



ADDENDUM NO. 4
NEW DOVER HIGH SHOOOL – BID PACKAGE G-1
Dover, Delaware 19904

May 14, 2013

NOTICE: Attach this addendum to the project manual for this project. It modifies and becomes a part of the contract documents. Work or materials not specifically mentioned herein are to be described in the main body of the specifications and as shown on the drawings. Bidders shall acknowledge receipt of this addendum on the space provided on the Bid Form. Failure to do so may subject the bidder to disqualification.

The contract documents for the above referenced project, dated March 1, 2013 are amended as follows:

GENERAL CLARIFICATIONS

- The bid due date for BPG-1 will be extended to May 23, 2013 and bids will be received at the Professional Development Administration Building located at 198 Commerce Way Dover, Delaware 19904-8210 until 3:00 pm.
- The switch gear shown in the maintenance building shall be part of Contract NDHS-39 Site Electrical
- All Electric related to the press boxes will be part of Contract NDHS-39 Site Electrical

QUESTIONS

N/A

MODIFICATIONS TO SPECIFICATIONS

- Section 00 31 32 – Geotechnical Data: INSERT attached Geotechnical Report.
- Technical Specifications: REPLACE original sections with the following:
 - 04 20 00 Unit Masonry
 - 05 12 00 Structural Steel Framing
 - 05 40 00 Cold-Formed Metal Framing
 - 05 44 00 Cold-Formed Metal Trusses
 - 05 50 00 Metal Fabrications
 - 07 21 40 Foamed-In-Place Masonry Wall Insulation
 - 07 42 13 Metal Wall Panels
 - 07 62 00 Sheet Metal Flashing And Trim
 - 07 71 00 Roof Specialties
 - 08 06 72 Door Hardware Schedule
 - 09 65 66 Resilient Athletic Flooring
 - 09 68 13 Tile Carpeting
 - 11 40 00 Foodservice Equipment
 - 11 66 00 Tension Ball Safety Netting System
 - 11 68 20 Outdoor Athletic Equipment





- 13 34 16 Grandstands And Bleachers
- 13 34 19 Metal Building Systems
- 27 41 01 Exterior Athletic Sound Systems
- 32 18 16.16 Artificial Turf
- 32 18 17 Synthetic Track Surfacing System
- 32 31 13 Chain Link Fences And Gates
- 32 92 23 Lawns
- 33 41 00 Storm Utility Drainage Piping

MODIFICATIONS TO DRAWINGS

N/A

End of Addendum No. 4



GEOTECHNICAL EVALUATION

DOVER HIGH SCHOOL CAPITAL SCHOOL DISTRICT DOVER, DELAWARE

December 2010

Prepared for:

Becker Morgan Group, Inc.
309 South Governors Avenue
Dover, Delaware 19904

Prepared by:

Duffield Associates, Inc.
Consultants in the Geosciences
5400 Limestone Road
Wilmington, Delaware 19808



Kevin M. Yezdimer, E.I.
Geotechnical Engineer



James F. Cloonan, P.E., LEED AP
Senior Geotechnical Engineer

Project No. 8715.GC

TABLE OF CONTENTS

<u>SECTION</u>	<u>DESCRIPTION</u>	<u>PAGE</u>
	EXECUTIVE SUMMARY	i
I.	INTRODUCTION	1
II.	FIELD AND LABORATORY TESTING PROGRAMS.....	3
A.	STANDARD PENETRATION TEST BORINGS	3
B.	BACKHOE EXCAVATED TEST PITS	4
C.	INFILTRATION TESTING	4
D.	LABORATORY TESTING.....	5
III.	SUBSURFACE CONDITIONS	5
A.	GENERALIZED SITE GEOLOGY	5
B.	STRATIGRAPHIC CONDITIONS.....	6
IV.	DISCUSSION OF ANALYSIS	7
A.	PROPOSED STRUCTURES.....	7
B.	FOUNDATIONS	8
C.	GROUNDWATER CONSTRUCTION CONSIDERATIONS.....	9
D.	SITE PAVEMENTS	9
E.	INFILTRATION TESTING	10
V.	CONCLUSIONS AND RECOMMENDATIONS	11
A.	DESIGN.....	11
B.	CONSTRUCTION.....	14

TABLE OF CONTENTS
(continued)

APPENDICES

Appendix A	Site Location Sketch Sampling Location Sketch, dated October 21, 2010
Appendix B	Test Boring Logs (29) Test Pit Logs (11) Infiltration Testing Plot (1)
Appendix C	General Notes

EXECUTIVE SUMMARY

This report summarizes Duffield Associates, Inc.'s (Duffield Associates) geotechnical evaluation for the proposed Dover High School campus to be located approximately 3.1 miles west of North DuPont Highway along State Road 8 (Forrest Avenue) in Dover, Delaware. The proposed construction includes a three-story high school, single-story field house, stands, various stormwater management facilities, site pavements, as well as several athletic fields. The high school and field house structures are anticipated to encompass footprints of approximately 235,000- and 10,000-square feet, respectively, and to be supported on shallow foundation and slab-on-grade systems (i.e., no basement level).

The project site consists of approximately 106.3 acres of undeveloped agricultural land. A manmade agricultural ditch extends in a southeast-to northwest orientation across the site. A proposed site grading plan was not available at the time of this evaluation. However, it is understood that only minor regrading (i.e., net "cuts" and "fills") on the order of 2 to 4 feet or less will be required to achieve the proposed site grades.

A total of twenty-nine (29) Standard Penetration Test borings extending to depths ranging from 5 to 50 feet below the ground surface, eleven (11) test pits extending to depths of up to 14.5 feet below the ground surface and four (4) single-ring infiltration tests were performed at the site between November 3 and 23, 2010. Beneath a surficial layer of topsoil, the subsurface conditions observed can generally be described as soft to stiff consistency silt or clay underlain by predominately very loose to medium dense silty sand. Groundwater was observed during performance of the field program at depths ranging from approximately 3.5 to 11.5 feet below the existing ground surface, corresponding to elevations ranging from approximately 46.3 to 39 feet, project datum.

In general, with the exception of the biofiltration swales proposed within the locations of I-4 and I-5, Duffield Associates generally does not recommend the utilization of infiltration practices at this site due to the generally shallow groundwater conditions observed, elevations of seasonal high water indications, and observed infiltration testing results.

Based on the observed subsurface conditions and the provided and assumed loading information, it is Duffield Associates' opinion that the proposed structures could be supported on shallow foundation systems and slabs-on-grade. A maximum net allowable bearing pressure of 2,500 pounds per square foot is recommended for the design of all foundations. Total foundation settlement is estimated to be on the order of 1 inch for the field house and stands and 1½ inches for the high school.

Post-construction settlement is estimated to be ½ inch or less, with differential settlements between typical column or wall spacing within the footprint of the structures estimated to be ½ inch or less between adjacent columns or walls. Foundations should be supported on the predominately loose to medium dense apparent "natural" silty sand soil of Stratum C generally observed beneath Strata A and B (i.e., topsoil and silt or clay soils) or on compacted structural fill as recommended herein.

More detailed conclusions and recommendations for design and construction of the foundations, floor slabs and site pavements, as well as the stormwater management areas for the proposed site are provided in the following report.

I. INTRODUCTION

This report summarizes Duffield Associates, Inc.'s (Duffield Associates) geotechnical evaluation for the proposed Dover High School campus to be located approximately 3.1 miles west of North DuPont Highway along State Road 8 (Forrest Avenue) in Dover, Delaware. Included in this report is a summary of the data obtained during field and laboratory testing programs and a discussion of the subsequent geotechnical analysis. Recommendations for the design and construction of proposed building foundations, slabs, site pavements, and stormwater management areas are also provided. These services were performed in general accordance with an agreement between Duffield Associates and the Becker Morgan Group, Inc. (Becker Morgan), dated June 28, 2010, authorized to proceed on October 25, 2010.

To assist with the preparation of this report, Duffield Associates was provided with the following documents:

- A request for a subsurface and geotechnical engineering report prepared by the project's structural engineer, Baker, Ingram & Associates, dated June 1, 2010, delivered via electronic mail on June 1, 2010; and
- A sketch titled "Boring Locations – As Staked 2010-10-29," prepared by Becker Morgan, dated October 21, 2010, delivered via electronic mail on November 2, 2010, indicating the proposed site layout, existing topography and proposed sampling locations.

Based on discussions with the project team and the information provided, it is understood that it is proposed to construct a three-story high school, single-story field house, stands (i.e., bleachers along the east and west sides of the football field), various stormwater management facilities (i.e., two (2) ponds, six (6) biofiltration basins and one (1) biofiltration swale), site pavements (i.e., access drives and parking lots), as well as several athletic fields (i.e., 9 to 11 playing fields designated for football, soccer, field hockey, softball and baseball). Further, it is understood that an initially proposed "remote athletic structure" to consist of a relatively small building similar to the proposed field house is currently not being considered as part of the proposed project development.

The high school and field house structures are anticipated to encompass footprints of approximately 235,000- and 10,000-square feet, respectively. It is anticipated that the high school building structure will be supported on a shallow foundation and slab-on-grade system (i.e., no basement level). The proposed structure is to consist of steel and composite steel floor framing, concrete masonry block and cold-formed steel stud walls, and brick veneer construction. The remote field house is anticipated to be supported by shallow foundations, masonry bearing walls, and concrete framing construction. The football stands are proposed to be supported by a shallow foundation system.

The referenced request for subsurface and geotechnical engineering report provided the following anticipated loading conditions:

	Maximum Wall Loads (kips/linear foot)	Maximum Column Loads (kips)
High School	5	240
Remote Athletic Structure	3	0

No structural loading information for the proposed football stands was available at the time of this evaluation. Therefore, maximum column loads on the order of 50 kips have been assumed.

Becker Morgan indicated that the proposed high school and field house are anticipated to have finished floor elevations of 49.5 feet, project datum. It was indicated that the finished floor of the high school may be increased to elevation 50 feet depending on the finalized stormwater management design. A proposed site grading plan was not available at the time of this evaluation. However, it is understood that only minor regrading (i.e., net “cuts” and “fills”) on the order of 2 to 4 feet or less will be required to achieve the proposed site grades.

At the time of this evaluation the project site consisted of approximately 106.3 acres of undeveloped agricultural land. A manmade agricultural ditch extends in a southeast-to northwest orientation across the site. Duffield Associates previously performed a wetlands evaluation report for Becker Morgan titled “Subaqueous Lands, Waters of the U.S. including Wetlands Evaluation Report, Capital School District – Proposed Dover High School Property,” dated July 6, 2010, which concluded that the agricultural ditch was not classified as “wetlands” based on the methodology utilized to prepare the report. Duffield Associates submitted this report to the U.S. Army Corps of Engineers and to the State of Delaware at the request of Becker Morgan to determine if the water bodies on the property are jurisdictional and subjected to Federal or State laws. The U.S. Army Corps of Engineers and the State of Delaware indicated via written correspondence on November 4, 2010 and September 1, 2010, respectively that they agreed with Duffield Associates’ conclusion and that no jurisdictional governance was applicable by either agency.

The site is relatively flat with existing elevations ranging from 45 to 55 feet, project datum. Generally, the site grades increase away from the agricultural ditch (i.e., east-to-west of the ditch) and from north-to-south across the site. The site is bound to the south by residential development including a large stormwater management pond, the southwest by agricultural land, the north by State Road 8 and residences adjacent to the south side of the road, and by undeveloped land to the northeast. An apparent farmhouse previously existed within the eastern half of the site but was demolished prior to the start of this field evaluation. However, the farmhouse driveway was still present and extends in a north-to-south orientation connecting to State Road 8.

Overhead utilities were present, crossing the majority of the project site in two different orientations (see the Sampling Location Sketch included in Appendix A for an approximate location). No underground utilities were located within the project site as a result of contacting Miss Utility prior to the start of the field work. It is understood that several underground utilities may be present within approximately 50 feet south of State Road 8 along the northern boundary of the site. However, this was not within the general area of the field exploration program. A terracotta pipe (apparent field drainage pipe) was encountered during the performance of test pit Nos. I-1A and I-2 at depths corresponding to 2.5 and 2 feet below the existing ground surface respectively. Although only observed at these two (2) sampling locations, it is anticipated that similar field drainage pipe may be present elsewhere on the site.

II. FIELD AND LABORATORY TESTING PROGRAMS

A. STANDARD PENETRATION TEST BORINGS

A total of twenty-nine (29) Standard Penetration Test borings (performed in general accordance with ASTM D 1586), extending to depths ranging from approximately 5 to 50 feet below the ground surface, were performed at the site from November 15 to 23, 2010. The test borings, designated as TB-S1 through TB-S13 (for structural borings), TB-B1 through TB-B10 (for civil site borings), and TB-R1 through TB-R6 (for roadway borings) were performed at locations as staked in the field by Becker Morgan prior to the start of the field evaluation. These locations were observed to be accessible to the drill rig and clear of existing utilities. The approximate test boring locations are indicated on the Sampling Location Sketch.

The test borings were performed by Feldmann Brothers, Inc. of Newark, Delaware, as a subcontractor to Duffield Associates, utilizing an ATV-mounted Diedrich D-50 drill rig with hollow-stem augers. Approximately twenty (20) of the test borings were performed utilizing mud-rotary drilling techniques. Duffield Associates' representative was present to review the performance of the test borings. Test boring logs, which describe the conditions observed during the field exploration program, are included in Appendix B.

At completion of the drilling, the boreholes were backfilled with the soil cuttings. Excess soil was mounded above the boring locations to compensate for potential future settlement of the boring backfill. However, additional settlement and softening of the soils replaced in the boreholes may occur, resulting in depressions or holes in the ground surface. Consequently, future maintenance and restoration of the site may be required.

B. BACKHOE EXCAVATED TEST PITS

The evaluation also included the performance of eleven (11) test pits designated as TP-1 through TP-5 and I-1A through I-6 performed on November 3 and 9, 2010, respectively. The test pits were performed by Feldmann Brothers, Inc. of Newark, Delaware as a subcontractor to Duffield Associates, utilizing a rubber-tired backhoe.

The test pits were extended to depths of up to 14.5 feet below the existing ground surface. Test pit locations were staked in the field by Becker Morgan prior to the start of the field evaluation. Ten (10) of the test pits were performed within the proposed stormwater management areas. Infiltration testing was performed in four (4) of the test pit locations. One (1) test pit was performed within the proposed athletic fields. A sketch indicating the approximate locations of the test pits is enclosed in Appendix A.

Duffield Associates' representative was present to review the performance of the test pits. Test pit logs, describing the conditions observed during the field exploration program, are included in Appendix B. At completion of the test pits, the excavations were backfilled with the excavated material and leveled with the existing ground surface. Settlement and softening of soils replaced in the test pits may occur, resulting in a depression or holes in the ground surface. Consequently, future maintenance and restoration of the site may be required.

C. INFILTRATION TESTING

A total of six (6) infiltration tests were initially proposed to be performed during the field evaluation. On November 3, 2010, five (5) test pit excavations were performed at the site. Four (4) of these test pits were performed within proposed stormwater management areas in an effort to evaluate conditions related to seasonal high groundwater level and groundwater seepage prior to performing infiltration testing. Following the performance of these test pits, Duffield Associates provided the project civil engineer (Becker Morgan) with preliminary field observations of seasonal high groundwater, groundwater seepage, and stratigraphy via electronic mail on November 4, 2010. These preliminary observations were discussed between Duffield Associates and Becker Morgan on November 5, 2010, and the initially proposed scope modified.

A total of (4) single-ring infiltration tests were performed at the project site at test pit location Nos. I-2, I-3, I-4 and I-5. The single-ring infiltration tests were performed in general accordance with ASTM D 3385 and D 5126. At the completion of the infiltration tests, additional excavation was performed with the backhoe to further evaluate the stratigraphy and the relative saturation over depth. Test pit logs, which describe the conditions observed during the field exploration program, are included in Appendix B. At completion of the test pits and

infiltration test operations, the test pits were backfilled with the excavated soil as described above. Results from the infiltration testing are provided below within the “Discussion of Analysis” section and Infiltration Testing Plots are located in Appendix B.

D. LABORATORY TESTING

Following completion of the field program, soil samples were returned to Duffield Associates’ laboratory for testing of selected samples. The laboratory testing program for this evaluation included the determination of natural water content (ASTM D 2216), and silt/clay content (percent finer than a No. 200 sieve, ASTM D 1140) for a total of seventeen (17) soil samples and the performance of Atterberg Limits (liquid and plastic, ASTM D 4318) determinations for a total of three (3) soil samples obtained during the field evaluation. The laboratory testing program also included the determination of percent finer than a No. 270 sieve [silt/clay content in accordance with the United States Department of Agriculture (USDA) classification system] for four (4) soil samples obtained from the infiltration test locations. The results of these laboratory tests are included on the test boring and test pit logs included in Appendix B. No environmental testing or characterization was performed.

III. SUBSURFACE CONDITIONS

A. GENERALIZED SITE GEOLOGY

Regional geologic mapping by the Delaware Geologic Survey (DGS) indicates that the project site is located within the Atlantic Coastal Plain Physiographic Province. A review of geologic map Series No. 14 titled “Geologic Map of Kent County, Delaware,” prepared by DGS, dated 2007 indicates that the surficial geology of the site is comprised of the middle Pleistocene Aged Columbia Formation. This formation is defined as fine to coarse, feldspathic quartz sand with varying amounts of gravel. Scattered beds of clayey silt are common. This stratigraphic unit is less than 50 feet thick and is interpreted to be primarily a body of fluvial glacial outwash sediment. This formation is underlain by the lower to middle Miocene Aged Calvert Formation. This formation is defined as clayey silt to silty clay interbedded with silty fine to coarse quartz sands and interpreted to be a marine deposit. Three major aquifers are located within the Calvert Formation within Kent County, Delaware. The project site is located within the Frederica Aquifer System Subgroup. This Calvert Formation ranges up to 425 feet in thickness.

B. STRATIGRAPHIC CONDITIONS

Beneath a surficial layer of topsoil, the subsurface conditions observed can generally be described as soft to stiff consistency SILT/CLAY underlain by very loose to medium dense silty sand. This silty sand stratum was only fully penetrated within sampling locations TB-S1 and TB-S9 which were extended to a depth of 50 feet below the existing ground surface. Within these test borings the silty sand stratum was underlain by a layer of medium to stiff consistency silt. This predominately fine-grained soil was underlain by medium to dense silty sand to the extent of the two (2) deeper test borings. The subsurface conditions encountered can generally be described as follows:

Stratum	Approximate Thickness (feet)	Generalized Description ^[1]
A ^[2]	0.4 – 1.1	TOPSOIL (approximately 5 to 13 inches)
B ^[3,4]	0.4 – 3.5	Light brown, gray, orange SILT or CLAY, trace to and fine sand, trace to little medium to coarse sand, trace to little gravel, trace organics (e.g., root material) (dry to moist, soft to stiff consistency); USCS: ML, CL
C ^[2,5]	33 – 35.5	Orange-brown, light gray, yellow, white, black fine to medium SAND, trace to and silt/clay, trace to and gravel, trace to some coarse sand (moist to wet, very loose to medium dense); USCS: SM, SC
D ^[5]	5 – 10	Dark gray SILT, trace to and fine sand (moist, medium stiff consistency); USCS: ML
E ^[6]	— — — ^[7]	Dark gray, white, orange fine SAND, little to some silt, trace to little medium to coarse sand (wet, medium to dense); USCS: SM
<p>Notes: 1. The soil descriptions utilized herein and on the test boring and test pit logs are defined by the General Notes enclosed in Appendix C.</p> <p>2. Stratum encountered within all sampling locations.</p> <p>3. Stratum not encountered within sampling locations TP-4, TB-R1 through TB-R4, TB-R6, TB-B7, TB-B9, TB-B10, TB-S3, TB-S7, TB-S11 and TB-S12.</p> <p>4. Stratum interbedded within Stratum C within sampling locations TB-S4 and TB-B1.</p> <p>5. Stratum only fully penetrated within sampling locations TB-S1 and TB-S9.</p> <p>6. Stratum not fully penetrated at any sampling location.</p>		

Groundwater observations made during the performance of the test borings and test pits are indicated on the logs included in Appendix B. Groundwater was observed during performance of the field program at depths ranging from approximately 3.5 to 11.5 feet below the existing ground surface, corresponding

to elevations ranging from approximately 46.3 to 39 feet (project datum). Groundwater levels at the site are likely to be affected by seasonal and annual variations in precipitation. It is estimated that variations in groundwater levels several feet higher or lower than those observed by this evaluation could be experienced during extreme variations in precipitation.

Groundwater mapping by DGS and the current State of Delaware, Department of Natural Resources and Environmental Control (DNREC) well permit database indicates groundwater levels in “normal,” “dry,” and “wet” conditions range from approximately 7 to 13 feet below the existing ground surface. The borings for this evaluation were performed during a relatively “dry” to “normal” period, and appear consistent with the database information.

IV. DISCUSSION OF ANALYSIS

A. PROPOSED STRUCTURES

Proposed High School

The proposed footprint of the high school is situated within the northwestern third of the site. As discussed, an existing agricultural ditch bisects the majority of the western and southern portions of the proposed high school footprint. It was observed that the existing site grading generally sloped towards the agricultural ditch. During the field evaluation, existing terracotta field drainage pipes apparently installed to facilitate field drainage towards the ditch were observed. The proposed finished floor elevation of the high school is anticipated to be 49.5 feet, project datum. To achieve this elevation “fills” on the order of up to 4 feet will be required. In general, the areas of the largest fills required to achieve the proposed finished floor elevation are located within the vicinity of the ditch and within the western and northwestern portions of the high school.

Proposed Field House

It is proposed to locate the field house within the eastern-third of the site adjacent to a proposed parking area located off of the main site access drive (see Sampling Location Sketch within Appendix A). It is understood that a location just north of the football field and south of the southeastern extent of the high school is also being considered. Analysis of this structure is based on the currently proposed location. The proposed finished floor elevation for this structure is anticipated to be 49.5 to 50 feet, project datum. The provided topographic information indicates that the existing site grades at this location are at approximately elevation 52 feet, project datum. Therefore, cuts on the order of 2 to 2.5 feet are anticipated to achieve the proposed finished floor elevation.

Proposed Football Field Stands

Two (2) areas of stands (i.e., bleachers) are proposed to extend in a north-to-south orientation along the eastern and western sides of the football and track and field area located southeast of the high school. The western stands are anticipated to be 1.5 to 2 times greater in plan area than the eastern stands. At the time of this evaluation, specific information (i.e., dimensions, framing and anticipated loading conditions) were not available for these structures. Therefore, a maximum column load (i.e., dead plus live loads) of 50 kips was assumed.

B. FOUNDATIONS

Based on the subsurface data obtained during this evaluation, it is Duffield Associates' opinion that the predominately loose to medium dense apparent "natural" silty sand soil of Stratum C, generally observed beneath Strata A and B (i.e., topsoil and silt or clay soils), is generally suitable for supporting the proposed structures on a shallow spread foundation system and slab-on-grade construction.

Structural fill, placed over suitable soils and compacted, as recommended in this report, is also considered suitable for supporting a shallow foundation system. Analysis indicates that the building foundations bearing on the Stratum C soils or on compacted structural fill could be sized for a maximum allowable bearing pressure of 2,500 pounds per square foot (psf). This analysis has assumed a shallow foundation system with a minimum width of 3 feet for isolated footings and 2 feet for continuous footings, and a minimum burial depth of 18 inches for interior footings and 24 inches for exterior footings.

