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."

F. Install hardware uniformly and precisely. Set hinges snug and flat in mortises unless otherwise indicated. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.

G. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.3 CLEANING

A. Repair or remove and replace defective work as directed on completion of installation.

B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

END OF SECTION

DIVISION 12 – FURNISHINGS

SECTION 123623.13 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

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 plastic-laminate countertops.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, including panel products, high-pressure decorative laminate, adhesive for bonding plastic laminate, and fire-retardant-treated materials.
   1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
   1. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, electrical switches and outlets, and other items installed in plastic-laminate countertops.
   2. Apply AWI Quality Certification Program label to Shop Drawings.

C. Samples for Initial Selection:
   1. Plastic laminates.

D. Samples for Verification:
   1. Plastic laminates, 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish, with one sample applied to core material and specified edge material applied to one edge.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver countertops until painting and similar operations that could damage countertops have been completed in installation areas. If countertops must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE COUNTERTOPS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades indicated for construction, installation, and other requirements.
   1. Provide labels from AWI certification program indicating that countertops comply with requirements of grades specified.

B. Grade: Premium.

C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Formica Corporation.
      b. Wilsonart LLC.

D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
   1. As selected by Architect from manufacturer's full range in the following categories:
      a. Solid colors, gloss and matte finish.
      b. Patterns, gloss and matte finish.

E. Edge Treatment: Same as laminate cladding on horizontal surfaces.

F. Core Material: Particleboard made with exterior glue.

G. Core Material at Sinks: Particleboard made with exterior glue.

H. Core Thickness: 3/4 inch (19 mm).
   1. Build up countertop thickness to 1-1/2 inches (38 mm) at front, back, and ends with additional layers of core material laminated to top.

I. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

2.2 MISCELLANEOUS MATERIALS

A. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
   1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.3 FABRICATION

A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

B. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch (25 mm) over base cabinets. Ease edges to radius indicated for the following:
   1. Solid-Wood (Lumber) Members: 1/16 inch (1.5 mm) unless otherwise indicated.

C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
   1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.

B. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install countertops to comply with same grade as item to be installed.

B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.

1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items.
2. Seal edges of cutouts by saturating with varnish.

C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches (150 mm) of front and back edges and at intervals not exceeding 24 inches (600 mm). Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

D. Install countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

E. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

F. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
1. Install countertops with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
2. Secure backsplashes to tops with concealed metal brackets at 16 inches (400 mm) o.c. and to walls with adhesive.
3. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean countertops on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION

SECTION 07 42 13 – METAL WALL PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Metal lap-seam wall panels with exposed fasteners, including trim and accessories].

1.2 REFERENCES

A. General: Standards listed by reference form a part of this specification section. Standards listed are identified by issuing authority, abbreviation, designation number, title or other designation. Standards subsequently referenced in this Section are referred to by issuing authority abbreviation and standard designation.

B. ASTM International:

1. ASTM A 653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM A 792 – Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
3. ASTM A 1011 – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
4. ASTM D 2244 – Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
5. ASTM D 4214 – Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
6. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

C. Underwriters Laboratories (UL):

1. UL 263 - Fire Tests of Building Construction and Materials.

D. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): "Architectural Sheet Metal Manual."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meetings: Conduct preinstallation meeting to clarify Project requirements, substrate conditions, manufacturer’s installation instructions and manufacturer’s warranty requirements.

1.4 ACTION SUBMITTALS

A. Product Technical Data: For each type of product required, including manufacturer's preparation recommendations, storage and handling requirements, and recommended installation methods.

B. Shop Drawings: Showing methods of installation, plans, sections, elevations and details of roof and wall panels, specified loads, flashings, vents, sealants, interfaces with all materials not supplied by the metal panel system manufacturer, and identification of proposed component parts and their finishes. Do not proceed with fabrication prior to approval of shop drawings.

C. Samples: Selection and verification samples for finishes, colors and textures. Submit two complete sample sets of each type of panel, trim, clip and fastener required.

D. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics, criteria and physical requirements.

E. Test and Evaluation Reports: Showing compliance with specified performance characteristics and physical properties.

F. Qualifications Statements: For manufacturer and installer.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For installed products including maintenance methods and precautions against cleaning materials and methods detrimental to finishes and performance.

B. Warranty: Warranty documents required in this section.

1.6 MAINTENANCE MATERIAL

A. Extra Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 01 Closeout Submittals Section.

1. Quantity: Furnish quantity min. of 2 units equal to 10 percent of amount installed.
2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra materials.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Provider of advanced installer training.
2. Minimum of ten years of experience in manufacturing metal wall panel systems.
3. Provider of products produced in a permanent factory environment with fixed roll-forming equipment.