Estimates of foundation settlement were performed to aid in evaluating the effects of the provided and assumed structural loads on the subsurface conditions. Based on this analysis, total foundation settlement is estimated to be on the order of 1 inch for the field house and stands and 1½ inches for the high school. Due to the presence of predominately granular soils beneath the proposed foundations, most of the estimated settlement should occur relatively quickly following the application of loads. Post-construction settlement is estimated to be ½ inch or less, with differential settlements between typical column or wall spacing within the footprint of the structures estimated to be ½ inch or less between adjacent columns or walls. These magnitudes of total and differential settlement are generally considered to be within tolerable limits for the types of structures proposed. However, the actual settlement tolerances of the structures should be verified with the project's structural engineer. If actual loading and/or grading conditions vary significantly from the assumptions of this analysis, Duffield Associates should be contacted to review and possibly modify this analysis.

C. GROUNDWATER CONSTRUCTION CONSIDERATIONS

Groundwater was observed at a range of depths between approximately 3.5 to 11.5 feet below the existing ground surface, corresponding to elevations ranging from approximately 46.3 to 39 feet (project datum). Groundwater levels at the site are likely to be affected by seasonal and annual variations in precipitation. It is estimated that variations in groundwater levels several feet higher or lower than those observed by this evaluation could be experienced during extreme variations in precipitation. Therefore, depending on seasonal variations in precipitation, it is possible that groundwater could be encountered during shallow foundation construction for the proposed structures resulting in wet conditions and seepage during construction. Additionally, groundwater may be encountered within and adjacent to the existing agricultural ditch during construction.

Based on the relatively shallow groundwater conditions observed during the field evaluation and the presence of standing water within the existing agricultural ditch, it appears that groundwater control methods will need to be utilized at the site in order to facilitate the proposed construction. Typically, dewatering during construction can be accomplished using a series of localized sumps installed along the length of an excavation during shallow foundation construction. Well points could also be considered for deeper excavation, utility construction, etc. Groundwater collected during construction should be discharged in accordance with local regulatory requirements. If lowering of the groundwater table is performed during construction, the effects on nearby structures should also be monitored.

D. SITE PAVEMENTS

Based on the information available to date, it is assumed that minor regrading (i.e., net cuts/fills of 2 to 3 feet or less) will be required to achieve the finished pavement grades. Based on the sampling locations performed within the proposed pavement areas (i.e., TB-R1 through TB-R6, TB-B1, TB-B3, TB-B4, TB-B7, TB-B10 and TB-S13), the subsurface conditions generally consist of a surficial layer of topsoil overlying either predominately fine-grained soils (Stratum B) or granular soils (Stratum C). Where encountered, the fine-grained soils (Stratum B) were relatively shallow, ranging in depth from approximately 2 to 4 feet below the existing ground surface.

The fine-grained soils correspond to the American Association of State Highway and Transportation Officials (AASHTO) classifications A-4 and A-5. A-4 and A-5 soils are classified as “fair to poor” subgrade soils and typically require a deeper paving section to provide drainage and reduce frost susceptibility than predominantly granular subgrade soils. The coarse-grained soils correspond to AASHTO classification A-2. A-2 soils are classified as “excellent to good” subgrade soils.

The fine-grained soils of Stratum B would be considered as “fair to poor” subgrade soils in the classification system described above. However, the underlying granular soils encountered across the site meet the “excellent to good” subgrade soil criteria. Depending on the final pavement grading, pavement subgrade elevations may be below the relatively shallow depth of the “fair to poor” subgrade soils of Stratum B, and could likely be designed assuming “excellent to good” subgrade conditions. The final proposed grading should be reviewed with the subgrade conditions described herein to determine proper pavement design parameters. Further recommendations regarding pavement design are included in the conclusions and recommendations section of this report.

E. INFILTRATION TESTING

The table below summarizes the infiltration and geotechnical laboratory testing results for the soils at the approximate depth of infiltration testing.

Infiltration Test Location	Elevation of Test (Ft., Project Datum)	Depth Below Grade (Ft.)	USDA Description	USCS Description	Average Field Infiltration Rate (In/Hr)
I-2	43.5±	1.5±	Silty Loam	Silt	0.04
I-3	43.5±	3.5±	Sandy Loam	Silty Sand	0.27
I-4	45.2±	4.5±	Sandy Loam	Silty Sand	1.84
I-5	48.8±	4.0±	Sandy Loam	Silty Sand	2.62

Several soil series are identified by the Kent County Soil Survey within the area of the project site. These soil series include the Fallsington, Sassafras and Woodstown Soil Series. The Kent County Soil Survey provides estimated “permeability” rates of 2.0 to 6.3, 0.63 to 6.3 and 0.63 to 2.0 inches/hour for the aforementioned shallow site soils respectively. The test results for I-2 and I-3 were well below the anticipated infiltration range referenced within the Kent County Soil Survey.

In general, with the exception of the biofiltration swales proposed within the locations of I-4 and I-5, Duffield Associates generally does not recommend the utilization of infiltration practices at this site due the generally shallow groundwater conditions observed, elevations of seasonal high water indications, and observed infiltration testing results.

V. CONCLUSIONS AND RECOMMENDATIONS

Based on the data obtained in the field and laboratory testing programs and the subsequent geotechnical analysis, the following conclusions and recommendations are presented.

A. DESIGN

- 1. Allowable Foundation Bearing Capacity.** It is Duffield Associates' opinion that the predominately loose to medium dense apparent "natural" silty sand soil of Stratum C, generally observed beneath Strata A and B (i.e., topsoil and silt or clay soils), is generally considered suitable for supporting the proposed structures on shallow foundation systems. Structural fill, placed over suitable soils, compacted and reviewed, as recommended in this report, is also considered suitable for supporting shallow foundations. It is recommended that the proposed foundations for all structures be designed for a maximum net allowable bearing pressure of 2,500 psf.
- 2. Estimated Foundation Settlement.** Settlement of the site soils will result from the proposed site grading and loads. Total foundation settlement is estimated to be on the order of 1 inch for the field house and stands and 1½ inches for the high school. Due to the presence of predominately granular soils beneath the proposed foundations, most of the estimated settlement should occur relatively quickly following the application of loads. Post-construction settlement is estimated to be ½ inch or less, with differential settlements between typical column or wall spacing within the footprint of the structures estimated to be ½ inch or less. These magnitudes of total and differential settlement are generally considered to be within tolerable limits for the types of structures proposed. However, the actual settlement tolerances of the structures should be verified with the project's structural engineer. If actual loading and/or grading conditions vary significantly from the assumptions of this analysis, Duffield Associates should be contacted to review and possibly modify this analysis.
- 3. Foundation Burial Depth and Size.** The base of all exterior spread footings in areas exposed to frost should be placed at least 24 inches below final exterior grade. Interior foundations in insulated areas should be placed at least 18 inches below the proposed finished floor elevation. All isolated column footings should be at least 3 feet wide, and all continuous wall footings should be at least 2 feet wide regardless of bearing pressure. Some undercut excavation of the Stratum B silt or clay soils may be required to bear the building foundations on suitable soils. If a winter construction schedule is proposed for the foundations, provisions for the protection of shallow foundations from frost heave during construction should be included in the contract specifications.

4. **Slab-On-Grade.** Ground-supported floor slabs for the proposed structures should be designed as fully floating and not connected to the other structural elements of the building. It is anticipated that the slab-on-grade will be constructed over suitable Stratum B silts or clay, Stratum C sand, or structural fill soil. The foundation-slab interface and partition wall-slab interface should also be designed to allow relative movement. Control joints should be utilized, within the slab, to control the location of possible cracking due to differential slab settlement. Slabs should be provided with a minimum 4-inch drainage layer (AASHTO SP No. 57 stone) and minimum 10-mil polyethylene vapor barrier. Subgrade conditions should be modeled for design utilizing a subgrade modulus; K_S , of 150 pci, assuming subgrade preparation is performed, as discussed herein.

5. **Retaining Walls.** Backfill pressures on “unyielding” retaining walls restrained from rotation at the top be analyzed using the “at rest” earth pressure coefficient, K_O . The “active” and “passive” earth pressure coefficients, K_A and K_P , respectively, should be utilized for the design of “yielding” retaining walls such as cantilevered walls. Retaining walls should typically be provided with free draining backfill materials and a drainage system or weep holes to relieve hydrostatic pressures on the walls. The free draining backfill materials should extend behind the wall with its top at least as wide as 60% of the wall height.

Based on the conditions encountered in this evaluation, it is anticipated that on-site fill materials will consist primarily of the fine-grained soils of Stratum B and the granular soils of Stratum C. The predominately fine-grained soils of Stratum B should not be utilized for wall backfill. Should sufficient quantities of the granular soils of Stratum C not be available, off-site granular borrow could also be utilized for wall backfill. Recommended lateral earth pressure parameters for design are presented below.

Backfill Materials	K_A	K_P	K_O	Coeff. of Sliding Friction	Moist Unit Weight (pcf)
Stratum C soils	0.35	2.9	0.52	0.37	125
Imported Granular Fill (with less than 25% passing a No. 200 sieve)	0.28	3.5	0.44	0.45	130

6. **Control Joints.** Masonry walls should be provided with frequent control joints placed at architecturally convenient locations, such as windows and doorways, to provide a “preferred” location for the differential settlement to occur without cracking the walls.

7. **Seismic Design Parameters.** Based on subsurface conditions encountered during the field exploration at the site and review of regional geologic maps, a Site Class “E,” as defined by Table 1613.5.2 of the 2006 International Building Code, is recommended.
8. **Infiltration Test Results.** A total of four (4) field infiltration tests were performed in the vicinity of the proposed stormwater management areas. The infiltration tests were performed at depths ranging from approximately 1.5 to 4.5 feet below the existing ground surface. The tests were performed at the elevations recommended or determined based on the subsurface conditions exposed during excavation. With the exception of the biofiltration swales proposed within the locations of I-4 and I-5, Duffield Associates generally does not recommend the utilization of infiltration practices at this site due the generally shallow groundwater conditions observed, elevations of seasonal high water indications, and observed infiltration testing results.
9. **Site Grading.** Site grading should be designed to provide positive drainage away from the locations of the proposed structures. Positive site drainage should be maintained throughout construction activities.
10. **Pavement Design.** Based on the assumed site grading, it appears that the pavement subgrades will primarily consist of the predominantly sandy soils of Stratum C.

Traffic loading consisting primarily of passenger vehicles in the proposed parking areas (with limited access to trash collection vehicles and other truck traffic) is anticipated. Additional recommendations are included for areas where limited truck or bus traffic is proposed.

Based on the conditions encountered in this evaluation and assuming subgrade preparation as discussed herein, the following minimum pavement sections for parking lots and driveways are recommended:

Location	Bituminous Concrete Wearing Course, Type C (inches)	Bituminous Concrete Binder Course, Type B (inches)	Graded Aggregate Base Course, Type A (inches)	Total Thickness (inches)
Parking Areas	2	2	8 ^[1]	12
Traffic lanes, dumpster areas and bus areas	2	3	12 ^[1]	17
<p>NOTES:</p> <ol style="list-style-type: none"> 1. The installation of a 6 ounce, non-woven, Geotextile Fabric (Geotex 601 or equivalent) is recommended between the prepared subgrade and graded aggregated base course to reduce the potential for migration of the “natural” site soils into the pavement section. 2. All pavement construction and materials should conform to the Delaware Department of Transportation Standard Specifications for Roadway and Bridge Construction, dated August 2001 and as subsequently revised. 				

11. Stormwater Management Areas. The following recommendations are provided for the stormwater management areas:

- As discussed in the Infiltration Testing section of this report, with the exception of the biofiltration swales proposed within the locations of infiltration tests I-4 and I-5, Duffield Associates generally does not recommend the utilization of infiltration practices at this site, due the generally shallow groundwater conditions observed, elevations of seasonal high water indications, and observed infiltration testing results.
- Observations during the field testing program and the results of laboratory testing indicate that soils typically recommended by the U.S. Soil Conservation Service (SCS) Pond Code 378 for embankment fills and low permeability soil liner construction (USCS: CL, CH, SC, GC) are not likely present in sufficient quantities to facilitate pond construction. However, the fine-grained soils of Stratum B may be suitable for embankment pond construction. If additional laboratory testing confirms the presence of suitable soils the project team may want to consider further field investigation in order to estimate the available quantity of these soils. If suitable soils are determined to not be present at the site, all imported embankment fill should meet the material requirements as recommended in SCS Pond Code 378.
- Stormwater management areas, infiltration design and construction should be performed in accordance with the DNREC “Delaware Sediment &

Stormwater Regulations,” dated January 23, 1991, most recently revised October 11, 2006.

- Stormwater embankment ponds should be designed in accordance with the SCS Pond Code 378.
12. **Assumptions.** This evaluation has been based on the information provided regarding the proposed finish floor elevations, structures and loading conditions. Assumptions regarding the design loads for the proposed football stands should be verified by the project team prior to the completion of their design. If the proposed loading conditions vary from those utilized, Duffield Associates should be notified to possibly modify the recommendations provided herein, as required.

B. CONSTRUCTION

1. **Proofroll and Subgrade Preparation.** At the start of construction, the proposed building construction and pavement areas should be stripped of all topsoil. Variable topsoil depth should be anticipated due to the past usage of the area for agricultural purposes. Following rough grading and prior to footing excavation, placement of fill, or construction of the floor slabs, it is recommended that the exposed subgrade be proofrolled. The proofroll should be performed using a minimum 10-ton vibratory roller in the presence of a qualified soils technician working under the supervision of a geotechnical engineer. The purpose of the proofrolling is to densify the subgrade soils and identify yielding subgrade conditions. Yielding or otherwise unsuitable subgrade conditions encountered within the proposed building areas should be undercut to firm subgrade conditions and backfilled with compacted structural fill in accordance with the recommendations of this report. Scarification and recompaction could also be performed in lieu of undercutting. A qualified soils technician working under the supervision of a geotechnical engineer should confirm the consistency and texture of the exposed soils with the conditions encountered by this evaluation, as described herein.
2. **Foundation Subgrade Review.** All shallow foundations should be placed on firm, dry, non-frozen subgrade consisting of the natural site soils of Stratum C or structural fill. Foundation excavations should be reviewed by a qualified technician working under the supervision of a geotechnical engineer who is familiar with the recommendations of this report. (Note: It is anticipated that the silt or clay soils of Stratum B will be encountered during foundation excavation. Where encountered, these soils were generally observed directly beneath the surficial topsoil and should be excavated to the suitable bearing soils of Stratum C). Subgrade review should be performed prior to the placement of reinforcing steel or concrete and should verify the presence of these soils. If these conditions are not encountered at the proposed foundation

depth, additional excavation should be performed until they are uniformly encountered across the base of the foundation's excavation or, if acceptable to the project geotechnical engineer, the natural soils can be densified in place. Foundation undercut areas should be backfilled with structural fill as recommended herein.

3. **Re-use of On-Site Soils as Structural Fill.** On-site soils free of organic material, topsoil, miscellaneous fill, debris and rock fragments in excess of 3 inches in their largest dimension may be suitable as structural fill. The shallow site soils consist primarily of the fine-grained soils (silt or clay) of Stratum B and the granular soils of Stratum C. The Stratum C soil may be suitable for re-use as structural fill. While it is possible that fine-grained soils could be utilized as structural fill or foundation backfill, some of these soils were encountered with an in-situ moisture content that exceeds the typical range that would allow the recommended compaction to be achieved. As a result, drying of these soils may be required to achieve the recommended compaction. Drying fine-grained soils requires an area in which to spread them out, extended periods of warm, dry weather, and time.

If sufficient quantities of suitable on-site soils are not available for structural fill, imported borrow consisting of predominately granular soils conforming to the requirements of the Delaware Department of Transportation Standard Specifications Select Borrow, Type G should be utilized. AASHTO SP-57 stone could also be utilized as structural fill and should be considered for localized, relatively deep fills such as within the agricultural ditch, foundation undercuts or wall backfill if applicable.

4. **Compaction Requirements.** Structural fill utilized within the proposed building areas should be placed in loose lifts with a maximum thickness of 8 inches. Each lift of fill placed within the proposed building areas (defined as the area extending at least 5 feet beyond the building perimeter) should be compacted to at least 95% of the maximum dry density, as determined by the Modified Proctor test (ASTM D 1557). Structural fill for utility trenches, wall backfill and pavement areas, located outside of the proposed building should be compacted to at least 90% of the maximum dry density. The placement and compaction of structural fill should be monitored on a full-time basis by a qualified technician under the supervision of a geotechnical engineer.
5. **Groundwater Control.** Groundwater was observed at a range of depths between approximately 3.5 to 11.5 feet below the existing ground surface, corresponding to elevations ranging from approximately 46.3 to 39 feet (project datum). Due to seasonal fluctuations in precipitation, higher groundwater elevations than those encountered are possible. Based on the subsurface conditions encountered, it is anticipated that groundwater conditions will be at or slightly below the depth of typical shallow foundation

excavation. Groundwater is also anticipated to be encountered within and adjacent to the existing agricultural ditch. Further, due to the observed fine-grained shallow site soils of Stratum B, it is considered possible that localized perched groundwater may be encountered at relatively shallow depths within footing or utility excavations. If groundwater is encountered, localized sumping may be required. Wherever significant quantities of groundwater are encountered during foundation and utility trench excavations, it may become necessary for the resulting excavation to be over excavated by several inches and backfilled with AASHTO SP-57 stone to facilitate sumping and protect the exposed subgrade during construction. Deeper well points should also be considered for deeper excavation, utility construction, etc. Groundwater collected during construction should be discharged in accordance with local regulatory requirements. Additionally, if lowering of the groundwater table is performed during construction, the effects on nearby structures should also be monitored.

6. **Protection of Subgrade Soils.** Subgrade soils disturbed by precipitation and construction traffic should be either scarified and recompacted, or undercut and replaced with structural fill as previously discussed. Subgrade disturbance could be reduced by maintaining positive surface drainage, by establishing and maintaining a sump throughout the construction period, and by limiting construction traffic on the exposed subgrade soils. Where construction traffic is required over the subgrade soils, construction of a temporary haul road, consisting of at least 8 inches of crushed stone (Type B aggregate) over a geotextile fabric (e.g., Geotex 315 or equivalent) should be considered. A thicker stone section will likely be required for prolonged heavy use by trucks. Additional stone can be added later as needed.
7. **Excavation Safety.** All utility and foundation excavation should be performed in accordance with OSHA guidelines. Typically, the predominately granular soils can be characterized by OSHA CFR Part 1926 Excavation Standards as Type C soils. Should it be required, all temporary sheeting and shoring should be designed by a qualified engineer registered in the State of Delaware.
8. **Subsurface Data.** All contractors interested in bidding on phases of this work which involve subsurface conditions should be given full access to this report so that they can develop their own interpretations of the available data.

These recommendations have been prepared according to generally accepted soil and foundation engineering standards and are based on the conditions encountered by the sampling performed at the site. It is noted that, although soil quality has been inferred from the interpolation of the sampling data, subsurface conditions beyond the sampling points are, in fact, unknown. As a result, these recommendations may require modifications based on the conditions encountered and exposed during construction excavation. Should any conditions encountered during construction differ from those described in this report, this office should be notified immediately in order to review and

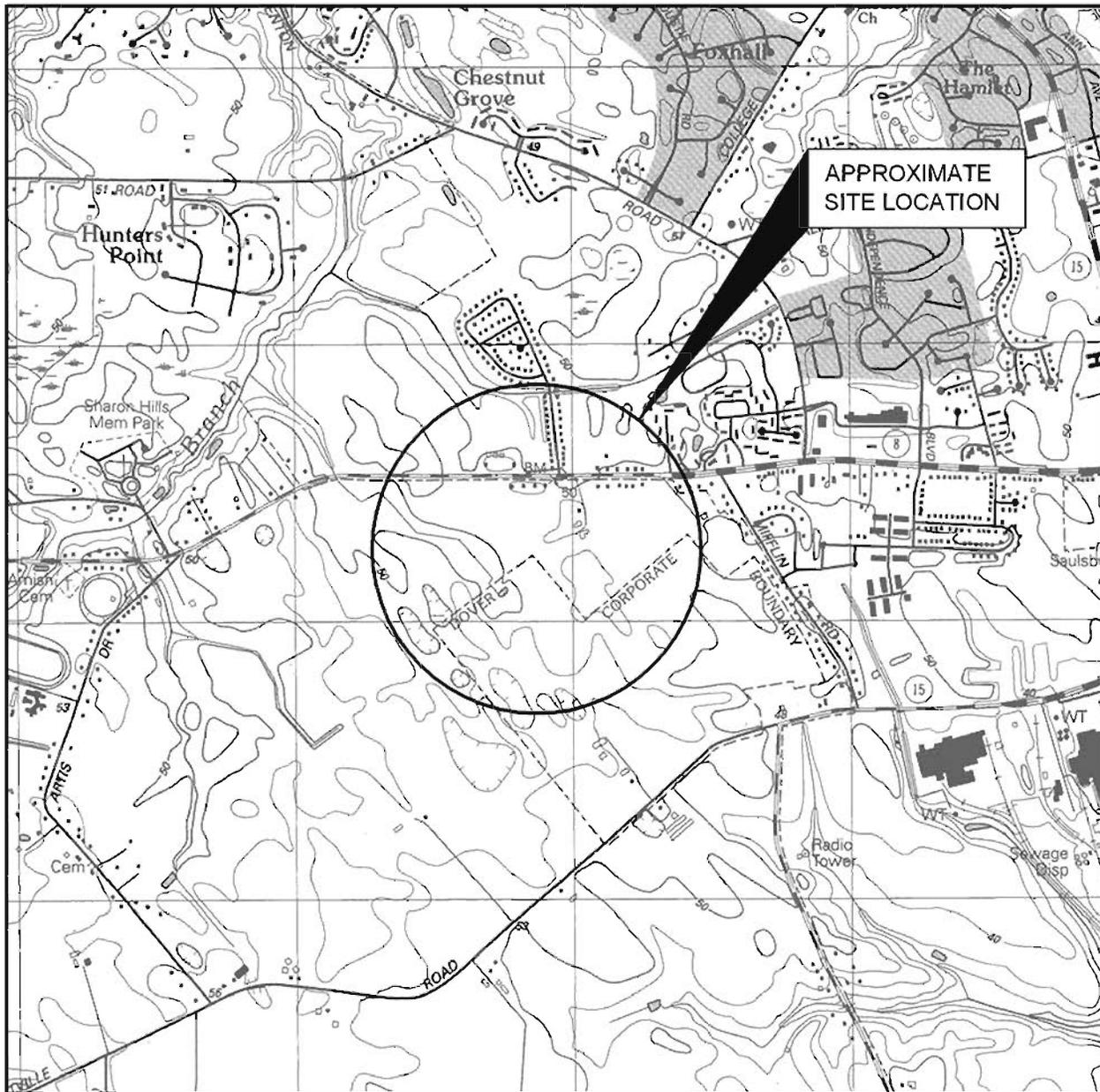
possibly modify these recommendations. The cost for this construction review is not part of the existing agreement. This report applies solely to the size, type and location of the structures described herein. In the event that changes are proposed, this report will not be considered valid unless the changes have been reviewed and the recommendations of this report modified and reapproved in writing by Duffield Associates, Inc.

WORD\7158GC.1210-DOVER HIGH SCHOOL.RPT

APPENDIX A

SITE LOCATION SKETCH

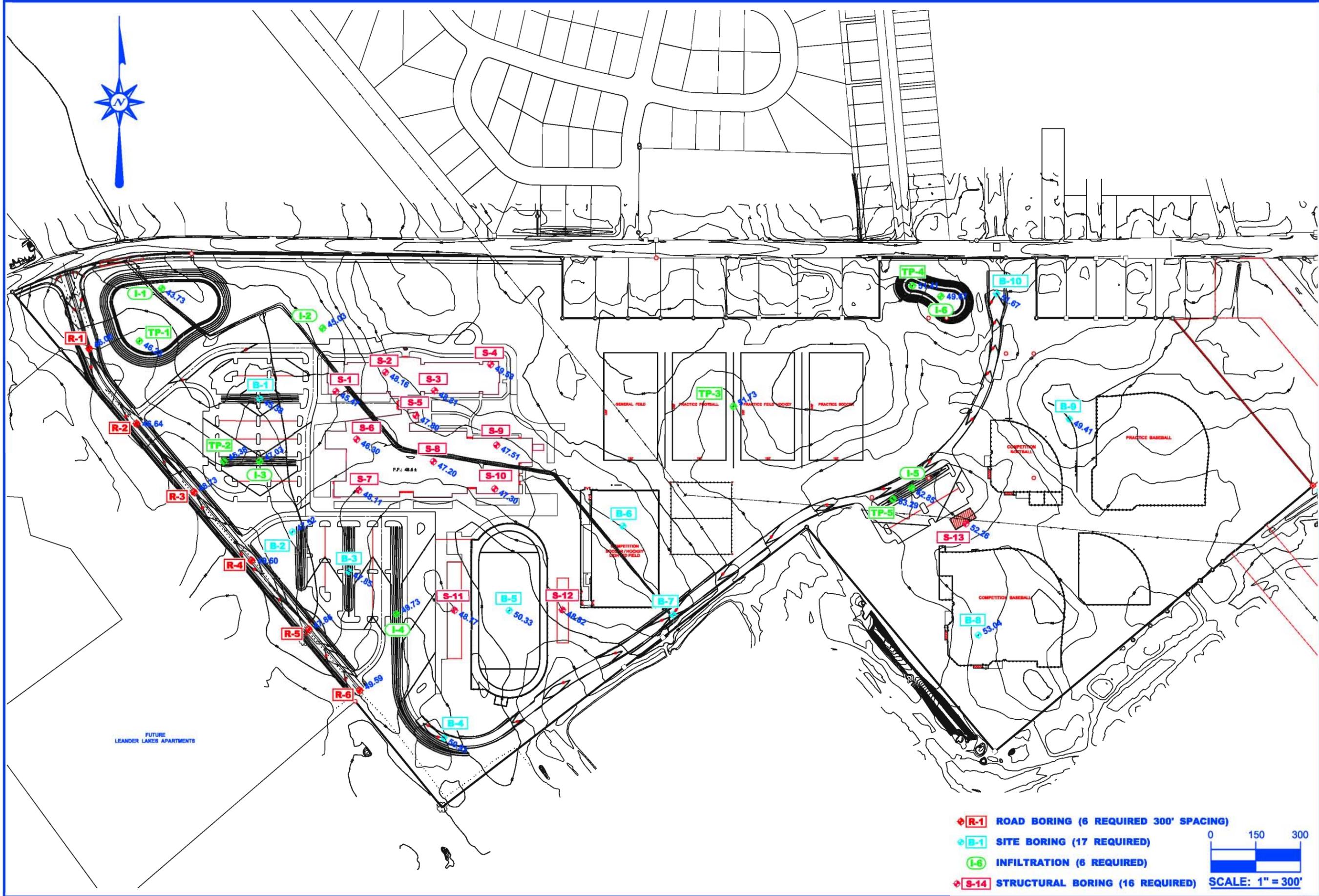
SAMPLING LOCATION SKETCH



NOTE:

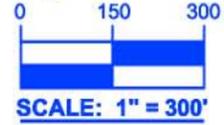
THIS LOCATION SKETCH IS ADAPTED FROM THE U.S.G.S. TOPOGRAPHIC MAP, 7.5 MINUTE SERIES, FOR DOVER, DELAWARE 1993.

DATE: 3 NOVEMBER 2010	SITE LOCATION SKETCH CAPITAL SCHOOL DISTRICT - DOVER HIGH SCHOOL GEOTECHNICAL EVALUATION DOVER - KENT COUNTY ~ DELAWARE	DESIGNED BY: KMY	 <i>Consultants in the Geosciences</i> 5400 LIMESTONE ROAD WILMINGTON, DE 19808-1232 TEL. (302)239-6634 FAX (302)239-8485 OFFICES IN DELAWARE, MARYLAND PENNSYLVANIA AND NEW JERSEY E-MAIL: DUFFIELD@DUFFNET.COM
SCALE: 1"=2000'		DRAWN BY: EMP	
PROJECT NO. 7158.GC		CHECKED BY: KMY	
SHEET: FIGURE 1		FILE: A-7518GC-01	



FUTURE
LEANDER LAKES APARTMENTS

- ◆ R-1 ROAD BORING (6 REQUIRED 300' SPACING)
- ◆ B-1 SITE BORING (17 REQUIRED)
- ◆ I-6 INFILTRATION (6 REQUIRED)
- ◆ S-14 STRUCTURAL BORING (16 REQUIRED)



BORING LOCATIONS - AS STAKED 2010-10-29
DOVER HIGH SCHOOL
CAPITAL SCHOOL DISTRICT
 CITY OF DOVER
 KENT COUNTY, DELAWARE

**BECKER
MORGAN**
GROUP

ARCHITECTURE
ENGINEERING
Dover
309 S. Governors Ave.
Dover, DE 19904
Ph. 302.734.7950
Fax 302.734.7965

BMG: 2010057
SCALE: 1" = 300'
DATE: 10/21/10
DRAWN BY: M.A.R.

APPENDIX B

TEST BORING LOGS (29)

TEST PIT LOGS (11)

INFILTRATION TESTING PLOT (1)



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 18, 2010
 Date Completed : November 18, 2010
 Logged by : ARS
 Weather : Partly cloudy, 40's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 45.4 feet ± Project Datum
 Northing : 0
 Easting : 20

Depth in feet	Surf. Elev. 45.4 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0	45			TOPSOIL (± 12 inches)								
			SC	Dark gray, gray, orange, white fine SAND and CLAY, trace medium to coarse sand, trace gravel; LIQUID LIMIT = 17, PLASTICITY INDEX = 1	<input checked="" type="checkbox"/>	S-1	5-4-6	1.3	13.3	46.9		
				Gray, light brown, orange-brown fine SAND, some to and silt (moist)	<input checked="" type="checkbox"/>	S-2A	3-2-2	1.1				<input checked="" type="checkbox"/>
5	40			Gray, light brown, white fine SAND, some silt, trace gravel, trace medium to coarse sand (moist)	<input checked="" type="checkbox"/>	S-2B						
				Varicolored (Brown, white, gray, red-brown) fine to medium SAND, little to some coarse sand, little gravel, trace silt (wet)	<input checked="" type="checkbox"/>	S-3	3-3-5	1.4				
				Orange-brown, dark gray, white fine to medium SAND, little to some coarse sand, little to trace gravel, trace silt (wet)	<input checked="" type="checkbox"/>	S-4	2-3-5	1.1				
10	35				<input checked="" type="checkbox"/>							
			SM	Orange-brown, white, red-brown, orange-yellow fine to medium SAND, little gravel, trace coarse sand, trace silt (wet)	<input checked="" type="checkbox"/>	S-5	2-3-4	1.4				
				Orange, red-orange, yellow fine to medium SAND, little silt, trace coarse sand, trace gravel (wet)	<input checked="" type="checkbox"/>	S-6	4-4-8	1.4				
20	25				<input checked="" type="checkbox"/>							
				Brown, orange-brown, black, red-brown, white fine to medium SAND, little to some coarse sand, little to trace gravel, trace silt (wet)	<input checked="" type="checkbox"/>	S-7	6-7-8	1.3				
25	20											

NOTES:

- Test boring terminated at ± 50.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-rod conditions observed at 4.9 feet b.e.g.s.
- Water elevation at 4.2 feet b.e.g.s. with augers at 6.0 feet b.e.g.s. after obtaining sample S-3.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 50 feet b.e.g.s.
- Borehole dry and caved at 2.4 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 18, 2010
 Date Completed : November 18, 2010
 Logged by : ARS
 Weather : Partly cloudy, 40's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 45.4 feet ± Project Datum
 Northing : 0
 Easting : 20

Depth in feet	Surf. Elev. 45.4 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
30	15		SM			<input checked="" type="checkbox"/>	S-8	7-6-8	1.5			
							<input checked="" type="checkbox"/>	S-9	5-9-15	1.5		
35	10		ML			<input checked="" type="checkbox"/>	S-10	3-5-8	1.5			
40	5					<input checked="" type="checkbox"/>	S-11	6-5-6	1.5	23.9	15.7	
45	0		SM			<input checked="" type="checkbox"/>	S-12	13-17-25	1.4			
50	-5					<input checked="" type="checkbox"/>						

NOTES:

- Test boring terminated at ± 50.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-rod conditions observed at 4.9 feet b.e.g.s.
- Water elevation at 4.2 feet b.e.g.s. with augers at 6.0 feet b.e.g.s. after obtaining sample S-3.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 50 feet b.e.g.s.
- Borehole dry and caved at 2.4 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 19, 2010
 Date Completed : November 19, 2010
 Logged by : ARS
 Weather : Partly cloudy, 40's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 48.2 feet ± Project Datum
 Northing : 0
 Easting : 0

Depth in feet	Surf. Elev. 48.2 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0				TOPSOIL (± 13 inches)								
			ML	Gray, red-brown, brown SILT, some to and fine sand, trace medium to coarse sand, trace fine gravel (moist)	<input checked="" type="checkbox"/>	S-1	2-2-6	1.4				
45			SM	Gray, red-orange, white fine SAND, some to and SILT, trace medium to coarse sand, trace gravel (moist)	<input checked="" type="checkbox"/>	S-2	7-9-12	1.3				
5				Orange-brown, gray, gray-brown, fine SAND, some silt, trace medium to coarse sand, trace gravel (moist)	<input checked="" type="checkbox"/>	S-3	4-5-8	1.3				<input checked="" type="checkbox"/>
40				Orange-brown, red-brown, yellow-white fine to medium SAND, little coarse sand, trace gravel, trace silt (wet)	<input checked="" type="checkbox"/>	S-4	3-4-5	1.4				
10				Orange, brown, white fine SAND, little medium to coarse sand, little silt (wet)	<input checked="" type="checkbox"/>	S-5	2-1-3	1.5	29.0	16.6		
35				Orange, red-orange, yellow fine SAND, little silt, trace medium to coarse sand, trace gravel (wet)	<input checked="" type="checkbox"/>	S-6	2-2-3	1.3				
15			Orange, orange-yellow, red-brown, white fine to medium SAND, trace silt, trace coarse sand (wet)	<input checked="" type="checkbox"/>	S-7	4-2-4	1.5					
30												
20												
25												
25												

NOTES:

- Test boring terminated at ± 30.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-spoon conditions observed at 6 feet b.e.g.s.
- Water elevation at 6.4 feet b.e.g.s. with augers at 6 feet b.e.g.s. after obtaining sample S-3.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 30 feet b.e.g.s.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 19, 2010 Drilling Equipment : ATV Mounted Diedrich D-50
 Date Completed : November 19, 2010 Drilling Methods : HSA (SPT, ASTM D 1586)
 Logged by : ARS Surface Elevation : 48.2 feet ± Project Datum
 Weather : Partly cloudy, 40's °F Northing : 0
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc. Easting : 0

Depth in feet	Surf. Elev. 48.2 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
				DESCRIPTION								
20			SM			<input checked="" type="checkbox"/>	S-8	6-10-11	1.5			
30												
15												
35												
10												
40												
5												
45												
0												
50												
-5												

NOTES:

- Test boring terminated at ± 30.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-spoon conditions observed at 6 feet b.e.g.s.
- Water elevation at 6.4 feet b.e.g.s. with augers at 6 feet b.e.g.s. after obtaining sample S-3.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 30 feet b.e.g.s.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 19, 2010
 Date Completed : November 19, 2010
 Logged by : ARS
 Weather : Partly cloudy, 40's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 48.8 feet ± Project Datum
 Northing : 0
 Easting : 30

Depth in feet	Surf. Elev. 48.8 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL	
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling								
DESCRIPTION													
0													
				TOPSOIL (± 9 inches)									
						<input checked="" type="checkbox"/>	S-1	2-1-5	1.5				
45						<input checked="" type="checkbox"/>	S-2A						
						<input checked="" type="checkbox"/>	S-2B	6-18-24	1.5				
5						<input checked="" type="checkbox"/>	S-3	5-7-7	1.5				
						<input checked="" type="checkbox"/>	S-4	2-3-3	1.5				
40						<input checked="" type="checkbox"/>	S-5	2-3-6	1.5				
10						<input checked="" type="checkbox"/>	S-6	4-4-6	1.5				
35			SM			<input checked="" type="checkbox"/>	S-7	4-4-4	1.5				
15						<input checked="" type="checkbox"/>							
30						<input checked="" type="checkbox"/>							
20						<input checked="" type="checkbox"/>							
25						<input checked="" type="checkbox"/>							
25						<input checked="" type="checkbox"/>							

NOTES:

- Test boring terminated at ± 30.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-spoon conditions observed at 7.9 feet b.e.g.s.
- Water elevation at 7.7 feet b.e.g.s. with augers at 8.5 feet b.e.g.s.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 30 feet b.e.g.s.
- Borehole caved at approximately 8.2 feet b.e.g.s. with water level at 4.5 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 19, 2010 Drilling Equipment : ATV Mounted Diedrich D-50
 Date Completed : November 19, 2010 Drilling Methods : HSA (SPT, ASTM D 1586)
 Logged by : ARS Surface Elevation : 48.8 feet ± Project Datum
 Weather : Partly cloudy, 40's °F Northing : 0
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc. Easting : 30

Depth in feet	Surf. Elev. 48.8 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
				DESCRIPTION								
20			SM			<input checked="" type="checkbox"/>	S-8	7-8-16	1.3			
30												
15												
35												
10												
40												
5												
45												
0												
50												
-5												

NOTES:

- Test boring terminated at ± 30.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-spoon conditions observed at 7.9 feet b.e.g.s.
- Water elevation at 7.7 feet b.e.g.s. with augers at 8.5 feet b.e.g.s.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 30 feet b.e.g.s.
- Borehole caved at approximately 8.2 feet b.e.g.s. with water level at 4.5 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 15, 2010
 Date Completed : November 15, 2010
 Logged by : ARS
 Weather : Overcast, 50's °F
 Driller/Agency : Dana/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 49.5 feet ± Project Datum
 Northing : 0
 Easting : 10

Depth in feet	Surf. Elev. 49.5 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0				TOPSOIL (± 12 inches)								
			SM	Orange-brown, dark brown fine SAND, little to trace medium sand, trace silt (moist)	<input checked="" type="checkbox"/>	S-1	1-4-10	1.0				
				Orange-brown, dark brown fine SAND, little to trace medium sand, trace gravel, trace silt (moist)	<input checked="" type="checkbox"/>	S-2A						
45			ML	Gray, orange SILT, little fine sand, trace medium to coarse sand (moist)	<input checked="" type="checkbox"/>	S-2B	10-4-2	1.5				
5				Varicolored (yellow-gray, gray, orange, black) fine SAND, little to some silt, trace medium to coarse sand, trace fine gravel (moist to wet)	<input checked="" type="checkbox"/>	S-3	4-4-3	1.5				
				Orange, yellow, red-brown fine to medium SAND, little silt, trace coarse sand (wet)	<input checked="" type="checkbox"/>	S-4	2-3-5	1.5				<input checked="" type="checkbox"/>
10				Yellow, white fine to medium SAND, little silt (wet)	<input checked="" type="checkbox"/>	S-5	1/12"-2	1.5				
15			SM	Gray, white, gray-yellow fine to medium SAND, little silt, little coarse sand, trace fine gravel (wet)	<input checked="" type="checkbox"/>	S-6	2-2-4	1.5				
20				Varicolored (gray, orange, yellow-brown, white) fine to medium SAND, little silt, trace coarse sand (wet)	<input checked="" type="checkbox"/>	S-7	2-3-5	1.5				
25												

NOTES:

- Test boring terminated at ± 25.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-rod conditions observed at 8.2 feet b.e.g.s.
- Water elevation at 8.1 feet b.e.g.s. with augers at 8.5 feet b.e.g.s.
- Borehole caved at 8.6 feet b.e.g.s. with water level at 6.4 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 19, 2010
 Date Completed : November 19, 2010
 Logged by : ARS
 Weather : Clear, 40's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 47.8 feet ± Project Datum
 Northing : 0
 Easting : 40

Depth in feet	Surf. Elev. 47.8 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0				TOPSOIL (± 13 inches)								
			ML	Gray, orange SILT and fine SAND, trace gravel (moist)	<input checked="" type="checkbox"/>	S-1A						
				Gray, orange, red-brown fine SAND, little gravel, little medium to coarse sand, trace silt (moist)	<input checked="" type="checkbox"/>	S-1B	2-3-9	1.4				
45				Brown, gray, orange, dark brown fine SAND, little silt, trace medium to coarse sand, trace gravel (moist)	<input checked="" type="checkbox"/>	S-2	13-9-9	1.5				
5				Orange, red-orange, yellow, gray, brown fine SAND, some silt, trace medium sand (moist)	<input checked="" type="checkbox"/>	S-3	4-5-5	1.3	19.2	24.6		
40				Orange, red-gray fine SAND, little silt, trace gravel, trace medium to coarse sand (wet)	<input checked="" type="checkbox"/>	S-4	2-4-3	1.4				
10												
35			SM	Yellow, white, orange-yellow fine SAND, little to some medium to coarse sand, little silt (wet)	<input checked="" type="checkbox"/>	S-5	2-1-1	1.5	27.3	16.0		
15												
30				Orange, yellow-orange, white, gray fine to medium SAND, little to some coarse sand, little to trace gravel, trace silt (wet)	<input checked="" type="checkbox"/>	S-6	5-4-5	1.1				
20												
25				Orange, yellow-gray, red-brown, brown fine SAND, little to some medium to coarse sand, trace to little silt (wet)	<input checked="" type="checkbox"/>	S-7	3-4-6	1.5				
25												

NOTES:

- Test boring terminated at ± 25.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-spoon conditions observed at 8.2 feet b.e.g.s.
- Water elevation at 7.2 feet b.e.g.s. with augers at 8.5 feet b.e.g.s.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 25 feet b.e.g.s.
- Borehole caved at 3.8 feet b.e.g.s. with water level at 3.8 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 17, 2010
 Date Completed : November 17, 2010
 Logged by : ARS
 Weather : Clear, Windy, 40's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 46.3 feet ± Project Datum
 Northing : 0
 Easting : 50

Depth in feet	Surf. Elev. 46.3 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0				TOPSOIL (± 14 inches)								
45			CL	Gray, dark gray, orange CLAY, little fine sand, trace gravel, trace organics (e.g., root material) (dry)	<input checked="" type="checkbox"/>	S-1A S-1B	2-4-9	1.3				
				Gray, orange, white fine SAND, little silt, trace coarse sand, trace gravel (dry)								
				Gray, brown, orange-brown, white fine SAND, some silt, trace medium to coarse SAND (moist with depth)	<input checked="" type="checkbox"/>	S-2	5-9-6	1.1				<input checked="" type="checkbox"/>
5												
40				Orange-brown, yellow-brown, red-brown, white fine to medium SAND, little silt, trace coarse sand, trace gravel (wet)	<input checked="" type="checkbox"/>	S-3	1-2-1	1.3	24.1	13.7		
				Orange, gray-orange, white fine to medium SAND, little gravel, little to trace coarse sand, trace silt (wet)	<input checked="" type="checkbox"/>	S-4	5-5-5	1.4				
10												
35			SM	Orange, brown-orange, white fine to medium SAND, little coarse sand, trace gravel, trace silt (wet)	<input checked="" type="checkbox"/>	S-5	4-4-3	1.4				
15												
30				Orange, orange-brown, dark gray fine to medium SAND, some coarse sand, little silt, trace gravel (wet)	<input checked="" type="checkbox"/>	S-6	2-4-4	1.5				
20												
25				Orange, orange-brown, red-brown fine to medium SAND, little to some coarse sand, trace silt, trace gravel (wet)	<input checked="" type="checkbox"/>	S-7	5-6-9	1.5				
25												
20												

NOTES:

- Test boring terminated at ± 25.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-spoon conditions observed at 5.0 feet b.e.g.s.
- Water elevation at 4.6 feet b.e.g.s. with augers at 6.0 feet b.e.g.s.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 25 feet b.e.g.s.
- Borehole dry and caved at 2.9 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 15, 2010
 Date Completed : November 15, 2010
 Logged by : ARS
 Weather : Overcast, 50's °F
 Driller/Agency : Dana/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 48.1 feet ± Project Datum
 Northing : 0
 Easting : 80

Depth in feet	Surf. Elev. 48.1 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
				DESCRIPTION								
0												
				TOPSOIL (± 14 inches)		<input checked="" type="checkbox"/>						
45				Brown, gray, orange fine SAND, little to some silt, trace gravel (moist)		<input checked="" type="checkbox"/>	S-1	2-4-7	1.3			
5				Brown, gray, orange, red-orange fine SAND, little to some silt, little to trace medium to coarse sand, trace gravel (moist)		<input checked="" type="checkbox"/>	S-2	7-4-9	1.5			
40				Varicolored (red-brown, orange, yellow, black) fine to medium SAND, little silt, trace fine gravel (wet)		<input checked="" type="checkbox"/>	S-3	4-5-4	1.5			<input checked="" type="checkbox"/>
10				Varicolored (yellow-orange, red-brown, dark gray) fine to medium SAND, little silt, trace coarse sand to fine gravel (wet)		<input checked="" type="checkbox"/>	S-4	1-3-4	1.5			
35			SM	Orange-brown fine to medium SAND, little silt, little coarse sand to fine gravel (wet)		<input checked="" type="checkbox"/>	S-5	1-2-1	1.5			
20				Orange-brown fine to medium SAND, some coarse sand, little to trace gravel, trace silt (wet)		<input checked="" type="checkbox"/>	S-6	2-5-8	1.5			
25				Orange-brown, red-brown fine to medium SAND, little coarse sand, trace gravel, trace silt (wet)		<input checked="" type="checkbox"/>	S-7	6-6-12	1.5			
25												

NOTES:

- Test boring terminated at ± 25.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-spoon conditions observed at 4 feet b.e.g.s.
- Water elevation at 6.6 feet b.e.g.s. with augers at 6.0 feet b.e.g.s. after obtaining sample S-3.
- Approximately 4 inches of heave in borehole before obtaining sample S-6.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 17, 2010
 Date Completed : November 17, 2010
 Logged by : ARS
 Weather : Clear, Windy, 40's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 47.2 feet ± Project Datum
 Northing : 0
 Easting : 70

Depth in feet	Surf. Elev. 47.2 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0				TOPSOIL (± 12 inches)								
			CL	Dark gray, orange CLAY, little silt, some fine sand, trace organics (e.g., root material) (moist)	<input checked="" type="checkbox"/>	S-1A						
45				Gray, dark gray, orange fine SAND, little silt, trace to little coarse sand, trace gravel (moist)	<input checked="" type="checkbox"/>	S-1B	1-6-10	1.3				
				Orange-brown, yellow-orange, brown, light gray fine SAND, trace silt (moist)	<input checked="" type="checkbox"/>	S-2	5-5-5	1.3				
5												<input checked="" type="checkbox"/>
				Red-orange, orange fine to medium SAND, trace silt (wet)	<input checked="" type="checkbox"/>	S-3	4-5-3	1.4				
40				Orange-brown, orange, yellow-orange, brown fine SAND, little medium to coarse sand, little silt, trace gravel (wet)	<input checked="" type="checkbox"/>	S-4	2-3-5	1.5	22.7	12.5		
10												
			SM	Orange-brown, orange, yellow-orange, brown fine SAND, little medium to coarse sand, trace gravel, trace silt (wet)	<input checked="" type="checkbox"/>	S-5	3-3-4	1.5				
35				Yellow-brown, orange-brown, red-orange, red-brown fine to medium SAND, little to some silt, little coarse sand, trace gravel (wet)	<input checked="" type="checkbox"/>	S-6	2-2-4	1.5				
15												
30				Orange, yellow-orange, white, red-brown fine SAND, some medium to coarse sand, little silt, trace gravel (wet)	<input checked="" type="checkbox"/>	S-7	3-3-5	1.5				
20												
25												
25												