B. Installer Qualifications:

1. At least five years of experience in the installation of metal wall panels.
2. Experience on at least five projects of similar size, type and complexity as this Project that have been in service for a minimum of two years with satisfactory performance of the wall panel system.
3. Employer of workers for this Project who are competent in techniques required by manufacturer for installation indicated and who shall be supervised at all times when material is being installed..

D. Preinstallation Conference: Conduct a preinstallation conference on site.

E. Fire Resistance Ratings: Determined by testing identical products and assemblies according to UL 263 and ASTM E 84 by a testing agency acceptable to authorities having jurisdiction.

1. Flame-Spread Index: **25 (Class A**

1.8 DELIVERY, STORAGE AND HANDLING

A. General: Comply with manufacturer's current printed product storage recommendations.

B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Storage: Store materials above ground, under waterproof covering, protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Provide proper ventilation of metal panel system to prevent condensation build-up between each panel and trim or flashing component. Tilt stack to drain in wet conditions. Remove strippable plastic film before storage under high-heat conditions. Store products in manufacturer's unopened packaging until just prior to installation.

D. Handling: Exercise caution in unloading and handling metal panel system to prevent bending, warping, twisting and surface damage.

1.9 WARRANTY

A. Special Exposed Panel Finish Warranty: Manufacturer's standard form PVDF Fluorocarbon System Warranty for film integrity, chalk rating and fade rating in which manufacturer agrees to repair or replace panels that show evidence of deterioration within specified warranty period.

1. Deterioration shall include but is not limited to:

a. Color fading of more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling or failure of paint to adhere to bare metal.

2. Warranty Period: Film integrity for 45 years and chalk and fade rating for 35 years from date of Substantial Completion.
3. Manufacturer's warranty may exclude surface deterioration due to physical damage and exposure to salt air environments.

2. Warranty Period: Film integrity for 45 years, chalk and fade rating for 30 years, and perforation for 25 years from date of Substantial Completion.
3. Manufacturer's warranty may exclude surface deterioration due to physical damage and exposure to salt air environments.

PART 2 PRODUCTS

2.1 METAL WALL PANELS

A. Basis of Design Product: Subject to compliance with requirements provide Metal Sales Manufacturing Corporation; Industrial Rib/Deep Rib Series T-13A

B. Substitution Limitations: [All other manufacturers: Submit substitution request.

C. Product Options:

1. Panel coverage: Maximum practical for installation.
2. Rib Height: [2 inches (50.8 mm)].
3. Material: Aluminum-zinc alloy-coated steel sheet, ASTM A 792, [AZ50] [AZ55] [G90] coating designation, structural quality, Grade 50] [Grade 33], [0.0236-inch (0.60-mm)] [0.0296-inch (0.75-mm)] [0.0356 inch (0.904 mm)] [0.0466 inch (1.184 mm)] minimum thickness.
4. Attachment: Exposed direct fastened panel.
5. Application: Designed for application over open framing or solid substrate.
6. Rib Configuration: SLIGHT Trapezoidal.
7. Perforation: None >.
8. Surface Finish: [PVDF (Kynar 500)]
9. Color: As selected by Architect from manufacturer's standard colors
10. Fire Resistance Rating: Comply with UL 263 and UL 790 Class A Fire Resistance Ratings.

2.6 SOURCE QUALITY CONTROL

A. Source: Obtain metal wall panels, trim and other accessories from a single manufacturer.
B. Quality Control: Obtain metal wall panels, trim and other accessories from a manufacturer capable of providing on-site technical support and installation assistance.

PART 3 EXECUTION

3.2 PREPARATION

A. Miscellaneous Framing: Install furring, angles, subpurlins, and other miscellaneous wall panel support members and anchorage according to metal wall panel manufacturer's recommendations.

3.3 THERMAL INSULATION INSTALLATION

3.4 METAL WALL PANEL INSTALLATION

A. General: Comply with panel manufacturer's installation instructions including but not limited to special techniques, interface with other work, and integration of systems.

B. Fasten metal wall panels to supports with concealed clips at each standing-seam joint at location, spacing, and using proper fasteners as recommended by panel manufacturer.

3.5 ACCESSORY INSTALLATION

A. General: Install accessories using techniques recommended by manufacturer and which will assure positive anchorage to building and weather tight mounting. Provide for thermal movement. Coordinate installation with flashings and other components.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and the SMACNA "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and install units to true level. Install work with laps, joints, and seams that will be permanently watertight.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: If requested by Owner, provide manufacturer's field service consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

1. Site Visits: not required.

3.7 CLEANING

A. Remove temporary coverings and protection of adjacent work areas.
B. Repair or replace any installed products that have been damaged.
C. Clean installed panels in accordance with manufacturer's instructions prior to Owner's acceptance.
D. Remove and lawfully dispose of construction debris from Project site.

3.8 PROTECTION

A. Protect installed product and finish surfaces from damage during construction.

END OF SECTION 07 42 13 – METAL WALL PANELS