NOTES:

- Test boring terminated at ± 25.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-rod conditions observed at 5.3 feet b.e.g.s.
- Water elevation at 5.5 feet b.e.g.s. with augers at 6.0 feet b.e.g.s.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 25 feet b.e.g.s.
- Borehole caved at 3.3 feet b.e.g.s. with water level at approximately 2.9 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 18, 2010
 Date Completed : November 18, 2010
 Logged by : ARS
 Weather : Partly cloudy, 40's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 47.5 feet ± Project Datum
 Northing : 0
 Easting : 60

Depth in feet	Surf. Elev. 47.5 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
				DESCRIPTION								
0												
			CL	TOPSOIL (± 14 inches)		<input checked="" type="checkbox"/>	S-1A					
				Gray, orange CLAY, some fine sand, little silt (moist)		<input checked="" type="checkbox"/>	S-1B	2-2-7	1.5			
45				Gray, white fine SAND, little silt, trace medium to coarse sand (moist)		<input checked="" type="checkbox"/>	S-2	12-21-26	1.4			
5				Light gray, gray, orange-brown, gray-brown, white fine SAND, some medium to coarse sand, trace silt (moist)		<input checked="" type="checkbox"/>	S-3	5-5-4	1.5			
40				Orange, yellow-orange, gray, gray-brown fine SAND, little silt, little medium sand (moist to wet)		<input checked="" type="checkbox"/>	S-4	3-2-4	1.5			<input checked="" type="checkbox"/>
10				Orange, gray-brown fine SAND, little to some silt, little to trace medium sand (wet)		<input checked="" type="checkbox"/>	S-5	1-1-2	1.5	27.3	17.7	
35			SM	Orange, yellow-orange, red-brown, black fine SAND, little silt, trace to little medium to coarse sand, trace gravel (wet)		<input checked="" type="checkbox"/>	S-6	3-5-5	1.3			
20				Orange-brown, yellow-orange, red-brown, green-gray fine to medium SAND, trace to little coarse sand, trace gravel, trace silt (wet)		<input checked="" type="checkbox"/>	S-7	3-4-6	1.4			
25				Orange, white, red-brown, dark gray fine to medium SAND, little to some coarse sand, little gravel, trace silt (wet)		<input checked="" type="checkbox"/>						

NOTES:

- Test boring terminated at ± 50.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-spoon conditions observed at 6.0 feet b.e.g.s.
- Water elevation at 6.7 feet b.e.g.s. with augers at 6.0 feet b.e.g.s. after obtaining sample S-3.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 50 feet b.e.g.s.
- Borehole caved at 3.1 feet b.e.g.s. with water level at approximately 2.5 feet b.e.g.s. upon removal of augers.
- Borehole caved at 3.1 feet b.e.g.s. with water level at approximately 2.5 feet b.e.g.s. upon removal of augers.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 18, 2010
 Date Completed : November 18, 2010
 Logged by : ARS
 Weather : Partly cloudy, 40's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 47.5 feet ± Project Datum
 Northing : 0
 Easting : 60

Depth in feet	Surf. Elev. 47.5 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL	
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling								
				DESCRIPTION									
20			SM			<input checked="" type="checkbox"/>	S-8	4-3-6	1.4				
30							<input checked="" type="checkbox"/>	S-9	5-22-42	1.3			
15			ML										
35							<input checked="" type="checkbox"/>	S-10	4-5-6	1.5	44.0	97.0	
40							<input checked="" type="checkbox"/>	S-11	3-2-6	1.5			
5			SM										
45							<input checked="" type="checkbox"/>	S-12	4-6-9	1.5			
50													
-5													

NOTES:

- Test boring terminated at ± 50.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-spoon conditions observed at 6.0 feet b.e.g.s.
- Water elevation at 6.7 feet b.e.g.s. with augers at 6.0 feet b.e.g.s. after obtaining sample S-3.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 50 feet b.e.g.s.
- Borehole caved at 3.1 feet b.e.g.s. with water level at approximately 2.5 feet b.e.g.s. upon removal of augers.
- Borehole caved at 3.1 feet b.e.g.s. with water level at approximately 2.5 feet b.e.g.s. upon removal of augers.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 15, 2010
 Date Completed : November 15, 2010
 Logged by : ARS
 Weather : Overcast, 50's °F
 Driller/Agency : Dana/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 47.3 feet ± Project Datum
 Northing : 0
 Easting : 90

Depth in feet	Surf. Elev. 47.3 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0				TOPSOIL (± 12 inches)								
			CL	Dark gray, orange silty CLAY, little fine sand (dry)		<input checked="" type="checkbox"/>	S-1A					
45				Light gray, dark gray fine SAND, trace to little medium to coarse sand, little silt, trace gravel (dry)		<input checked="" type="checkbox"/>	S-1B	2-7-14	1.3			
5				White-gray, gray, orange fine SAND, little to some silt, trace medium to coarse sand, trace gravel (moist)		<input checked="" type="checkbox"/>	S-2	4-3-2	1.3			
40				Varicolored (yellow, orange-yellow, red-brown, yellow-gray) fine to medium SAND, trace silt, trace coarse sand to fine gravel (wet)		<input checked="" type="checkbox"/>	S-3	2-1-1	1.4			<input checked="" type="checkbox"/>
10				Orange, orange-brown fine to medium SAND, little to some silt, little to trace coarse sand (wet)		<input checked="" type="checkbox"/>	S-4	1-1-2	1.5			
35			SM	Orange fine to medium SAND, little silt, little to trace coarse sand to fine gravel (wet)		<input checked="" type="checkbox"/>	S-5	1-2-3	1.5			
20				Yellow-orange, red-orange fine to medium SAND, little to some silt (wet)		<input checked="" type="checkbox"/>	S-6	1-2-6	1.5			
25				Orange, dark orange, orange-yellow fine to medium SAND, little silt (wet)		<input checked="" type="checkbox"/>	S-7	3-6-10	1.5			
25												

NOTES:

- Test boring terminated at ± 25.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-rod conditions observed at 7 feet b.e.g.s.
- Water elevation at 6.9 feet b.e.g.s. with augers at 8.5 feet b.e.g.s.
- Borehole caved at 8.1 feet b.e.g.s. with water level at 6.8 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 15, 2010
 Date Completed : November 15, 2010
 Logged by : ARS
 Weather : Overcast, 50's °F
 Driller/Agency : Dana/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 46 feet ± Project Datum

Depth in feet	Surf. Elev. 46 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0												
45												
5												
40			SM									
10												
35												
15												
30												
20												
25												
25												
20												

NOTES:

- Test boring terminated at ± 10.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-spoon conditions observed at 5.2 feet b.e.g.s.
- Water elevation at 5.7 feet b.e.g.s. with augers at 6.0 feet b.e.g.s.
- Borehole caved at 5.2 feet b.e.g.s. with water level at 4.8 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 19, 2010
 Date Completed : November 19, 2010
 Logged by : ARS
 Weather : Clear, 40's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 46.6 feet ± Project Datum

Depth in feet	Surf. Elev. 46.6 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded								
DESCRIPTION												
0				TOPSOIL (± 9 inches)								
45			SM	Orange-brown fine SAND, little silt (moist)		<input checked="" type="checkbox"/>	S-1	2-5-9	0.2			
5				Orange-brown, gray, red-brown fine SAND, little medium to coarse sand, trace silt (moist)		<input checked="" type="checkbox"/>	S-2	4-6-6	1.4			
40												
10												
35												
15												
30												
20												
25												
25												
20												

NOTES:

1. Test boring terminated at ± 5.0 feet b.e.g.s. (below existing ground surface).
2. Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
3. No groundwater encountered during drilling.

4. Borehole dry and caved at 2.7 feet b.e.g.s. upon removal of augers.
5. Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 15, 2010
 Date Completed : November 15, 2010
 Logged by : ARS
 Weather : Overcast, 50's °F
 Driller/Agency : Dana/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 48.7 feet ± Project Datum

Depth in feet	Surf. Elev. 48.7 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0				TOPSOIL (± 12 inches)								
				Brown, orange-brown fine SAND, little silt, little medium to coarse sand, trace gravel (moist)	<input checked="" type="checkbox"/>	S-1	2-3-6	1.3				
45				Brown, orange-brown, black, white fine to medium SAND, little silt, little coarse sand, trace gravel (moist)	<input checked="" type="checkbox"/>	S-2	7-8-9	1.4				
5			SM	Orange-brown, yellow-gray, white fine to medium SAND, little silt, trace coarse sand, trace gravel (wet)	<input checked="" type="checkbox"/>	S-3	5-6-7	1.3				<input checked="" type="checkbox"/>
40				Varicolored (orange-brown, yellow, black, gray) fine to medium SAND, little to some coarse sand, little silt, trace gravel (wet)	<input checked="" type="checkbox"/>	S-4	3-3-4	1.3				
10												
35												
15												
30												
20												
25												
25												

NOTES:

- Test boring terminated at ± 10.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-spoon conditions observed at 5.2 feet b.e.g.s.
- Water elevation at 6.4 feet b.e.g.s. with augers at 6.0 feet b.e.g.s. after obtaining sample S-3.
- Borehole caved at 6.6 feet b.e.g.s. with water level at 5.2 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 19, 2010
 Date Completed : November 19, 2010
 Logged by : ARS
 Weather : Clear, 40's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 49.6 feet ± Project Datum

Depth in feet	Surf. Elev. 49.6 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded								
DESCRIPTION												
0												
						<input checked="" type="checkbox"/>	S-1	2-3-4	1.3	14.7	46.1	
			SM			<input checked="" type="checkbox"/>	S-2	6-5-9	1.5			
45												
5												
40												
35												
30												
25												

NOTES:

1. Test boring terminated at ± 5.0 feet b.e.g.s. (below existing ground surface).
2. Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
3. No groundwater encountered during drilling.

4. Borehole dry and caved at 2.1 feet b.e.g.s. upon removal of augers.
5. Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 17, 2010
 Date Completed : November 17, 2010
 Logged by : ARS
 Weather : Clear, Windy, 40's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 47.9 feet ± Project Datum

Depth in feet	Surf. Elev. 47.9 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0				TOPSOIL (± 13 inches)								
			ML	Gray, orange clayey SILT, little fine sand	<input checked="" type="checkbox"/>	S-1A						
				Gray, orange fine SAND, little to some gravel, trace medium to coarse sand, trace silt (moist)	<input checked="" type="checkbox"/>	S-1B	3-3-10	1.2				
45			SM	Gray, orange-brown, red-brown fine SAND, little silt, trace gravel, trace medium to coarse sand (moist)	<input checked="" type="checkbox"/>	S-2	6-8-7	1.5				
5				Varicolored (Brown, gray, white, orange-brown) fine to medium SAND, little gravel, trace coarse sand, trace silt (moist to wet)	<input checked="" type="checkbox"/>	S-3	6-7-7	1.2				
40				Varicolored (Brown, orange-brown, red-brown, white, yellow) fine to medium SAND, trace to little coarse sand, trace silt, trace gravel (wet)	<input checked="" type="checkbox"/>	S-4	3-5-5	1.3				<input checked="" type="checkbox"/>
10												
35												
15												
30												
20												
25												
25												

NOTES:

- Test boring terminated at ± 10.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-rod conditions observed at 6.9 feet b.e.g.s.
- Water elevation at 5.9 feet b.e.g.s. with augers at 8.5 feet b.e.g.s.
- Borehole wet and caved at 4.1 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 19, 2010
 Date Completed : November 19, 2010
 Logged by : ARS
 Weather : Clear, 40's
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 49.6 feet ± Project Datum

Depth in feet	Surf. Elev. 49.6 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded								
DESCRIPTION												
0				TOPSOIL (± 10 inches)								
			SM	Orange-brown fine SAND, trace gravel, trace silt (moist)	<input checked="" type="checkbox"/>	S-1	6-12-12	1.1				
45				Orange-brown, white fine SAND, some gravel, little medium to coarse sand, trace silt (moist)	<input checked="" type="checkbox"/>	S-2	6-10-8	1.2				
5												
10	40											
15	35											
20	30											
25	25											

NOTES:

1. Test boring terminated at ± 5.0 feet b.e.g.s. (below existing ground surface).
2. Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
3. No groundwater encountered during drilling.

4. Borehole dry and caved at 1.5 feet b.e.g.s. upon removal of augers.
5. Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 22, 2010
 Date Completed : November 22, 2010
 Logged by : ARS
 Weather : Foggy, 40's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 45.4 feet ± Project Datum

Depth in feet	Surf. Elev. 45.4 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0	45		SM	TOPSOIL (± 5 inches)		<input checked="" type="checkbox"/>	S-1A					
			ML	Gray, orange fine SAND, trace medium to coarse sand, trace silt, trace gravel (moist)		<input checked="" type="checkbox"/>	S-1B	2-3-3	1.1			
				Gray, orange SILT, little gravel, trace fine sand (moist)		<input checked="" type="checkbox"/>						
5	40			Light gray, gray, orange-brown, white fine SAND, some medium to coarse sand, little silt, trace gravel (moist to wet)		<input checked="" type="checkbox"/>	S-2	5-4-4	1.3			<input checked="" type="checkbox"/>
				Orange, yellow, yellow-gray, dark brown fine SAND, little to some medium to coarse sand, little clay (wet)		<input checked="" type="checkbox"/>	S-3	3-4-4	1.3			
10	35		SM	Orange-brown, red-brown, yellow-brown, black fine SAND, little silt, trace gravel, trace medium to coarse sand (wet)		<input checked="" type="checkbox"/>	S-4	2-1-3	1.5			
15	30			Orange, orange-brown, red-brown, yellow-orange fine SAND, some medium to coarse sand, little to trace silt, trace gravel (wet)		<input checked="" type="checkbox"/>	S-5	4-4-6	1.4			

NOTES:

- Test boring terminated at ± 15.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-rod conditions observed at 4.7 feet b.e.g.s.
- Water elevation at 4.7 feet b.e.g.s. during drilling.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 15 feet b.e.g.s.
- Borehole caved at 3.6 feet b.e.g.s. with water level at 3.3 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 22, 2010
 Date Completed : November 22, 2010
 Logged by : ARS
 Weather : Partly cloudy, 40's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 47.5 feet ± Project Datum

Depth in feet	Surf. Elev. 47.5 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0				TOPSOIL (± 12 inches)								
			ML	Gray, orange SILT, some fine sand, little medium to coarse sand, trace gravel (moist)	<input checked="" type="checkbox"/>	S-1A						
45			SM	Orange, gray, white fine to medium SAND, little to some coarse sand, little gravel, trace silt (moist)	<input checked="" type="checkbox"/>	S-1B	1-3-9	1.4				
			SM	Gray, orange-brown, red-brown, white fine SAND, some medium to coarse sand, little gravel, trace silt (moist)	<input checked="" type="checkbox"/>	S-2	4-3-6	1.1				
5			SM	Varicolored (light gray, orange-brown, yellow-brown, white) fine to medium SAND, trace coarse sand, trace gravel, trace silt (wet)	<input checked="" type="checkbox"/>	S-3	1-3-1	0.9				<input checked="" type="checkbox"/>
40			SM	Yellow-gray, orange-brown, white fine SAND, trace to little silt (wet)	<input checked="" type="checkbox"/>	S-4	2-1-2	1.5				
10			SM	Orange, yellow-orange, red-brown, white fine SAND, little silt, little gravel, little medium to coarse sand (wet)	<input checked="" type="checkbox"/>	S-5	3-2-3	1.4				
35			SM	Orange-brown, black, white, red-brown fine to medium SAND, some to and coarse sand, trace silt (wet)	<input checked="" type="checkbox"/>	S-6	6-5-8	1.3				
15			SM									
30			SM									
20			SM									
25			SM									
25			SM									

NOTES:

- Test boring terminated at ± 20.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-spoon conditions observed at 5.0 feet b.e.g.s.
- Water elevation at 5.8 feet b.e.g.s. during drilling.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 20 feet b.e.g.s.
- Borehole wet and caved at 4.9 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 22, 2010
 Date Completed : November 22, 2010
 Logged by : ARS
 Weather : Partly cloudy, 40's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 47.9 feet ± Project Datum

Depth in feet	Surf. Elev. 47.9 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0				TOPSOIL (± 11 inches)								
			ML	Gray, orange-brown SILT, little to some fine sand (moist)	<input checked="" type="checkbox"/>	S-1A						
				Gray, orange, orange-brown, black fine SAND, trace medium to coarse sand, trace gravel, trace silt (moist)	<input checked="" type="checkbox"/>	S-1B	3-4-11	1.4				
45				Orange-brown, yellow-gray, gray fine SAND, little to some medium to coarse sand, trace gravel, trace silt (moist)	<input checked="" type="checkbox"/>	S-2	7-7-7	1.4				
5				Orange-brown, red-brown, light gray fine SAND, little silt, trace medium to coarse sand (wet)	<input checked="" type="checkbox"/>	S-3	2-3-5	1.4				<input checked="" type="checkbox"/>
40			SM	Orange-brown, red-brown fine SAND, trace gravel, trace medium to coarse sand, trace silt (wet)	<input checked="" type="checkbox"/>	S-4	3-3-4	1.5				
10				Orange-brown fine to medium SAND, little coarse sand, trace gravel, trace silt (wet)	<input checked="" type="checkbox"/>	S-5	4-4-4	1.4				
35												
15												
30												
20												
25												
25												

NOTES:

- Test boring terminated at ± 15.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-rod conditions observed at 5.5 feet b.e.g.s.
- Water elevation at 5.7 feet b.e.g.s. during drilling.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 15 feet b.e.g.s.
- Borehole caved at 4.2 feet b.e.g.s. with water level at 3.3 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 19, 2010
 Date Completed : November 22, 2010
 Logged by : ARS
 Weather : Partly cloudy, 40's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 50.9 feet ± Project Datum

Depth in feet	Surf. Elev. 50.9 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0				TOPSOIL (± 9 inches)								
50			ML	Brown, orange-brown SILT and fine SAND (moist)		<input checked="" type="checkbox"/>	S-1	2-2-3	1.3	16.6	58.2	
			SM	Gray, orange-brown SILT, little to some fine sand (moist)		<input checked="" type="checkbox"/>	S-2A	5-13-5	1.5			<input checked="" type="checkbox"/>
5				Orange-brown, brown, white fine SAND, little silt, trace medium to coarse sand, trace gravel (moist)		<input checked="" type="checkbox"/>	S-2B					
45				Orange-brown, dark brown fine SAND, trace silt, trace medium to coarse sand (moist to wet)		<input checked="" type="checkbox"/>	S-3	5-6-3	1.2			
				Orange-brown, yellow-white, red-brown fine SAND, trace gravel, trace silt, trace medium to coarse sand (wet)		<input checked="" type="checkbox"/>	S-4	1-2-3	1.2			
10				Orange-brown, red-brown, black fine SAND, little gravel, little medium to coarse sand, trace silt (wet)		<input checked="" type="checkbox"/>	S-5	2-2-7	1.5			
40				Orange-brown, red-brown, black, yellow fine SAND, some medium to coarse sand, little silt, trace gravel (wet)		<input checked="" type="checkbox"/>	S-6	5-6-5	1.5			
15												
35												
20												
30												
25												
25												

NOTES:

- Test boring terminated at ± 20.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-spoon conditions observed at 5.0 feet b.e.g.s.
- Water elevation at 4.6 feet b.e.g.s. during drilling.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 20 feet b.e.g.s.
- Borehole caved at 6.8 feet b.e.g.s. with water level at 6.7 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 22, 2010
 Date Completed : November 22, 2010
 Logged by : ARS
 Weather : Clear, 50's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 50.3 feet ± Project Datum

Depth in feet	Surf. Elev. 50.3 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0	50			TOPSOIL (± 12 inches)								
			ML	Brown, orange-brown, orange SILT, little to some fine sand, trace coarse sand (moist)	<input checked="" type="checkbox"/>	S-1	1-1-2	1.4				
			SM	Orange-brown, brown, white fine SAND, little gravel, little medium to coarse sand, trace silt (moist)	<input checked="" type="checkbox"/>	S-2	11-12-14	1.4				
5	45		SM	Orange-brown, gray, yellow, orange-yellow fine SAND, little silt, trace gravel (moist to wet)	<input checked="" type="checkbox"/>	S-3	4-4-4	1.3				<input checked="" type="checkbox"/>
			SM	Orange-brown, red-orange fine SAND, trace silt, trace medium to coarse sand (wet)	<input checked="" type="checkbox"/>	S-4	3-3-6	1.5				
10	40		SM	Orange-brown, red-brown, black-brown fine SAND, trace gravel, trace medium to coarse sand, trace silt (wet)	<input checked="" type="checkbox"/>	S-5	3-3-5	1.5				
15	35		SM									
20	30											
25	25											

NOTES:

- Test boring terminated at ± 15.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-spoon conditions observed at 7.3 feet b.e.g.s.
- Water elevation at 7.5 feet b.e.g.s. during drilling.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 15 feet b.e.g.s.
- Borehole wet and caved at 5.7 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 23, 2010
 Date Completed : November 23, 2010
 Logged by : ARS
 Weather : Clear, 50's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 48.0 feet ± Project Datum

Depth in feet	Surf. Elev. 48.0 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0				TOPSOIL (±13 inches)								
			ML	Gray, dark gray, orange SILT, some fine sand (moist)	<input checked="" type="checkbox"/>	S-1A						
				Gray, dark gray, orange fine SAND, little silt (moist)	<input checked="" type="checkbox"/>	S-1B	2-3-5	1.4				
45				Light gray, gray, white fine SAND, little to some gravel, little medium to coarse sand, trace silt (moist)	<input checked="" type="checkbox"/>	S-2	1-6-7	1.5				
5				Orange-brown, gray fine SAND, little silt, trace medium to coarse sand, trace gravel (wet)	<input checked="" type="checkbox"/>	S-3	4-4-3	1.4				<input checked="" type="checkbox"/>
40				Orange-brown, red-brown fine SAND, trace to little silt, trace medium to coarse sand, trace gravel (wet)	<input checked="" type="checkbox"/>	S-4	1-3-3	1.5				
10			SM	Orange-brown, red-brown fine SAND, little silt, trace medium to coarse sand, trace gravel (wet)	<input checked="" type="checkbox"/>	S-5	2-1-2	1.5				
35				Orange-brown, red-brown, black fine SAND, little to some gravel, trace silt, trace medium to coarse sand (wet)	<input checked="" type="checkbox"/>	S-6	4-4-4	1.4				
15												
30												
20												
25												
25												

NOTES:

- Test boring terminated at ± 20.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-spoon conditions observed at 6.0 feet b.e.g.s.
- Water elevation at 6.3 feet b.e.g.s. during drilling.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 20 feet b.e.g.s.
- Borehole caved at 6.4 feet b.e.g.s. with water level at 3.8 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 22, 2010
 Date Completed : November 22, 2010
 Logged by : ARS
 Weather : Clear, 50's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 48.5 feet ± Project Datum

Depth in feet	Surf. Elev. 48.5 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0				TOPSOIL (± 8 inches)								
				Gray, orange fine SAND, some silt (moist)	<input checked="" type="checkbox"/>	S-1	3-3-3	1.2				
45				Orange-brown, gray, red-brown, white fine SAND, some gravel, little silt, little to trace medium to coarse sand (moist)	<input checked="" type="checkbox"/>	S-2	4-5-8	1.4				
5				Orange-brown, red-brown, yellow-brown, white fine SAND, little silt, little medium to coarse sand, trace gravel (wet)	<input checked="" type="checkbox"/>	S-3	3-5-4	1.5				<input checked="" type="checkbox"/>
			SM	Orange-brown, yellow-brown, red-brown fine SAND, little silt, little medium to coarse sand, trace gravel (wet)	<input checked="" type="checkbox"/>	S-4	3-4-7	1.5				
40				Orange-brown, red-brown fine to medium SAND, little to some coarse sand, little gravel, trace silt (wet)	<input checked="" type="checkbox"/>	S-5	3-2-4	1.5				
10												
35												
15												
30												
20												
25												
25												

NOTES:

- Test boring terminated at ± 15.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-spoon conditions observed at 6.0 feet b.e.g.s.
- Water elevation at 5.9 feet b.e.g.s. during drilling.
- Drilling methods were Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 15 feet b.e.g.s.
- Borehole caved at 5.0 feet b.e.g.s. with water level at 4.7 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 23, 2010
 Date Completed : November 23, 2010
 Logged by : ARS
 Weather : Clear, 40's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 53.0 feet ± Project Datum

Depth in feet	Surf. Elev. 53.0 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0				TOPSOIL (± 7 inches)								
			ML	Brown SILT, little to some fine sand (moist)		<input checked="" type="checkbox"/>	S-1A S-1B	2-3-3	1.4			
				Brown fine SAND, little medium to coarse sand, trace silt (moist)		<input checked="" type="checkbox"/>	S-2	3-5-5	1.5			
				Brown, yellow-brown, red-brown, white fine SAND, some medium to coarse sand, trace gravel, trace silt (moist)		<input checked="" type="checkbox"/>	S-3	6-10-10	1.5			
				Orange-brown, gray, red-gray, white fine SAND, some medium sand, trace coarse sand, trace gravel, trace silt (moist)		<input checked="" type="checkbox"/>	S-4	4-3-4	1.4			
			SM	Varicolored (yellow-brown, gray, red-brown, white) fine SAND, little gravel, little medium to coarse sand, trace silt (moist to wet)		<input checked="" type="checkbox"/>	S-5	3-3-3	1.5			<input checked="" type="checkbox"/>
				Yellow-brown, orange-brown, red-brown, gray-brown fine to medium SAND, little to some gravel, little coarse sand, trace to little silt (wet)		<input checked="" type="checkbox"/>	S-6	3-2-3				
				Orange-brown, red-brown, gray, black fine SAND, some to and medium to coarse sand, little gravel, little to trace silt (wet)		<input checked="" type="checkbox"/>						

NOTES:

- Test boring terminated at ± 20.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-spoon conditions observed at 8.8 feet b.e.g.s.
- Water elevation at 9.9 feet b.e.g.s. with augers at 8.5 feet b.e.g.s. after obtaining sample S-4.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 20 feet b.e.g.s.
- Borehole caved at 7.3 feet b.e.g.s. with water level at 6.8 feet b.e.g.s. upon removal of augers.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 23, 2010
 Date Completed : November 23, 2010
 Logged by : ARS
 Weather : Clear, 50's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 49.4 feet ± Project Datum

Depth in feet	Surf. Elev. 49.4 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0				TOPSOIL (± 14 inches)								
				Gray, orange, orange-brown, yellow-orange fine SAND and SILT, trace gravel, trace medium to coarse sand (moist)	<input checked="" type="checkbox"/>		S-1	3-2-3	1.5			
45				Gray, light gray, orange-brown, red-brown, white fine SAND, trace medium to coarse sand, trace silt (moist)	<input checked="" type="checkbox"/>		S-2	3-4-5	1.5			
5				Gray, yellow-gray, orange-brown, red-brown, white fine SAND, some medium to coarse sand, little gravel, little to trace silt (wet)	<input checked="" type="checkbox"/>		S-3	3-3-2	1.5			
40			SM	Orange, orange-brown, red-brown, gray fine SAND, little silt, trace gravel, trace medium to coarse sand (wet)	<input checked="" type="checkbox"/>		S-4	2-1-2	1.5			<input checked="" type="checkbox"/>
10				Light orange-brown, black fine SAND, some silt (wet)	<input checked="" type="checkbox"/>		S-5	1-2-1	1.5			
35				Light orange-brown, black fine SAND, some silt (wet)	<input checked="" type="checkbox"/>		S-6	2-1-3	1.5			
20												
25												

NOTES:

- Test boring terminated at ± 20.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-spoon conditions observed at 5.5 feet b.e.g.s.
- Water elevation at 7.9 feet b.e.g.s. during drilling.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 20 feet b.e.g.s.
- Borehole caved at 6.8 feet b.e.g.s. with water level at 5.2 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



Capital School District
 Dover High School
 Dover, DE
 Project No. 7158.GC

Date Started : November 23, 2010
 Date Completed : November 23, 2010
 Logged by : ARS
 Weather : Partly cloudy, 40's °F
 Driller/Agency : Wayne Proud/Feldmann Brothers, Inc.

Drilling Equipment : ATV Mounted Diedrich D-50
 Drilling Methods : HSA (SPT, ASTM D 1586)
 Surface Elevation : 51.7 feet ± Project Datum

Depth in feet	Surf. Elev. 51.7 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				<input checked="" type="checkbox"/> Remolded	<input checked="" type="checkbox"/> During Drilling							
DESCRIPTION												
0				TOPSOIL (± 13 inches)								
50				Red-brown, orange-brown, gray fine SAND, trace medium to coarse sand, trace gravel, trace silt (moist)	<input checked="" type="checkbox"/>	S-1	2-2-4	1.4				
5				Orange-brown, gray, red-orange, light brown fine SAND, trace medium to coarse sand, trace silt (moist)	<input checked="" type="checkbox"/>	S-2	3-3-4	1.3				
45				Yellow-brown, gray, orange-brown, red-brown, white fine SAND, little to trace silt (moist)	<input checked="" type="checkbox"/>	S-3	2-4-5	1.5				
			SM									
10				Gray, yellow-brown, orange, white fine SAND, trace gravel, trace medium to coarse sand, trace silt (moist to wet)	<input checked="" type="checkbox"/>	S-4	1-1-1	1.3				<input checked="" type="checkbox"/>
40				Yellow-brown, orange-brown, red-brown, white fine SAND, little to some medium to coarse sand, trace silt (wet)	<input checked="" type="checkbox"/>	S-5	2-2-2	1.5				
15												
35												
20												
30												
25												
25												

NOTES:

- Test boring terminated at ± 15.0 feet b.e.g.s. (below existing ground surface).
- Ground surface elevations estimated based on drawing titled "Boring Locations - As Staked 2010-10-29," prepared by Becker Morgan Group, dated October 21, 2010.
- Wet-on-spoon conditions observed at 8.0 feet b.e.g.s.
- Water elevation at 9.0 feet b.e.g.s. during drilling.
- Drilling methods utilized: Hollow Stem Augers from 0 to 10 feet b.e.g.s. and mud rotary from 10 to 15 feet b.e.g.s.
- Borehole caved at 5.6 feet b.e.g.s. with water level at 4.1 feet b.e.g.s. upon removal of augers.
- Borehole backfilled with soil cuttings upon completion.



DUFFIELD ASSOCIATES

Consultants in the Geosciences

TEST PIT DESCRIPTIVE LOG

PROJECT: Dover High School

PROJECT NO.: 7158.GC

CLIENT: Becker Morgan Group

DATE: November 3, 2010

LOGGED BY: TRA

<u>Test Pit No.</u>	<u>Depth Range (feet below existing ground surface)</u>	<u>Generalized Soil Description</u>
TP-1	0 – 0.7	TOPSOIL
(Elev. 46.2 feet)	0.7 – 2.0 Sample No. 1 @ 1.5'	Light brown SILT, little fine sand (moist, medium stiff consistency)
	2.0 – 4.0 Sample No. 2 @ 3'	Orange-brown fine SAND, some silty clay, trace medium sand (moist, medium density, slightly plastic)
	4.0 – – – Sample No. 3 @ 6'	Light brown fine to medium SAND, trace to little clay, trace rounded gravel (wet, medium density, plastic, mottled at 4 feet)

NOTES:

- (1) Test pit excavated by Feldmann Brothers, Inc. personnel utilizing a rubber tired backhoe.
- (2) Ground surface elevations estimated based on grade marks provided on a drawing titled, "Dover High School Capital School District, Boring Locations – As Staked 2010-10-29," dated October 21, 2010, prepared by Becker Morgan Group.
- (3) Test pit terminated approximately 12 feet below the existing ground surface (b.e.g.s.).
- (4) Moderate groundwater seepage was observed in the test pit at a depth of 6 feet b.e.g.s.
- (5) Seasonal high water table estimated to be approximately 4 ft b.e.g.s. based on observed redoximorphic features.
- (6) Extensive sidewall caving was observed during the excavation of the test pit below 6 feet b.e.g.s. then below 2 ft b.e.g.s. after completion of the test pit.
- (7) Test pit caved and dry at 6 feet b.e.g.s. upon completion due to sidewall caving.
- (8) Test pit backfilled with excavated soils upon completion.
- (9) Soil descriptions and classifications were performed in general accordance with ASTM D:2488 (Visual-Manual Procedure) and ASTM D:2487 (Unified Soil Classification System) along with laboratory analysis if analysis was performed.



DUFFIELD ASSOCIATES

Consultants in the Geosciences

TEST PIT DESCRIPTIVE LOG

PROJECT: Dover High School

PROJECT NO.: 7158.GC

CLIENT: Becker Morgan Group

DATE: November 3, 2010

LOGGED BY: TRA

<u>Test Pit No.</u>	<u>Depth Range (feet below existing ground surface)</u>	<u>Generalized Soil Description</u>
TP-2	0 – 1.1	TOPSOIL
(Elev. 46.4 feet)	1.1 – 2.0 Sample No. 1 @ 1.5'	Light brown, light gray-brown silty CLAY, trace fine sand (moist, medium stiff consistency)
	2.0 – -- Sample No. 2 @ 2.5' Sample No. 3 @ 5.5'	Light brown, orange-brown, light gray fine to medium SAND, trace to little clay, trace rounded gravel (moist to wet, medium to loose density, plastic, mottled at 4 feet)

NOTES:

- (1) Test pit excavated by Feldmann Brothers, Inc. personnel utilizing a rubber tired backhoe.
- (2) Ground surface elevations estimated based on grade marks provided on a drawing titled, "Dover High School Capital School District, Boring Locations – As Staked 2010-10-29," dated October 21, 2010, prepared by Becker Morgan Group.
- (3) Test pit terminated approximately 11 feet below the existing ground surface (b.e.g.s.).
- (4) Rapid groundwater seepage was observed in the test pit at a depth of 5 feet b.e.g.s.
- (5) Seasonal high water table estimated to be approximately 4 ft b.e.g.s. based on observed redoximorphic features.
- (6) Extensive sidewall caving was observed during the excavation of the test pit below 6 feet b.e.g.s.
- (7) Test pit caved at 8 feet b.e.g.s. with water level at 8 feet b.e.g.s. upon completion.
- (8) Test pit backfilled with excavated soils upon completion.
- (9) Soil descriptions and classifications were performed in general accordance with ASTM D:2488 (Visual-Manual Procedure) and ASTM D:2487 (Unified Soil Classification System) along with laboratory analysis if analysis was performed.



DUFFIELD ASSOCIATES

Consultants in the Geosciences

TEST PIT DESCRIPTIVE LOG

PROJECT: Dover High School

PROJECT NO.: 7158.GC

CLIENT: Becker Morgan Group

DATE: November 3, 2010

LOGGED BY: TRA

<u>Test Pit No.</u>	<u>Depth Range (feet below existing ground surface)</u>	<u>Generalized Soil Description</u>
TP-3	0 – 0.8	TOPSOIL
(Elev. 51.7 feet)	0.8 – 3.0 Sample No. 1 @ 3'	Brown, light gray-brown, light brown, mottled clayey SILT, little to some fine sand (moist, medium consistency)
	3.0 – -- Sample No. 2 @ 4.5' Sample No. 3 @ 8.5' Sample No. 4 @ 9' Sample No. 5 @ 12'	Light gray, light brown fine SAND, little to trace clay, trace medium sand, trace rounded gravel (moist to wet, medium to loose density, mottled at 4 feet, plastic)

NOTES:

- (1) Test pit excavated by Feldmann Brothers, Inc. personnel utilizing a rubber tired backhoe.
- (2) Ground surface elevations estimated based on grade marks provided on a drawing titled, "Dover High School Capital School District, Boring Locations – As Staked 2010-10-29," dated October 21, 2010, prepared by Becker Morgan Group.
- (3) Test pit terminated approximately 13 feet below the existing ground surface (b.e.g.s.).
- (4) Moderate groundwater seepage was observed in the test pit at a depth of 8.5 feet b.e.g.s.
- (5) Seasonal high water table estimated to be approximately 3.5 ft b.e.g.s. based on observed redoximorphic features.
- (6) Moderate sidewall caving was observed during the excavation of the test pit below 8.5 feet b.e.g.s.
- (7) Test pit caved and dry at 12 feet b.e.g.s. upon completion.
- (8) Test pit backfilled with excavated soils upon completion.
- (9) Soil descriptions and classifications were performed in general accordance with ASTM D:2488 (Visual-Manual Procedure) and ASTM D:2487 (Unified Soil Classification System) along with laboratory analysis if analysis was performed.



DUFFIELD ASSOCIATES

Consultants in the Geosciences

TEST PIT DESCRIPTIVE LOG

PROJECT: Dover High School

PROJECT NO.: 7158.GC

CLIENT: Becker Morgan Group

DATE: November 3, 2010

LOGGED BY: TRA

<u>Test Pit No.</u>	<u>Depth Range (feet below existing ground surface)</u>	<u>Generalized Soil Description</u>
TP-4	0 – 0.9	TOPSOIL
(Elev. 51.4 feet)	0.9 – 4.0 Sample No. 1 @ 2.5'	Brown, orange-brown, light brown fine SAND, little clay, trace medium sand (moist, loose to medium density, plastic)
	4.0 – 8.0 Sample No. 2 @ 4.5'	Light brown fine SAND, trace clay, trace medium sand (moist, loose density, slightly plastic, slightly mottled at 4 to 4.5 feet)
	8.0 – – – Sample No. 3 @ 8' Sample No. 4 @ 12.5'	Light gray, yellow-brown, fine SAND, trace clay, trace medium sand lenses, trace rounded gravel (moist to wet, loose to medium density, mottled from 8 to 9 feet, plastic)

NOTES:

- (1) Test pit excavated by Feldmann Brothers, Inc. personnel utilizing a rubber tired backhoe.
- (2) Ground surface elevations estimated based on grade marks on a drawing titled, "Dover High School Capital School District, Boring Locations – As Staked 2010-10-29," dated October 21, 2010, prepared by Becker Morgan Group.
- (3) Test pit terminated approximately 14 feet below the existing ground surface (b.e.g.s.).
- (4) Moderate groundwater seepage was observed in the test pit at a depth of 10.5 feet b.e.g.s.
- (5) Seasonal high water table estimated to be approximately 4.5 ft b.e.g.s. based on observed redoximorphic features.
- (6) Extensive sidewall caving was observed during the excavation of the test pit below 7 feet b.e.g.s. then below 2 ft b.e.g.s. after completion of the test pit.
- (7) Test pit caved at 12 feet b.e.g.s. with water level at 11.5 feet b.e.g.s. upon completion.
- (8) Test pit backfilled with excavated soils upon completion.
- (9) Soil descriptions and classifications were performed in general accordance with ASTM D:2488 (Visual-Manual Procedure) and ASTM D:2487 (Unified Soil Classification System) along with laboratory analysis if analysis was performed.



DUFFIELD ASSOCIATES

Consultants in the Geosciences

TEST PIT DESCRIPTIVE LOG

PROJECT: Dover High School

PROJECT NO.: 7158.GC

CLIENT: Becker Morgan Group

DATE: November 3, 2010

LOGGED BY: TRA

<u>Test Pit No.</u>	<u>Depth Range (feet below existing ground surface)</u>	<u>Generalized Soil Description</u>
TP-5	0 – 1.0	TOPSOIL
(Elev. 53.3 feet)	1.0 – 3.0 Sample No. 1 @ 2'	Brown fine SAND and clayey silt, trace medium sand (moist, medium density, slightly plastic)
	3.0 – 5.0 Sample No. 2 @ 4'	Brown fine SAND, little clayey silt, trace medium sand (moist, loose to medium density, slightly plastic)
	5.0 – -- Sample No. 3 @ 7' Sample No. 4 @ 9.5' Sample No. 5 @ 14'	Light gray, brown, light brown, fine SAND, trace clay, trace medium sand, trace rounded gravel (moist to wet, loose to medium density, slightly mottled at 7.5 feet, slightly plastic)

NOTES:

- (1) Test pit excavated by Feldmann Brothers, Inc. personnel utilizing a rubber tired backhoe.
- (2) Ground surface elevations estimated based on grade marks on a drawing titled, "Dover High School Capital School District, Boring Locations – As Staked 2010-10-29," dated October 21, 2010, prepared by Becker Morgan Group.
- (3) Test pit terminated approximately 14.5 feet below the existing ground surface (b.e.g.s.).
- (4) Moderate groundwater seepage was observed in the test pit at a depth of 11.5 feet b.e.g.s.
- (5) Seasonal high water table estimated to be approximately 7.5 ft b.e.g.s. based on observed redoximorphic features.
- (6) Moderate sidewall caving was observed during the excavation of the test pit below 8.5 feet b.e.g.s.
- (7) Test pit caved at 11.5 feet b.e.g.s. with water level at 11.3 feet b.e.g.s. 1 hour after completion.
- (8) Test pit backfilled with excavated soils upon completion.
- (9) Soil descriptions and classifications were performed in general accordance with ASTM D:2488 (Visual-Manual Procedure) and ASTM D:2487 (Unified Soil Classification System) along with laboratory analysis if analysis was performed.



DUFFIELD ASSOCIATES

Consultants in the Geosciences

TEST PIT DESCRIPTIVE LOG

PROJECT: Dover High School

PROJECT NO.: 7158.GC

CLIENT: Becker Morgan Group

DATE: November 9, 2010

LOGGED BY: TRA

<u>Test Pit No.</u>	<u>Depth Range (feet below existing ground surface)</u>	<u>Generalized Soil Description</u>
I-1A	0 – 1.0	TOPSOIL
(Elev. 43.7 feet)	1.0 – 2.4 Sample No. 1 @ 1.5'	Light gray, dark gray silty CLAY, trace fine sand, trace organics (e.g., root material) (medium stiff consistency, moist)
	2.4 – -- Sample No. 2 @ 3.0'	Light gray, orange-brown, yellow-brown fine SAND, little to trace clayey silt (medium dense, wet)

NOTES:

- (1) Test pit excavated by Feldmann Brothers' personnel utilizing a rubber tired backhoe.
- (2) Ground surface elevations provided on a drawing titled "Dover High School Capital School District, Boring Locations – As Staked 2010-10-29," prepared by the Becker Morgan Group, dated October 21, 2010.
- (3) Test pit terminated approximately 4.0 feet below the existing ground surface (b.e.g.s.).
- (4) Moderate groundwater seepage was observed in the test pit at a depth of 3.5 ft b.e.g.s. during excavation.
- (5) Slight sidewall caving of excavation side walls observed from approximately 3.0 feet b.e.g.s., 0.5 hours after completion of excavation.
- (6) Water level at 3.6 feet b.e.g.s., bottom of excavation at 3.9 ft. b.e.g.s., 1 hour after completion of excavation.
- (7) Seasonal high water table estimated to be approximately 1 ft b.e.g.s. based on observed redoximorphic features.
- (8) Test pit backfilled with excavated soils upon completion.
- (9) Test pit offset approximately 30 ft northeast after obstructing a terracotta pipe (apparent field drainage pipe) approximately 2.5 ft b.e.g.s. at staked location.
- (10) Soil descriptions and classifications were performed in general accordance with ASTM D:2488 (Visual-Manual Procedure) and ASTM D:2487 (Unified Soil Classification System) along with laboratory analysis if analysis was performed.



DUFFIELD ASSOCIATES

Consultants in the Geosciences

TEST PIT DESCRIPTIVE LOG

PROJECT: Dover High School

PROJECT NO.: 7158.GC

CLIENT: Becker Morgan Group

DATE: November 9, 2010

LOGGED BY: TRA

<u>Test Pit No.</u>	<u>Depth Range (feet below existing ground surface)</u>	<u>Generalized Soil Description</u>
I-2	0 – 0.5	TOPSOIL
(Elev. 45.0 feet)	0.5 – 2.5 Sample No. 1A @ 1.5' Sample No. 2A @ 1.6'	Light gray, orange-brown clayey SILT (mottled), some fine sand (stiff consistency, moist) Lab results for sample S-2A <ul style="list-style-type: none">• Moisture: 15%• Percent passing No. 270 sieve: 76%• USDA: Silty Loam• USCS: ML
	2.5 – 4.7 Sample No. 2 @ 3.5'	Light gray fine SAND, trace to little medium sand, trace silty clay, trace rounded gravel (loose to medium dense, moist to wet)
	4.7 – -- Sample No. 3 @ 5.5'	Orange-brown, light gray, yellow-brown fine SAND (mottled), little medium sand, trace to little gravel, trace clay (medium dense, wet)

NOTES:

- 1) Test pit excavated by Feldmann Brothers' personnel utilizing a rubber tired backhoe.
- 2) Ground surface elevations provided on a drawing titled "Dover High School Capital School District, Boring Locations – As Staked 2010-10-29," prepared by the Becker Morgan Group, dated October 21, 2010.
- 3) Test pit terminated approximately 7.0 feet below the existing ground surface (b.e.g.s.).
- 4) Rapid groundwater seepage was observed in the test pit at a depth of 6.0 ft b.e.g.s. during excavation.
- 5) Moderate sidewall caving of excavation side walls observed from approximately 3.0 to 6.0 feet b.e.g.s., 0 to 1 hours after completion of excavation.
- 6) Water level at 2.8 feet b.e.g.s., 0 to 1 hour after completion of excavation.
- 7) Seasonal high water table estimated to be approximately 0.5 ft b.e.g.s. based on observed redoximorphic features.
- 8) Single ring infiltration test performed at approximately 1.5 feet b.e.g.s.
- 9) Test pit backfilled with excavated soils upon completion.
- 10) Terracotta pipe (apparent field drainage pipe) obstructed approximately 2 ft b.e.g.s. at staked location.
- 11) Soil descriptions and classifications were performed in general accordance with ASTM D:2488 (Visual-Manual Procedure) and ASTM D:2487 (Unified Soil Classification System) along with laboratory analysis if analysis was performed.



DUFFIELD ASSOCIATES

Consultants in the Geosciences

TEST PIT DESCRIPTIVE LOG

PROJECT: Dover High School

PROJECT NO.: 7158.GC

CLIENT: Becker Morgan Group

DATE: November 9, 2010

LOGGED BY: TRA

<u>Test Pit No.</u>	<u>Depth Range (feet below existing ground surface)</u>	<u>Generalized Soil Description</u>
I-3	0 – 0.6	TOPSOIL
(Elev. 47.0 feet)	0.6 – 2.6 Sample No. 1 @ 0.6'	Gray-brown, orange-brown silty CLAY (slightly mottled), little fine sand (medium consistency, moist)
	2.6 – 5.5 Sample No. 2 @ 3.5' Sample No. 3 @ 3.8'	Gray-brown, light gray, orange-brown fine SAND (slightly mottled), some silty clay, trace rounded gravel (medium dense, moist) Lab results for sample S-3 <ul style="list-style-type: none">• Moisture: 18.6%• Percent passing No. 270 sieve: 24.6%• USDA: Sandy Loam• USCS: SM (cemented sands 3.7 to 4.2 feet b.e.g.s)
	5.5 – -- Sample No. 4 @ 6.5'	Light brown fine to medium SAND, trace to little silty clay (loose density, wet)

NOTES:

- 1) Test pit excavated by Feldmann Brothers' personnel utilizing a rubber tired backhoe.
- 2) Ground surface elevations provided on a drawing titled "Dover High School Capital School District, Boring Locations – As Staked 2010-10-29," prepared by the Becker Morgan Group, dated October 21, 2010.
- 3) Test pit terminated approximately 7.0 feet below the existing ground surface (b.e.g.s.).
- 4) Rapid groundwater seepage was observed in the test pit at a depth of 5.5 ft b.e.g.s. during excavation.
- 5) Moderate sidewall caving of excavation side walls observed from approximately 5.0 to 7.0 feet b.e.g.s. during excavation.
- 6) Water level at 5.6 feet b.e.g.s., bottom of excavation at 6.0 ft. b.e.g.s. at completion of excavation.
- 7) Seasonal high water table estimated to be approximately 3 ft b.e.g.s. based on observed redoximorphic features.
- 8) Single ring infiltration test performed at approximately 3.5 feet b.e.g.s.
- 9) Test pit backfilled with excavated soils upon completion.
- 10) Soil descriptions and classifications were performed in general accordance with ASTM D:2488 (Visual-Manual Procedure) and ASTM D:2487 (Unified Soil Classification System) along with laboratory analysis if analysis was performed.



DUFFIELD ASSOCIATES

Consultants in the Geosciences

TEST PIT DESCRIPTIVE LOG

PROJECT: Dover High School

PROJECT NO.: 7158.GC

CLIENT: Becker Morgan Group

DATE: November 9, 2010

LOGGED BY: TRA

<u>Test Pit No.</u>	<u>Depth Range (feet below existing ground surface)</u>	<u>Generalized Soil Description</u>
I-4	0 – 0.8	TOPSOIL
(Elev. 49.7 feet)	0.8 – 3.2 Sample No. 1 @ 2.0'	Light brown clayey SILT, little fine sand, trace rounded gravel (medium consistency, moist)
	3.2– 3.8	Orange-brown, red-brown fine SAND, little silty clay, trace rounded gravel (dense, moist)
	3.8 – 4.5	Gray, orange-brown SILT (mottled), little fine sand, trace clay (stiff consistency, moist)
	4.5 – – – Sample No. 2 @ 4.5' Sample No. 3 @ 5'	Light orange-brown fine SAND, some silty clay (medium dense, moist) Lab results for sample S-3 <ul style="list-style-type: none">• Moisture: 18.1%• Percent passing No. 270 sieve: 19.7%• USDA: Sandy Loam• USCS: SM

NOTES:

1. Test pit excavated by Feldmann Brothers' personnel utilizing a rubber tired backhoe.
2. Ground surface elevations provided on a drawing titled "Dover High School Capital School District, Boring Locations – As Staked 2010-10-29," prepared by the Becker Morgan Group, dated October 21, 2010.
3. Test pit terminated approximately 9.0 feet below the existing ground surface (b.e.g.s.).
4. Moderate groundwater seepage was observed in the test pit at a depth of 8.0 ft b.e.g.s. during excavation.
5. Moderate sidewall caving of excavation side walls observed from approximately 7.0 to 9.0 feet b.e.g.s. during excavation.
6. Water level at 8.5 feet b.e.g.s., bottom of excavation at 8.8 ft. b.e.g.s. at completion of excavation.
7. Seasonal high water table estimated to be approximately 5.8 ft b.e.g.s. based on observed redoximorphic features.
8. Single ring infiltration test performed at approximately 4.5 feet b.e.g.s.
9. Test pit backfilled with excavated soils upon completion.
10. Soil descriptions and classifications were performed in general accordance with ASTM D:2488 (Visual-Manual Procedure) and ASTM D:2487 (Unified Soil Classification System) along with laboratory analysis if analysis was performed.



DUFFIELD ASSOCIATES

Consultants in the Geosciences

TEST PIT DESCRIPTIVE LOG

PROJECT: Dover High School

PROJECT NO.: 7158.GC

CLIENT: Becker Morgan Group

DATE: November 9, 2010

LOGGED BY: TRA

<u>Test Pit No.</u>	<u>Depth Range (feet below existing ground surface)</u>	<u>Generalized Soil Description</u>
I-5	0 – 0.8	TOPSOIL
(Elev. 52.8 feet)	0.8 – 2.1 Sample No. 1 @ 1.5'	Orange, light brown, dark brown silty CLAY, trace fine sand (stiff consistency, moist)
	2.1 – 3.2 Sample No. 2 @ 2.5	Brown, light brown fine SAND and silty CLAY, trace medium sand (medium dense, moist)
	3.2 – -- Sample No. 3 @ 3.8' Sample No. 4 @ 4.0'	Light brown, light gray fine to medium SAND, some silty clay, trace rounded gravel (medium dense, moist) Lab results for sample S-4 <ul style="list-style-type: none">• Moisture: 15.2%• Percent passing No. 270 sieve: 20.4%• USDA: Sandy Loam• USCS: SM
	Sample No. 5 @ 6.5'	Light brown, light gray fine to medium SAND, little silty clay, trace rounded gravel (medium dense, wet)

NOTES:

- (1) Test pit excavated by Feldmann Brothers' personnel utilizing a rubber tired backhoe.
- (2) Ground surface elevations provided on a drawing titled "Dover High School Capital School District, Boring Locations – As Staked 2010-10-29," prepared by the Becker Morgan Group, dated October 21, 2010.
- (3) Test pit terminated approximately 7.5 feet below the existing ground surface (b.e.g.s.).
- (4) No groundwater seepage or sidewall caving observed during the excavation of the test pit.
- (5) No apparent redoximorphic features indicating seasonal high water table observed.
- (6) Single ring infiltration test performed at approximately 4 feet b.e.g.s.
- (7) Test pit backfilled with excavated soils upon completion.
- (8) Soil descriptions and classifications were performed in general accordance with ASTM D:2488 (Visual-Manual Procedure) and ASTM D:2487 (Unified Soil Classification System) along with laboratory analysis if analysis was performed.



DUFFIELD ASSOCIATES

Consultants in the Geosciences

TEST PIT DESCRIPTIVE LOG

PROJECT: Dover High School

PROJECT NO.: 7158.GC

CLIENT: Becker Morgan Group

DATE: November 9, 2010

LOGGED BY: TRA

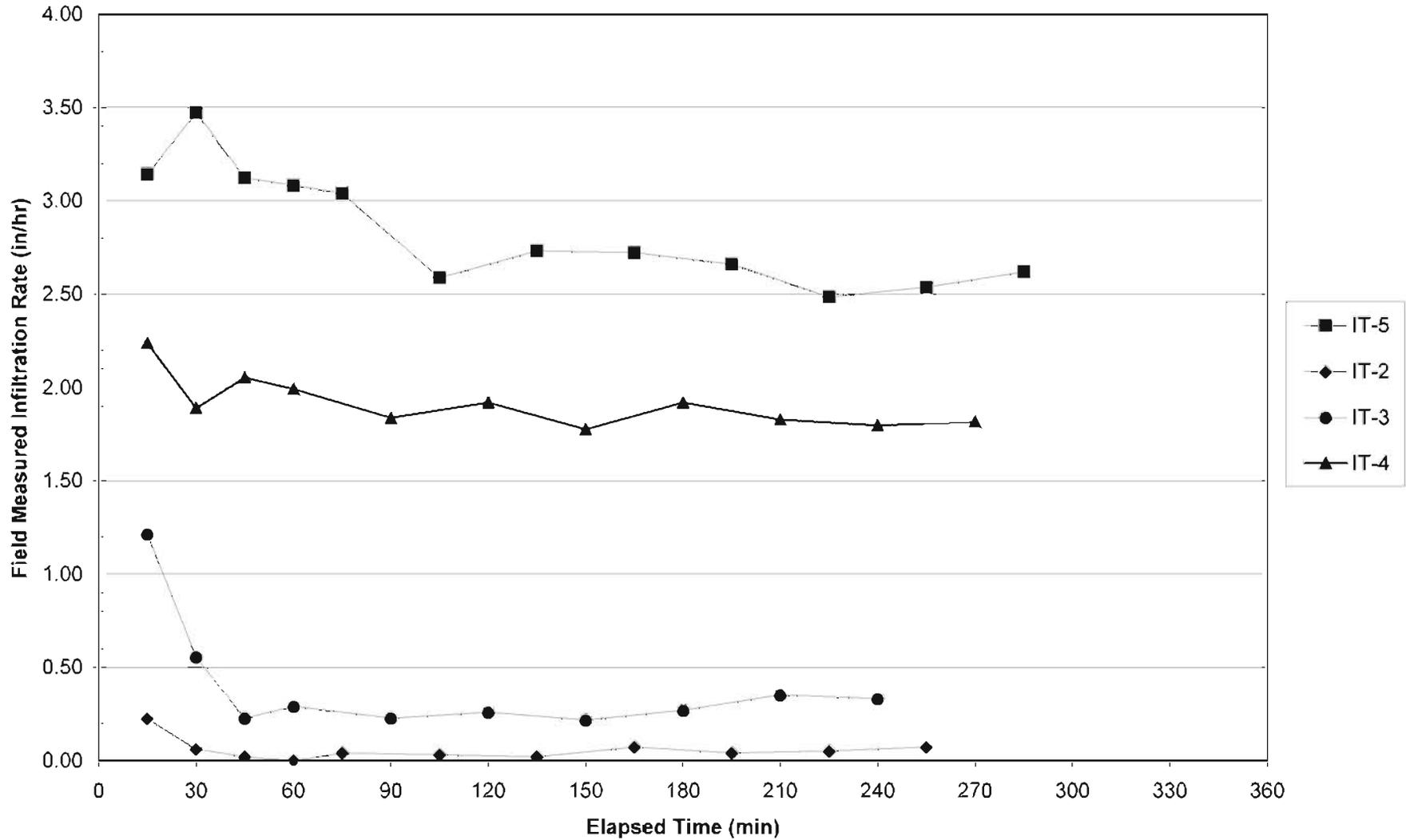
<u>Test Pit No.</u>	<u>Depth Range (feet below existing ground surface)</u>	<u>Generalized Soil Description</u>
I-6	0 – 0.7	TOPSOIL
(Elev. 49.7 feet)	0.7 – 2.3 Sample No. 1 @ 1.5'	Light gray-brown silty CLAY, little fine sand (medium consistency, moist)
	2.3 – 6.0 Sample No. 2 @ 4.0'	Light gray-brown, orange-brown fine SAND (slightly mottled) some to and silty CLAY, trace medium sand (medium dense, moist)
	6.0 – -- Sample No. 3 @ 8.0'	Orange-brown, light gray fine SAND (slightly mottled), little silty clay, trace medium sand (medium dense, wet)

NOTES:

1. Test pit excavated by Feldmann Brothers' personnel utilizing a rubber tired backhoe.
2. Ground surface elevations provided on a drawing titled "Dover High School Capital School District, Boring Locations – As Staked 2010-10-29," prepared by the Becker Morgan Group, dated October 21, 2010.
3. Test pit terminated approximately 11.0 feet below the existing ground surface (b.e.g.s.).
4. Slight groundwater seepage was observed in the test pit at a depth of 9.0 ft b.e.g.s.
5. Slight sidewall caving of excavation side walls observed from approximately 7.0 to 9.0 feet b.e.g.s., 0.5 hours after completion of excavation.
6. Water level at 8.5 feet b.e.g.s., bottom of excavation at 9.0 ft. b.e.g.s. 1.0 hour after completion of excavation.
7. Seasonal high water table estimated to be approximately 2.5 ft b.e.g.s. based on observed redoximorphic features.
8. Test pit backfilled with excavated soils upon completion.
9. Soil descriptions and classifications were performed in general accordance with ASTM D:2488 (Visual-Manual Procedure) and ASTM D:2487 (Unified Soil Classification System) along with laboratory analysis if analysis was performed.

Proposed Dover High School Capital School District

Infiltration Test Results Plot



APPENDIX C

GENERAL NOTES

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous construction waste.
 - 2. Recycling nonhazardous construction waste.
 - 3. Disposing of nonhazardous construction waste.
- B. Related Requirements:
 - 1. Section 04 20 00 "Unit Masonry" for disposal requirements for masonry waste.
 - 2. Section 31 10 00 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.02 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- C. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- D. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- E. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.03 PERFORMANCE REQUIREMENTS

- A. General: Achieve minimum end-of-Project rates for salvage/recycling of 75 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:
 - 1. Construction Waste:
 - a. Masonry and CMU.
 - b. Lumber.
 - c. Wood sheet materials.
 - d. Wood trim.
 - e. Metals.
 - f. Roofing.
 - g. Insulation.
 - h. Carpet and pad.
 - i. Gypsum board.
 - j. Piping.
 - k. Electrical conduit.
 - l. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.

- 2) Cardboard.
- 3) Boxes.
- 4) Plastic sheet and film.
- 5) Polystyrene packaging.
- 6) Wood crates.
- 7) Plastic pails.

1.04 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 30 days of date established for the Notice to Proceed.

1.05 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:
 1. Material category.
 2. Generation point of waste.
 3. Total quantity of waste in tons.
 4. Quantity of waste salvaged, both estimated and actual in tons.
 5. Quantity of waste recycled, both estimated and actual in tons.
 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. LEED Submittal: LEED letter template for Credit MR 2, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
- H. Qualification Data: For waste management coordinator and refrigerant recovery technician.
- I. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.06 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements, that employs a LEED-Accredited Professional, certified by the USGBC, as waste management coordinator.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

- C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss waste management plan including responsibilities of waste management coordinator.
 - 2. Review requirements for documenting quantities of each type of waste and its disposition.
 - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - 5. Review waste management requirements for each trade.

1.07 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Track and keep a summary log of all construction waste generated by type, the quantities of each type that were diverted and landfilled, and the total percentage of waste diverted from landfill disposal. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan. Plan shall, at a minimum, identify the diversion goals, relevant construction debris and materials to be diverted, implementation protocols, and parties responsible for implementing the plan.
- B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 - 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 - 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 - 5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 - 6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with operation, termination, and removal requirements in Section 01 50 00 "Temporary Facilities and Controls."
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 1. Distribute waste management plan to everyone concerned within three days of submittal return.
 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 2. Comply with Section 01 50 00 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.02 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 4. Store components off the ground and protect from the weather.
 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.03 RECYCLING CONSTRUCTION WASTE

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

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
- C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

3.04 DISPOSAL OF WASTE

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

END OF SECTION

SECTION 01 81 13

SUSTAINABLE DESIGN REQUIREMENTS LEED FOR SCHOOLS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes general requirements and procedures for compliance with certain USGBC LEED prerequisites and credits needed for Project to pursue LEED Silver certification based on USGBC's "LEED 2009 for Schools New Construction and Major Renovations."
 - 1. Other LEED prerequisites and credits needed to obtain LEED certification depend on product selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests and comparable product requests.
 - 2. Additional LEED prerequisites and credits needed to obtain the indicated LEED certification depend on Architect's design and other aspects of Project that are not part of the Work of the Contract.
 - 3. A copy of the LEED Project checklist is attached at the end of this Section for information only.
- B. Related Requirements:
 - 1. Divisions 01 through 49 Sections for LEED requirements specific to the work of each of these Sections. Requirements may or may not include reference to LEED.

1.02 DEFINITIONS

- A. Agrifiber Board: A composite panel product derived from recovered agricultural waste fiber from sources such as cereal straw, sugarcane bagasse, sunflower husk, walnut shells, coconut husks, and agricultural prunings. The raw fibers are processed and mixed with resins to produce panel products with characteristics similar to those derived from wood fiber. The following conditions describe which products must comply with requirements:
 - 1. The product is inside the building's waterproofing system.
 - 2. Composite components used in assemblies are to be included (e.g., door cores, panel substrates).
 - 3. The product is part of the base building systems.
- B. Certified Wood:
 - 1. Chain-of-Custody (COC): A tracking procedure for a product from the point of harvest or extraction to its end use, including all successive stages of processing, transformation, manufacturing, and distribution.
 - 2. Chain-of-Custody Certification: Certification awarded to companies that produce, sell, promote, or trade forest products after audits verify proper accounting of material flows and proper use of the Forest Stewardship Council name and logo. The COC certificate number is listed on invoices for nonlabeled products to document that an entity has followed FSC guidelines for product accounting.
- C. Composite Wood: Wood or plant particles or fibers bonded together by a synthetic resin or binder. Examples include plywood, particleboard, oriented-strand board (OSB), medium-density fiberboard (MDF), and composite door cores. The following conditions describe which products must comply with the credit requirements:
 - 1. The product is inside the buildings waterproofing system.
 - 2. Composite wood components used in assemblies are included (e.g., door cores, panel substrates, plywood sections of I-beams).
 - 3. The product is part of the base building systems.

- D. Construction Indoor Air Quality Management Plan: A plan that outlines measures to minimize contamination in a specific Project building during construction and describes procedures to flush the building of contaminant prior to occupancy.
- E. Construction and Demolition Debris: Waste and recyclables generated from construction and from the renovation, demolition, or deconstruction of preexisting structures. It does not include land-clearing debris, such as soil, vegetation, and rocks.
- F. Contaminants: Unwanted airborne elements that may reduce air quality. (ASHRAE 62.1-2007)
- G. Indoor Air Quality (IAQ): The nature of air inside a building that affects the health and well-being of building occupants. It is considered acceptable when there are known contaminants at harmful concentrations as determined by cognizant authorities and with which a substantial majority (80% or more) of the people exposed do not express dissatisfaction. (ASHRAE 62.1-2004).
- H. Minimum Efficiency Reporting Value (MERV): A filter rating established by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE 52.2-1999, Method of Testing General Ventilation Air Cleaning Devices for Removal Efficiency by Particle Size). MERV categories range from 1 (very low efficiency) to 16 (very high).
- I. Rapidly Renewable Materials: Agricultural products, both fiber and animal, that take 10 years or less to grow or raise and can be harvested in a sustainable fashion.
- J. Recycled Content: The proportion, by mass, of preconsumer or postconsumer recycled material in a product (ISO 14021).
 - 1. Postconsumer Recycled Content: The percentage of material in a product that was consumer waste. The recycled material was generated by household, commercial, industrial, or institutional end-users and can no longer be used for its intended purpose. It includes returns of materials from the distribution chain (ISO 14021). Examples include construction and demolition debris, materials collected through recycling programs, discarded products (e.g., furniture, cabinetry, decking), and landscaping waste (e.g., leaves, grass clippings, tree trimmings).
 - 2. Preconsumer Recycled Content: Formerly known as “postindustrial content”, this is the percentage of material in a product that is recycled from manufacturing waste. Examples include planer shavings, sawdust, bagasse, walnut shells, culls, trimmed materials, overissue publications, and obsolete inventories. Excluded are rework, regrind, or scrap materials capable of being reclaimed within the same process that generated them (ISO 14021).
- K. Recycling: The collection, reprocessing, marketing, and use of materials that were diverted or recovered from the solid waste stream.
- L. Refurbished Materials: Products that could have been disposed of as solid waste. These products have completed their life cycle as consumer items and are then refurbished for reuse without substantial alteration of their form. Refurbishing includes renovating, repairing, restoring, or generally improving the appearance, performance, quality, functionality, or value of a product.
- M. Regional Materials:
 - 1. Regionally Extracted Materials: Raw materials taken from within a 500-mile radius of the Project Site.
 - 2. Regionally Manufactured Materials: Materials assembled as finished products within a 500-mile radius of the Project Site
 - 3. Remanufactured Materials: Items that are made into other products. One example is concrete that is crushed and used as subbase.

- N. Reuse: The return of materials to active use in the same or a related capacity as their original use, thus extending the lifetime of materials that would otherwise be discarded.
- O. Salvaged Materials/Reused Materials: Construction materials recovered from existing buildings or construction sites and reused. Common salvaged materials include structural beams and posts, flooring, doors, cabinetry, brick, and decorative items.
- P. Urea-Formaldehyde: A combination of urea and formaldehyde that is used in some glues and may emit formaldehyde at room temperature.
- Q. Verification: The range of checks and tests carried out to determine whether components, subsystems, systems, and interfaces between systems operate in accordance with the Contract Documents.
- R. Volatile Organic Compounds (VOCs): Carbon compounds that participate in atmospheric photochemical reactions (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonates, and ammonium carbonate). The compounds vaporize at normal room temperatures.

1.03 REFERENCE STANDARDS

- A. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
 - 1. ASHRAE 52.2-1999: Method of Testing General Ventilation Air-Conditioning Devices for Removal Efficiency by Particle Size.
 - 2. ASHRAE 55: Thermal Environmental Conditions for Human Occupancy. Atlanta: ASHRAE, 2004.
 - 3. ASHRAE 62.1: Ventilation for Acceptable Indoor Air Quality, 2004.
 - 4. ASHRAE Guideline 1: The HVAC Commissioning Process, 1996.
- B. American Society of Heating, Refrigerating and Air-Conditioning Engineers/Illuminating Engineering Society of North America (ASHRAE/IESNA):
 - 1. ASHRAE/IESNA 90.1: Energy Standard for Buildings except Low-Rise Residential Buildings. Atlanta/New York: ASHRAE/IESNA, 2004.
- C. California Department of Health Services:
 - 1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
 - a. Available in PDF at www.cal-iaq.org/VOC/
- D. Carpet and Rug Institute; <http://www.carpet-rug.org/>:
 - 1. CRI 104-2002: Standard for Installation Specification of Commercial Carpet:
 - a. Green Label (testing program).
 - b. Green Label Plus (testing program).
- E. Code of Federal Regulations:
 - 1. 40 CFR 59, Subpart D-2001: National Volatile Organic Compound Emission Standard for Architectural Coatings.
- F. Efficiency Valuation Organization (P.O. Box 23363, Washington, DC 20026-3363):
 - 1. International Performance Measurement and Verification Protocol (IPMVP), Volume III: Concepts and Options for Determining Energy Savings in New Construction, 2003.
 - a. Available in PDF at www.ipmvp.org.
- G. Environmental Protection Agency:
 - 1. Compendium of Methods for the Determination of Air Pollutants in Indoor Air. April 1990.
 - 2. Document No. 832R92005: Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices. Washington, DC: EPA, 1992. Available from Department of Commerce, National Technical

Information Service, www.ntis.gov; Ch. 3 is available in PDF at
www.epa.gov/npdes/pubs/chap03_conguide.pdf

3. Document No. 840R92002: Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters. 1993. (Available from Department of Commerce, National Technical Information Service, www.ntis.gov)

H. Environmental Protection Agency:

1. FSC STD-01-001-2004: FSC Principals and Criteria for Stewardship; available in PDF at www.fsc.org.

I. Green Seal; <http://www.green seal.org>:

1. Green Seal GC-03: Green Seal Environmental Standard for Anti-Corrosive Paints, 2nd Edition, January 7, 1997.
2. Green Seal GS-11: Green Seal Environmental Standard for Paints and Coatings, 1st Edition, May 20, 1993.
3. Green Seal GS-36: Green Seal Environmental Standard for Commercial Adhesives, 1st Edition, October 9, 2000.

J. Public Technology Institute/U.S. Green Building Council:

1. Sustainable Building Technical Manual - Green Building Design, Construction, and Operation. Washington, DC: PTI/USGBC, 1996. (1301 Pennsylvania Ave. NW, Washington, DC 20004; 202-626-2412; available to members of the USGBC in PDF at www.usgbc.org)

K. Resilient Floor Covering Institute; <http://www.rfci.com>:

1. FloorScore Program; http://www.rfci.com/int_FloorScore.htm.

L. Sheet Metal and Air Conditioning Contractors' National Association:

1. SMACNA IAQ Guideline for Occupied Buildings under Construction. 1995.

M. South Coast Air Quality Management District; <http://www.aqmd.gov/>:

1. Rule 1113 - Architectural Coatings.
2. Rule 1168 - Adhesive and Sealant Applications.

N. U.S. Green Building Council; <http://www.usgbc.org/>:

1. LEED Reference Guide for Green Building Design and Construction, Schools 2009 Edition .

1.04 ADMINISTRATIVE SUBMITTALS

- A. Respond to questions and requests from Architect, LEED requirements coordinator (Project LEED AP), and the USGBC regarding LEED credits that are the responsibility of the Contractor, that depend on product selection or product qualities, or that depend on Contractor's procedures until the USGBC has made its determination on the project's LEED certification application. Document responses as informational submittals.

1.05 ACTION SUBMITTALS

- A. General: Submit additional LEED submittals required by other Specification Sections.
- B. LEED submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated LEED requirements.
- C. LEED Documentation Submittals:
 1. Credit EA 5 "Measurement and Verification": Product data and wiring diagrams for sensors and data collection system used to provide continuous metering of building energy-consumption performance over a period of time of not less than one year of postconstruction occupancy.

- a. Credit MR 2 “Construction Waste Management”: Comply with Section 01 74 19 "Construction Waste Management and Disposal."
- b. Credit MR 4 “Recycled Content”:
 - 1) List of product names, manufacturers' names, costs, percentage postconsumer content, and percentage preconsumer content.
 - 2) Cutsheets or manufacturer's letters to document the listed products' recycled content.
 - 3) List of actual materials costs, excluding labor and equipment, for CSI MasterFormat 2004 Edition Divisions 02-10 only.
- c. Credit MR 5 “Regional Materials”:
 - 1) List of product purchases manufactured, extracted, or harvested regionally.
 - 2) List of manufacturers' names, product costs, distances between the Project and manufacturer, and distances between the Project and the extraction site.
 - 3) Cutsheets that document material origin and manufacture within a 500-mile radius of the Project Site.
 - 4) List of actual materials costs, excluding labor and equipment, for CSI MasterFormat 2004 Edition Divisions 02-10 only.
- d. Credit MR 6 “Rapidly Renewable Materials”:
 - 1) List of rapidly renewable product purchases.
 - 2) List of manufacturers' names, materials costs, the percentage of each product that is rapidly renewable criteria (by weight), and each compliant value.
 - 3) Cutsheets that document rapidly renewable criteria.
 - 4) List of actual materials costs, excluding labor and equipment, for CSI MasterFormat 2004 Edition Divisions 02-10 only.
- e. Credit MR 7 “Certified Wood”: Product data and chain-of-custody (COC) certificates for products containing wood-based materials and products that are certified in accordance with the Forest Stewardship Council's (FSC's) principles and criteria and that are permanently installed in the Project.
 - 1) Each wood product must be identified on a line item basis.
 - 2) FSC products must be identified as such on a line item basis.
 - 3) The dollar value of each line item must be shown.
 - 4) Vendor invoices for each certified wood product. The vendor's COC certificate number must be shown on any invoice that includes FSC certified products.
 - 5) Include statement indicating cost for each certified wood product.
- f. Credit EQ 3.1 “Construction Indoor Air Quality Plan - During Construction”:
 - 1) Construction indoor-air-quality management plan.
 - 2) Product data for temporary filtration media, including MERV rating.
 - 3) Product data for filtration media used during occupancy, including MERV rating.
 - 4) Construction Documentation: Six photographs at three different times during the construction period, along with a brief description of the SMACNA approach employed, documenting implementation of the indoor-air-quality management measures, such as protection of ducts and on-site stored or installed absorptive materials.
- g. Credit IEQ 3.2 “Construction Indoor Air Quality Plan - Before Occupancy”:
 - 1) Submit a written construction indoor-air-quality management plan
 - 2) If Air Flush Out:
 - (a) Signed statement describing the building air flush-out procedures including the dates when flush-out was begun and completed, occupancy, outdoor air delivery rates, internal temperature, and humidity as well as any special

- considerations. Also include a statement that filtration media was replaced after flush-out.
- (b) Product data for filtration media used during flush-out and during occupancy.
- 3) If Air Testing:
- (a) Report from testing and inspecting agency indicating results of indoor-air-quality testing and documentation verifying that all required contaminants are accounted for and reported in the correct unit of measure.
- h. Credit IEQ 4.1 “Low-Emitting Materials - Adhesives & Sealants”:
- Submit a list of each indoor adhesive product, sealant, and sealant primer used on the interior of the building (i.e., inside of the weatherproofing system and applied on-site).
 - 1) Include manufacturer's name, product name, and specific VOC data (g/L, less water) for each product, as well as corresponding allowable VOC from the referenced standard.
 - 2) Submit laboratory test reports and other required documentation for each adhesive and sealant installed in the building interior that it meets the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.
- i. Credit IEQ 4.2 “Low-Emitting Materials - Paints & Coatings”:
- Submit a list of each paint and coating used on the interior of the building (i.e., inside of the weatherproofing system and applied on-site).
 - 1) Include manufacturer's name, product name, and specific VOC data (g/L, less water) for each product, as well as corresponding allowable VOC from the referenced standard.
 - 2) Submit laboratory test reports and other required documentation for each paint and coating installed in the building interior that it meets the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.
- j. Credit IEQ 4.3 “Low-Emitting Materials - Flooring Systems”:
- 1) Submit a list of each carpet, carpet cushion, and carpet adhesive installed in the building interior. Include manufacturer's name and product name. Record the VOC content for each adhesive.
 - 2) Submit a list of each hard surface flooring product, tile setting adhesive, finishes, and grout installed in the building interior. Record the VOC content for each tile setting adhesive and grout.
 - 3) Submit laboratory test reports and other required documentation for each flooring element installed in the building interior that it meets the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.
- k. Credit IEQ 4.4 “Low-Emitting Materials - Composite Wood & Agrifiber Products”:
- 1) Submit a list of each composite wood and agrifiber product installed in the building interior.
 - 2) Submit product data for each product containing composite wood or agrifiber products or wood glues indicating that each product contains no added urea-formaldehyde resins.

- 3) Submit product data for each laminating adhesive used to fabricate on-site and shop-applied composite wood and agrifiber assemblies indicating that each does not contain added urea-formaldehyde resins.
- 4) Submit laboratory test reports and other required documentation for each composite wood and agrifiber product installed in the building interior that it meets the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.
- l. Credit IEQ 4.5 "Low-Emitting Materials - Furniture and Furnishings":
 - 1) Submit a list of each Classroom furniture including all student desks, tables, and seats that was manufactured, refurbished or refinished within 1 year prior to occupancy. Salvaged and used furniture that is more than 1 year old at time of the occupancy is excluded from the credit requirements. Include manufacturer's name and product name.
 - 2) Submit required documentation for each furniture element to meet either option 1, 2 or 3.
- m. Credit IEQ 4.6 "Low-Emitting Materials - Ceiling and Wall Systems":
 - 1) Submit a list of all gypsum board, insulation, acoustical ceiling systems and wall coverings installed in the building interior (defined as, inside the weatherproofing system and applied on-site). Include manufacturer's name and product name.
 - 2) Submit laboratory test reports and other required documentation for each product that it meets the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For LEED coordinator.
- B. Project Materials Cost Data: Provide statement indicating total cost for materials used for Project. Costs exclude labor, overhead, and profit. Include breakout of costs for the following categories of items:
 1. Furniture.
 2. Plumbing.
 3. Mechanical.
 4. Electrical.
 5. Specialty items such as elevators and equipment.
 6. Wood-based construction materials.
- C. LEED Action Plans: Provide preliminary submittals within 30 days of date established for the Notice to Proceed indicating how the following requirements will be met:
 1. Credit MR 2 "Construction Waste Management": Waste management plan complying with Section 01 74 19 "Construction Waste Management and Disposal."
 2. Credit MR 4 "Recycled Content": List of proposed materials with recycled content. Indicate cost, post-consumer recycled content, and pre-consumer recycled content for each product having recycled content.
 3. Credit MR 5 "Regional Materials": List of proposed regional materials. Identify each regional material, including its source, cost, and the fraction by weight that is considered regional.
 4. Credit MR 6 "Rapidly Renewable Materials": List of proposed rapidly renewable materials. Identify each rapidly renewable material, including its source, cost, and the

percentage of each product that is rapidly renewable criteria (by weight), and each compliant value.

5. Credit MR 7 “Certified Wood”: List of proposed certified wood products. Indicate each product containing certified wood, including its source and cost of certified wood products.
 6. Credit IEQ 3.1 “Construction Indoor Air Quality Plan - During Construction”: Construction indoor-air-quality management plan.
- D. LEED Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with LEED action plans for the following:
1. Credit MR 2 “Construction Waste Management”: Waste reduction progress reports complying with Section 01 74 19 "Construction Waste Management and Disposal."
 2. Credit MR 4 “Recycled Content”: Recycled content.
 3. Credit MR 5 “Regional Materials”: Regional materials.
 4. Credit MR 6 “Rapidly Renewable Materials”: Rapidly renewable materials.
 5. Credit MR 7 “Certified Wood”: Certified wood products.

1.07 QUALITY ASSURANCE

- A. LEED Coordinator: Engage an experienced LEED-Accredited Professional to coordinate LEED requirements. LEED coordinator may also serve as waste management coordinator.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Provide products and procedures necessary to obtain LEED credits required in this Section. Although other Sections may specify some requirements that contribute to LEED credits, the Contractor shall determine additional materials and procedures necessary to obtain LEED credits indicated.

2.02 RECYCLED CONTENT OF MATERIALS

- A. Credit MR 4 “Recycled Content”: Building materials shall have recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content for Project constitutes a minimum of 20 percent of cost of materials used for Project.
1. Cost of post-consumer recycled content plus one-half of pre-consumer recycled content of an item shall be determined by dividing weight of post-consumer recycled content plus one-half of pre-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.
 2. Do not include plumbing, mechanical and electrical components, and specialty items such as elevators and equipment in the calculation. Furniture may be included if it is included consistently in MR credits 3-7.

2.03 REGIONAL MATERIALS

- A. Credit MR 5 “Regional Materials”: Not less than 20 percent of building materials (by cost) shall be regional materials.
1. If only a fraction of a product or material is extracted, harvested, or recovered and manufactured locally, then only that percentage (by weight) must contribute to the regional value.
 2. Do not include plumbing, mechanical and electrical components, and specialty items such as elevators and equipment in the calculation. Furniture may be included if it is included consistently in MR credits 3-7.

2.04 RAPIDLY RENEWABLE MATERIALS

- A. Credit MR 6 “Rapidly Renewable Materials”: Not less than 2.5 percent of the total value of all building materials and products used in the Project, based on cost, shall be rapidly renewable materials.
1. Furniture may be included if it is included consistently in MR credits 3-7.

2.05 CERTIFIED WOOD

- A. Credit MR 7 “Certified Wood”: Not less than 50 percent (by cost) of wood-based materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
1. Include only materials permanently installed in the project. Wood Products purchased for temporary use on the project may be included at the project team's discretion. If any such materials are included, all such materials must be included.
 2. Furniture may be included if it is included consistently in MR credits 3-7.
 3. Wood-based materials include, but are not limited to, the following materials when made from wood, engineered wood products, or wood-based panel products:
 - a. Rough carpentry.
 - b. Miscellaneous carpentry.
 - c. Heavy timber construction.
 - d. Wood decking.
 - e. Metal-plate-connected wood trusses.
 - f. Structural glued-laminated timber.
 - g. Finish carpentry.
 - h. Architectural woodwork.
 - i. Wood paneling.
 - j. Wood veneer wall covering.
 - k. Wood flooring.
 - l. Wood lockers.
 - m. Wood cabinets.
 - n. Furniture.

2.06 LOW-EMITTING MATERIALS

- A. Credit IEQ 4.1 “Low-Emitting Materials - Adhesives & Sealants”: All adhesives and sealants installed in the building interior (defined as, inside the weatherproofing system and applied on-site) must meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.
1. School projects may chose from IEQ credits 4.1-4.6 for a maximum of 4 points.
- B. Credit IEQ 4.2 “Low-Emitting Materials - Paints & Coatings”: All paints and coatings installed in the building interior (defined as, inside the weatherproofing system and applied on-site) must meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.
1. School projects may chose from IEQ credits 4.1-4.6 for a maximum of 4 points.
- C. Credit IEQ 4.3 “Low-Emitting Materials - Flooring Systems”: All flooring elements installed in the building interior (defined as, inside the weatherproofing system and applied on-site) must meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.
1. School projects may chose from IEQ credits 4.1-4.6 for a maximum of 4 points.

- D. Credit IEQ 4.4 “Low-Emitting Materials - Composite Wood & Agrifiber Products”: All composite wood and agrifiber products installed in the building interior (defined as, inside the weatherproofing system and applied on-site) must meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.
1. School projects may chose from IEQ credits 4.1-4.6 for a maximum of 4 points.
- E. Credit IEQ 4.5 “Low-Emitting Materials - Furniture and Furnishings”: Classroom furniture including all student desks, tables and seats that was manufactured, refurbished or refinished within 1 year prior to occupancy must meet 1 of the following requirements. Salvaged and used furniture that is more than 1 year old at the time of the occupancy is excluded from the credit requirements.
1. Option 1: Furniture and seating must be GREENGUARD Children and Schools certified.
 2. Option 2: Calculated indoor air concentrations that are less than or equal to those listed in the following table for furniture systems and seating determined by a procedure based on the EPA Environmental Technology Verification (ETV) Large Chamber Test Protocol for Measuring Emissions of VOCs and Aldehydes (September 1999) testing protocol conducted in an independent air quality testing laboratory.

Chemical Contaminant	Classroom Furniture	Seating
Total VOC's	0.5 mg/m ³	0.25 mg/m ³
Formaldehyde	50 parts per billion	25 parts per billion
Total aldehydes	100 parts per billion	50 parts per billion
4-Phenylcyclohexene (4-PCH)	0.0065 mg/m ³	0.00325 mg/m ³

3. Option 3: Calculated indoor air concentrations that are less than or equal to those established in table above for furniture systems and seating determined by a protocol based on ANSI/BIFMA M7.1-2007 and ANSI/BIFMA X7.1-2007 testing protocol conducted in an independent third-party quality testing laboratory.
 4. School projects may chose from IEQ credits 4.1-4.6 for a maximum of 4 points.
- F. Credit IEQ 4.6 “Low-Emitting Materials - Ceiling and Wall Systems”: All gypsum board, insulation, acoustical ceiling systems and wall coverings installed in the building interior (defined as, inside the weatherproofing system and applied on-site) must meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.
1. School projects may chose from IEQ credits 4.1-4.6 for a maximum of 4 points.

PART 3 - PRODUCTS

3.01 MEASUREMENT AND VERIFICATION

- A. Credit EA 5 “Measurement and Verification”: Implement measurement and verification plan consistent with either Option B: Energy Conservation Measure Isolation or Option D: Calibrated Simulation, Savings Estimation Method 2 in the EVO's "International Performance Measurement and Verification Protocol (IPMVP), Volume III: Concepts and Options for Determining Energy Savings in New Construction."
- B. If not already in place, install metering equipment to measure energy usage. Monitor, record, and trend log measurements.
- C. Evaluate energy performance and efficiency by comparing actual to predicted performance.
- D. Measurement and verification period shall cover at least one year of postconstruction occupancy.

3.02 CONSTRUCTION WASTE MANAGEMENT

- A. Credit MR 2 "Construction Waste Management": Comply with Section 01 74 19 "Construction Waste Management and Disposal."

3.03 CONSTRUCTION INDOOR-AIR-QUALITY MANGEMENT

- A. Credit IEQ 3.1 "Construction Indoor Air Quality Management Plan - During Construction": Develop and implement an IAQ management plan for the construction and preoccupancy phases of the building as follows:
1. During construction, meet or exceed the recommended control measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines For Occupied Buildings Under Construction, 2nd Edition 2007, ANSI/SMACNA 008-2008 (Chapter 3).
 2. Protect stored on-site and installed absorptive materials from moisture damage.
 3. If permanently installed air handlers are used during construction period as specified in Section 01 50 00 "Temporary Facilities and Controls," filtration media with a minimum efficiency reporting value (MERV) of 8 must be used at each return air grille, as determined by ASHRAE Standard 52.2-1999 (with errata but without addenda). Replace all filtration media immediately prior to occupancy.
 4. Prohibit smoking inside the building and within 25 feet of building entrances once the building is enclosed.
- B. Credit IEQ 3.2 "Construction Indoor Air Quality Management Plan - Before Occupancy": Develop an IAQ management plan and implement it after all finishes have been installed and the building has been completely cleaned before occupancy. Comply with one of the following requirements:
1. Flush-Out:
 - a. After construction ends, prior to occupancy and with all interior finishes installed, install new filtration media and perform a building flush-out by supplying a total volume of 14,000 cu. ft. of outdoor air per square foot of floor area while maintaining an internal temperature of at least 60 deg F and a relative humidity no higher than 60 percent.
 - b. If occupancy is desired prior to completion of the flush-out, the space may be occupied following delivery of a minimum of 3,500 cubic feet of outdoor air per square foot of floor area. Once the space is occupied, it must be ventilated at a minimum rate of 0.30 cubic feet per minute (cfm) per square foot of outside air or the design minimum outside air rate determined in Prerequisite EQ 1 "Minimum Air Quality Performance", whichever is greater. During each day of the flush-out period, ventilation must begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions must be maintained until a total of 14,000 cubic feet per square foot of outside air has been delivered to the space.
 2. Air Testing:
 - a. Conduct baseline indoor-air-quality testing, after construction ends and prior to occupancy, using testing protocols consistent with the EPA's "Compendium of Methods for the Determination of Air Pollutants in Indoor Air," and as additionally detailed in the USGBC's "Green Building Design and Construction Reference Guide, 2009 Edition."
 - b. Demonstrate that the contaminant maximum concentrations listed below are not exceeded:

Contaminant	Maximum Concentration
Total Volatile Organic Compounds (TVOC)	500 micrograms per cubic meter
Formaldehyde	27 parts per billion

Particulates (PM10)	50 micrograms per cubic meter
4-Phenylcyclohexene (4-PH)*	6.5 micrograms per cubic meter
Carbon Monoxide (CO)	9 parts per million and no greater than 2 parts per million above outdoor levels
* This test is required only if carpets and fabrics with styrene butadiene rubber (SBR) latex backing are installed as part of the base building systems.	

- c. For each sampling point where the maximum concentration limits are exceeded, conduct additional flush-out with outside air and retest the noncompliant concentrations. Repeat until all requirements are met. When retesting noncompliant building areas, take samples from same locations as in the first test, although it is not required.
- d. Conduct the air-sample testing as follows:
 - 1) All measurements shall be conducted prior to occupancy, but during normal occupied hours with the building ventilation system started at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the test.
 - 2) All interior finishes must be installed, including, but not limited to, millwork, doors, paint, carpet, and acoustic tiles. Movable furnishings such as workstations and partitions should be in place for the testing, although it is not required.
 - 3) The number of sampling locations will depend on the size of building and number of ventilation systems. For each portion of the building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 square feet or for each contiguous floor area, whichever is larger. Include areas with the least ventilation and greatest presumed source strength.
 - 4) Air samples must be collected between 3 and 6 feet from the floor to represent the breathing zone of occupants, and over a minimum four-hour period.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 1000, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Concrete formwork.
- C. Floors and slabs on grade.
- D. Concrete foundations.
- E. Concrete reinforcement.
- F. Joint devices associated with concrete work.
- G. Concrete curing.

1.02 REFERENCE STANDARDS

- A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; American Concrete Institute International; 2010.
- B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 2002).
- C. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete; American Concrete Institute International; 1998 (Reapproved 2004).
- D. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 2010.
- E. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International; 2004 (Errata 2007).
- F. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.
- G. ACI 305R - Hot Weather Concreting; American Concrete Institute International; 2010.
- H. ACI 306R - Cold Weather Concreting; American Concrete Institute International; 2010.
- I. ACI 308R - Guide to Curing Concrete; American Concrete Institute International; 2001 (Reapproved 2008).
- J. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2008.
- K. ACI 347 - Guide to Formwork for Concrete; American Concrete Institute International; 2004.
- L. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2007.
- M. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2012.
- N. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2011a.
- O. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.
- P. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2007.
- Q. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete; 2009.

- R. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2012.
- S. ASTM E1155 - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers; 1996 (Reapproved 2008).
- T. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- C. Samples: Submit samples of underslab vapor retarder to be used.
- D. LEED Submittal: If any fly ash, ground granulated blast furnace slag, silica fume, rice hull ash, or other waste material is used in mix designs to replace Portland cement, submit the total volume of concrete cast in place, mix design(s) used showing the quantity of portland cement replaced, reports showing successful cylinder testing, and temperature on day of pour if cold weather mix is used; use LEED New Product Content Form.
- E. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.04 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Formwork Design and Construction: Comply with guidelines of ACI 347 to provide formwork that will produce concrete complying with tolerances of ACI 117.
- B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.

2.02 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M Grade 60 (420).
- B. Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain type.
 - 1. Form: Flat Sheets.
 - 2. Mesh Size and Wire Gage: As indicated on drawings.
- C. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gage.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type I - Normal Portland type.
- B. Fine and Coarse Aggregates: ASTM C 33.
- C. Lightweight Aggregate: ASTM C 330.
- D. Fly Ash: ASTM C618, Class C or F.
- E. Water: Clean and not detrimental to concrete.

2.04 ACCESSORY MATERIALS

- A. Underslab Vapor Retarder: Multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, complying with ASTM E1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. The use of single ply polyethylene is prohibited.
 - 1. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations in vapor retarder.
 - 2. Products:
 - a. Insulation Solutions, Inc; Viper VaporCheck II 15-mil (Class A):
www.insulationsolutions.com.
 - b. Stego Industries, LLC; Stego Wrap Vapor Barrier 15-mil (Class A):
www.stegoindustries.com.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
- C. Moisture-Retaining Cover: ASTM C 171; regular curing paper, clear polyethylene, or white burlap-polyethylene sheet.

2.05 BONDING AND JOINTING PRODUCTS

- A. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.

2.06 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
 - 1. Replace as much Portland cement as possible with fly ash, ground granulated blast furnace slag, silica fume, or rice hull ash as is consistent with ACI recommendations.
- B. Proportioning Structural Lightweight Concrete: Comply with ACI 211.2 recommendations.
 - 1. Replace as much Portland cement as possible with fly ash, ground granulated blast furnace slag, silica fume, or rice hull ash as is consistent with ACI recommendations.
- C. Concrete Strength: Establish required average strength for each type of concrete on the basis of trial mixtures, as specified in ACI 301.
 - 1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- D. Normal Weight Concrete:
 - 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,000 psi.
- E. Structural Lightweight Concrete:
 - 1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,000 psi.

PART 3 EXECUTION

3.01 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

3.02 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

3.03 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete for floor slabs in accordance with ACI 302.1R.
- C. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.04 SLAB JOINTING

- A. Locate joints as indicated on the drawings.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

3.05 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. Minimum F(F) Floor Flatness and F(L) Floor Levelness Values:
 - 1. Exposed to View and Foot Traffic: F(F) of 20; F(L) of 15, on-grade only.
 - 2. Under Thin Resilient Flooring and Thinset Tile: F(F) of 35; F(L) of 25, on-grade only.
- B. Measure F(F) and F(L) in accordance with ASTM E1155, within 48 hours after slab installation; report both composite overall values and local values for each measured section.
- C. Correct the slab surface if composite overall value is less than specified and if local value is less than two-thirds of specified value or less than F(F) 13/F(L) 10.
- D. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.06 CONCRETE FINISHING

- A. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 - 1. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 301.1R; thin floor coverings include carpeting, resilient flooring, and seamless flooring.
 - 2. Other Surfaces to Be Left Exposed: "Steel trowel" as described in ACI 302.1R, minimizing burnish marks and other appearance defects.

3.07 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Surfaces Not in Contact with Forms:
 - 1. Slabs and Floors To Receive Adhesive-Applied Flooring: Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.
 - 2. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-fog spray, or saturated burlap.

3. Final Curing: Begin after initial curing but before surface is dry.
 - a. Moisture-Retaining Cover: Seal in place with waterproof tape or adhesive.

3.08 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

3.09 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.10 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

SECTION 04 20 00
UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Concrete Block.
 - 1. Standard concrete masonry units.
- C. Clay Facing Brick.
- D. Mortar and Grout.
- E. Reinforcement and Anchorage.
- F. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 04 72 00 - Cast Stone masonry
- B. Section 07 26 40 Spray Polyurethane Foam Insulating Air Barrier: Insulation for cavity spaces.
- C. Section 07 62 00 - Sheet Metal Flashing and Trim: Through-wall masonry flashings.

1.03 ALTERNATES

- A. Refer to Section 01 23 00 - Alternates, for description of work under this Section affected by alternates.

1.04 REFERENCE STANDARDS

- A. ASTM A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2007.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2009a.
- D. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2012.
- E. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.
- F. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.
- G. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.
- H. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
- I. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2012.
- J. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2012.
- K. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.
- L. ASTM C476 - Standard Specification for Grout for Masonry; 2010.
- M. ASTM C1148 - Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar; 1992a (Reapproved 2008) .
- N. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2011a.
- O. ASTM C1357 - Standard Test Methods for Evaluating Masonry Bond Strength; 2009.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.
- C. Samples for Verification: For each type and color of the following:
 - 1. Face brick in the form of straps of five or more bricks.
- D. Shop Drawings: For the following:
 - 1. Embedded Masonry Flashing: showing location of each course in wall section and plan view of each course with all details and stop ends referenced.
- E. Manufacturer's Certificate: Certify that water repellent admixture manufacturer has certified masonry unit manufacturer as an approved user of water repellent admixture in the manufacture of concrete block.
- F. Test Reports: Concrete masonry manufacturer's test reports for units with integral water repellent admixture.

1.06 MOCK-UP

- A. Construct a masonry wall as a mock-up panel sized 8 feet long by 6 feet high; include mortar and accessories and structural backup in mock-up.
- B. Locate where directed.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Regional Materials: Provide CMUs that have been manufactured within 500 miles of Project site from aggregates and cement that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
 - 2. Size: Standard units with nominal face dimensions of 16 x 8 inches and nominal depths as indicated on the drawings for specific locations.
 - 3. Special Shapes: Provide non-standard blocks configured for corners.
 - a. Provide bullnose blocks at exposed corners.
 - 4. Load-Bearing Units: ASTM C90, normal weight.
 - 5. Units with Integral Water Repellent: Concrete block units as specified in this section with polymeric liquid or powder admixture added to concrete masonry units at the time of manufacture.
 - a. Performance of Units with Integral Water Repellent:
 - 1) Water Permeance: When tested per ASTM E514 and for a minimum of 72 hours.
 - (a) No water visible on back of wall above flashing at the end of 24 hours.
 - (b) No flow of water from flashing equal to or greater than 0.032 gallons per hour at the end of 24 hours.
 - (c) No more than 25% of wall area above flashing visibly damp at end of test.
 - 2) Flexural Bond Strength: ASTM C1357; minimum 10% increase.
 - 3) Compressive Strength: ASTM C1314; maximum 5% decrease.
 - 4) Drying Shrinkage: ASTM C1148; maximum 5% increase in shrinkage.

- b. Use only in combination with mortar and grout that also has integral water repellent admixture.
- c. Use water repellent admixtures for masonry units, mortar and grout by a single manufacturer.

2.02 BRICK UNITS

- A. Facing Brick: ASTM C216, Type FBS, Grade SW.
 1. Regional Materials: Provide brick that has been manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
 2. Actual size: Standard Modular, 2-1/4 by 7-5/8 by 3-5/8.
 3. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
 4. Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:
 - a. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
 - b. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
 - c. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
 - d. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
 - e. Provide lipped brick at lintels and relieving angles.
 - f. Provide soldier course corner bricks.
- B. Face Brick: Facing brick complying with ASTM C 216.
 1. Face Brick A:
 - a. Texture: Smooth.
 - b. A blend of minimum (4) different reds of a narrow range.
 - c. Basis-of-Design Product: Subject to compliance with requirements, provide Colony Red Range as manufactured by Belden.

2.03 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: ASTM C91, Not Permitted.
- B. Portland Cement: ASTM C150, Type I; color as required to produce approved color sample.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Mortar Aggregate: ASTM C144.
- E. Grout Aggregate: ASTM C404.
- F. Water: Clean and potable.
- G. Integral Water Repellent Admixture for Mortar and Grout: Polymeric liquid or powder admixture added to mortar and grout at the time of manufacture.
 1. Use only in combination with masonry units manufactured with integral water repellent admixture.
 2. Use only water repellent admixture for mortar and grout from the same manufacturer as water repellent admixture in masonry units.
 3. Meet or exceed performance specified for water repellent admixture used in masonry units.

2.04 REINFORCEMENT AND ANCHORAGE

- A. Single Wythe Joint Reinforcement: Truss type; ASTM A 82/A 82M steel wire, mill galvanized to ASTM A 641/A 641M, Class 3; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.
- B. Adjustable Multiple Wythe Joint Reinforcement: Ladder type with adjustable ties or tabs spaced at 16 in on center and fabricated with moisture drip; ASTM A 82/A 82M steel wire, hot dip galvanized after fabrication to ASTM A 153/153M, Class B; 0.1875 inch side rods with 0.1483 inch cross rods and adjustable components of 0.1875 inch wire; width of components as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from each masonry face.
 - 1. Vertical adjustment: Not less than 2 inches.
- C. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.

2.05 FLASHINGS

- A. Flashing Type 1: Manufacturer's standard Elvaloy-modified flashing of type indicated below:
 - 1. Hyload SA Cloaked Flashing System:
 - a. 40 mils minimum thickness, glass reinforced.
 - b. UV resistant.
 - c. Color: black.
 - d. Provide all mastic and primer as recommended by manufacturer.
- B. Drip Edge: Install Flashing with a minimum 3 inch, extruded drip extending 3/8 inch beyond the face of building, unless otherwise directed by Architect.
 - 1. Stainless Steel Drip Edge manufactured by Hohmann & Barnard, Inc.
- C. Cloaks: Provide manufacturer's extruded pre-formed shapes for integration with embedded flashing at all inside corners, outside corners and at all change in elevations in embedded flashing system.
- D. Stop Ends: Locate "Stop Ends" at all windowsills, headers and inside corner terminations.
- E. Shelf Angles & Lintels: Flashing must be carried through the wall to prevent water from bypassing flashing.
- F. Shelf Angle Soft Joints: Flashing Membrane or Drip must be compatible with wet sealant. Provide letter from flashing manufacturer addressing sealant compatibility.

2.06 ACCESSORIES

- A. Preformed Control Joints: Neoprene material. Provide with corner and tee accessories, fused joints.
- B. Joint Filler: Closed cell neoprene; oversized 50 percent to joint width; self expanding; 3.5 inch wide x by maximum lengths available.
 - 1. Manufacturers:
 - a. Williams Products, Inc.; Product Type NN1, 1040 Series.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
 - 1. Mortar Diverter: Panels designed for installation at flashing locations.
 - a. Manufacturers:
 - 1) Advanced Building Products Inc: www.advancedflashing.com.

2) Mortar Net USA, Ltd: www.mortarnet.com.

- D. Weeps: Polyester mesh.
- E. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.07 MORTAR AND GROUT MIXES

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
 - 1. Masonry below grade and in contact with earth: Type M.
 - 2. Exterior, loadbearing masonry: Type S.
 - 3. Exterior, non-loadbearing masonry: Type N.
- B. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.
- C. Grout: ASTM C476. Consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
- D. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

- A. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

3.04 COURSING

- A. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- B. Concrete Masonry Units:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints: Concave, except at masonry to receive spray foam provide flush joints fully filled with mortar and mortar droppings removed from ties.
- C. Brick Units:
 - 1. Bond: Running.
 - 2. Coursing: Three units and three mortar joints to equal 8 inches.
 - 3. Mortar Joints: Concave.

3.05 PLACING AND BONDING

- A. Lay hollow masonry units with face shell bedding on head and bed joints.
- B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- C. Remove excess mortar and mortar smears as work progresses.

- D. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.
- E. Interlock intersections and external corners.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- H. Cut mortar joints flush where resilient base is scheduled or cavity insulation vapor barrier adhesive is applied.

3.06 WEEPS/CAVITY VENTS

- A. Install weeps in veneer and cavity walls at 24 inches on center horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.

3.07 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.
- C. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.08 REINFORCEMENT AND ANCHORAGE - GENERAL

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 24 inches vertically.

3.09 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

- A. Install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Masonry Back-Up: Embed anchors to bond veneer at maximum 24 inches on center vertically and 24 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

3.10 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
- B. Extend through-wall flashings through exterior face of masonry and turn down to form drip. Install joint sealer below drip edge to prevent moisture migration under flashing.
- C. Lap end joints of flashings at least 4 inches and seal with compatible sealant or self-sealing flashing.

3.11 GROUTED COMPONENTS

- A. Lap splices minimum 24 bar diameters.
- B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- C. Place and consolidate grout fill without displacing reinforcing.
- D. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.12 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control and expansion joints.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

3.13 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

3.14 CUTTING AND FITTING

- A. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.15 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

3.16 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 04 72 00
CAST STONE MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 1000, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Architectural cast stone.
- C. Units required are:
 - 1. Exterior wall units, including wall caps, coping, and sills.
 - 2. Other items indicated on the drawings.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry: Installation of cast stone in conjunction with masonry.
- B. Section 07 90 05 - Joint Sealers: Materials and execution methods for sealing soft joints in cast stone work.

1.03 REFERENCE STANDARDS

- A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2011.
- B. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2007.
- C. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2012.
- D. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2011a.
- E. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.
- F. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2012.
- G. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2012.
- H. ASTM C642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete; 2006.
- I. ASTM C1364 - Standard Specification for Architectural Cast Stone; 2010b.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.
- C. Product Data: Test results of cast stone components made previously by the manufacturer.
- D. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.
- E. Mortar Color Selection Samples.
- F. Verification Samples: Pieces of actual cast stone components not less than 12 inches square, illustrating range of color and texture to be anticipated in components furnished for the project.
- G. Source Quality Control Test Reports.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A current producer member of the Cast Stone Institute with a minimum of 5 years of experience in producing cast stone of the types required for project and:
- B. Mock-Up: Provide full size cast stone components for installation in mock-up of exterior wall.
 - 1. Approved mock-up will become standard for appearance and workmanship.
 - 2. Mock-up may remain as part of the completed work.
- C. Source Quality Control: Test compressive strength and absorption of specimens selected at random from plant production.
 - 1. Test in accordance with ASTM C642.
 - 2. Select specimens at rate of 3 per 500 cubic feet, with a minimum of 3 per production week.
 - 3. Submit reports of tests by independent testing agency, showing compliance with requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.
- B. Number each piece individually to match shop drawings and schedule.
- C. Store cast stone components and installation materials in accordance with manufacturer's instructions.
- D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.
- E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.
- F. Store mortar materials where contamination can be avoided.
- G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Architectural Cast Stone:
 - 1. Continental Cast Stone Manufacturing, Inc.,
 - 2. RockCast, A Division of Reading Rock, Inc..

2.02 ARCHITECTURAL CAST STONE

- A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural limestone, complying with ASTM C1364.
 - 1. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
 - 2. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C1364.
 - 3. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet.
 - 4. Color: Match sample on file at Architect 's office.
 - 5. Remove cement film from exposed surfaces before packaging for shipment.
- B. Shapes: Provide shapes indicated on drawings.

1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
2. Unless otherwise indicated on drawings, provide:
 - a. Wash or slope of 1:12 on exterior horizontal surfaces.
 - b. Drips on projecting components, wherever possible.
 - c. Raised fillets at back of sills and at ends to be built in.
- C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI 318.
 1. Pieces More than 12 inches Wide: Provide full length two-way reinforcement of cross-sectional area not less than 0.25 percent of unit cross-sectional area.

2.03 MATERIALS

- A. Portland Cement: ASTM C150.
 1. For Units: Type I, white or gray as required to match Architect 's sample.
 2. For Mortar: Type I or II, except Type III may be used in cold weather.
- B. Coarse Aggregate: ASTM C33, except for gradation; granite, quartz, or limestone.
- C. Fine Aggregate: ASTM C33, except for gradation; natural or manufactured sands.
- D. Admixtures: ASTM C494/C494M.
- E. Water: Potable.
- F. Reinforcing Bars: ASTM A615/A615M deformed bars, galvanized or epoxy coated.
- G. Steel Welded Wire Reinforcement: ASTM A185/A185M, galvanized or epoxy coated.
- H. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.
- I. Mortar: Portland cement-lime, ASTM C270, Type N; do not use masonry cement.
- J. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install cast stone components in conjunction with masonry, complying with requirements of Section 04 20 00.
- B. Mechanically anchor cast stone units indicated; set remainder in mortar.
- C. Setting:
 1. Drench cast stone components with clear, running water immediately before installation.
 2. Set units in a full bed of mortar unless otherwise indicated.
 3. Fill vertical joints with mortar.
 4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.
- D. Joints: Make all joints 3/8 inch, except as otherwise detailed.
 1. Rake mortar joints 3/4 inch for pointing.
 2. Remove excess mortar from face of stone before pointing joints.
 3. Point joints with mortar in layers 3/8 inch thick and tool to a slight concave profile.
 4. Leave the following joints open for sealant:
 - a. Head joints in top courses, including copings, parapets, cornices, sills, and steps.
 - b. Joints in projecting units.

- c. Joints between rigidly anchored units, including soffits, panels, and column covers.
 - d. Joints below lugged sills and stair treads.
 - e. Joints below ledge and relieving angles.
 - f. Joints labeled "expansion joint".
- E. Repairs: Repair chips and other surface damage noticeable when viewed in direct daylight at 20 feet.
- 1. Repair with matching touchup material provided by the manufacturer and in accordance with manufacturer's instructions.
 - 2. Repair methods and results subject to Architect 's approval.

3.02 CLEANING

- A. Clean completed exposed cast stone after mortar is thoroughly set and cured.
- 1. Wet surfaces with water before applying cleaner.
 - 2. Apply cleaner to cast stone in accordance with manufacturer's instructions.
 - 3. Remove cleaner promptly by rinsing thoroughly with clear water.
 - 4. Do not use acidic cleaners.

3.03 PROTECTION

- A. Protect completed work from damage.
- B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

END OF SECTION

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 1000, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Structural steel framing members, support members.
- C. Base plates, shear stud connectors and expansion joint plates.
- D. Grouting under base plates.

1.02 RELATED REQUIREMENTS

- A. Section 05 21 00 - Steel Joist Framing.
- B. Section 05 31 00 - Steel Decking: Support framing for small openings in deck.

1.03 REFERENCE STANDARDS

- A. AISC (MAN) - Steel Construction Manual; American Institute of Steel Construction, Inc.; 2005.
- B. AISC S303 - Code of Standard Practice for Steel Buildings and Bridges; American Institute of Steel Construction, Inc.; 2005.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2008.
- D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- E. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished; 2007.
- F. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- G. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength; 2010.
- H. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2010.
- I. ASTM A325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Tensile Strength (Metric); 2009.
- J. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2007.
- K. ASTM A514/A514M - Standard Specification for High-Yield Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding; 2005 (Reapproved 2009).
- L. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2011.
- M. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2011.
- N. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners; 2009.
- O. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2007.
- P. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2010.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
 - 2. Connections not detailed.
 - 3. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.05 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC "Steel Construction Manual."

PART 2 PRODUCTS

2.01 MATERIALS

- A. Steel Angles and Plates: ASTM A36/A36M.
- B. Rolled Steel Structural Shapes: ASTM A992/A992M.
- C. Hot-Formed Structural Tubing: ASTM A501, seamless or welded.
- D. Steel Bars: ASTM A108.
- E. Steel Plate: ASTM A514/A514M.
- F. Pipe: ASTM A53/A53M, Grade B, Finish black.
- G. Shear Stud Connectors: Made from ASTM A 108 Grade 1015 bars.
- H. Structural Bolts and Nuts: Carbon steel, ASTM A307, Grade A galvanized to ASTM A 153/A 153M, Class C.
- I. High-Strength Structural Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, medium carbon, galvanized.
- J. Load Indicator Washers: Provide washers complying with ASTM F959 at all connections requiring high-strength bolts.
- K. Welding Materials: AWS D1.1; type required for materials being welded.
- L. Grout: Non-shrink, non-metallic aggregate type, complying with ASTM C1107/C1107M and capable of developing a minimum compressive strength of 7,000 psi at 28 days.
- M. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.
- N. Touch-Up Primer for Galvanized Surfaces: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Shop fabricate to greatest extent possible.
- B. Continuously seal joined members by continuous welds. Grind exposed welds smooth.
- C. Fabricate connections for bolt, nut, and washer connectors.

PART 3 EXECUTION

3.01 ERECTION

- A. Erect structural steel in compliance with AISC "Code of Standard Practice for Steel Buildings and Bridges".

- B. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

3.02 TOLERANCES

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

END OF SECTION

SECTION 05 21 00
STEEL JOIST FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 1000, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Open web steel joists and shear stud connectors, with bridging, attached seats and anchors.
- C. Loose bearing members, such as plates or angles, and anchor bolts for site placement.
- D. Supplementary framing for roof openings greater than 18 inches.

1.02 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel Framing: Grouting base plates and bearing plates. Superstructure framing.
- B. Section 05 31 00 - Steel Decking: Bearing plates and angles.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2008.
- B. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished; 2007.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2010.
- E. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2010.
- F. SJI (SPEC) - Catalog of Standard Specifications and Load Tables for Steel Joists and Joist Girders; Steel Joist Institute; 2011.
- G. SJI Technical Digest No. 9 - Handling and Erection of Steel Joists and Joist Girders; Steel Joist Institute; 2008.
- H. SSPC-Paint 25 - Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II; Society for Protective Coatings; 1997 (Ed. 2004).
- I. SSPC-SP 2 - Hand Tool Cleaning; Society for Protective Coatings; 1982 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate standard designations, joist coding, configurations, sizes, spacings, cambers, locations of joists, joist leg extensions, bridging, connections, and attachments.
- C. Welders' Certificates: Submit manufacturer's certificates, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.
- D. Manufacturer's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.05 QUALITY ASSURANCE

- A. Perform Work, including that for headers and other supplementary framing, in accordance with SJI Standard Specifications Load Tables and SJI Technical Digest No.9.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Transport, handle, store, and protect products to SJI requirements.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Open Web Joists: SJI Type K Joists:
 - 1. Provide bottom chord extensions as indicated.
 - 2. Minimum End Bearing on Steel Supports: Comply with referenced SJI standard.
 - 3. Minimum End Bearing on Concrete or Masonry Supports: Comply with referenced SJI standard.
 - 4. Finish: Shop primed.
- B. Open Web Joists: SJI Type LH Joists:
- C. Anchor Bolts, Nuts and Washers: ASTM A 307, hot-dip galvanized per ASTM A 153/A 153M, Class C.
- D. Shear Stud Connectors: Made from ASTM A 108 Grade 1015 bars.
- E. Structural Steel For Supplementary Framing and Joist Leg Extensions: ASTM A 36/A 36M.
- F. Welding Materials: AWS D1.1; type required for materials being welded.
- G. Shop and Touch-Up Primer: SSPC-Paint 25, zinc oxide, complying with VOC limitations of authorities having jurisdiction.

2.02 FINISH

- A. Shop prime joists as specified.
- B. Prepare surfaces to be finished in accordance with SSPC-SP 2.

PART 3 EXECUTION

3.01 ERECTION

- A. Erect joists with correct bearing on supports.
- B. Allow for erection loads. Provide sufficient temporary bracing to maintain framing safe, plumb, and in true alignment.
- C. Coordinate the placement of anchors for securing loose bearing members furnished as part of the work of this section.
- D. After joist alignment and installation of framing, field weld joist seats to steel bearing surfaces.
- E. Install supplementary framing for floor and roof openings greater than 18 inches.
- F. Do not permit erection of decking until joists are braced bridged, and secured or until completion of erection and installation of permanent bridging and bracing.
- G. Do not field cut or alter structural members without approval of joist manufacturer.

3.02 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch.
- B. Maximum Offset From True Alignment: 1/4 inch.

3.03 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00.

END OF SECTION

SECTION 05 31 00
STEEL DECKING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 1000, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Roof deck.
- C. Supplementary framing for openings up to and including 18 inches.
- D. Bearing plates and angles.

1.02 RELATED REQUIREMENTS

- A. Section 05 21 00 - Steel Joist Framing: Support framing for openings larger than 18 inches and shear stud connectors.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2008.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.
- C. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2010.
- D. AWS D1.3 - Structural Welding Code - Sheet Steel; American Welding Society; 2008.
- E. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc.; 2011.
- F. ICC-ES AC70 - Acceptance Criteria for Fasteners Power Driven into Concrete, Steel and Masonry Elements; ICC Evaluation Service, Inc.; 2012.
- G. SDI (DM) - Publication No.31, Design Manual for Composite Decks, Form Decks, Roof Decks; Steel Deck Institute; 2007.
- H. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); The Society for Protective Coatings; 2002 (Ed. 2004).

1.04 QUALITY ASSURANCE

- A. Design deck layout, spans, fastening, and joints under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in Delaware.
- B. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel (AC172).

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Cut plastic wrap to encourage ventilation.
- B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 PRODUCTS

2.01 STEEL DECK

- A. All Deck Types: Select and design metal deck in accordance with SDI Design Manual.
- B. Roof Deck: Non-composite type, fluted steel sheet:
 - 1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.

2.02 ACCESSORY MATERIALS

- A. Bearing Plates and Angles: ASTM A36/A36M steel, galvanized per ASTM A123/A123M.
- B. Welding Materials: AWS D1.1.
- C. Fasteners: Galvanized hardened steel, self tapping.
- D. Powder Actuated Mechanical Fasteners: Steel; with knurled shank and forged ballistic point. Comply with applicable requirements of ICC-ES AC70.
- E. Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.
- F. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, complying with VOC limitations of authorities having jurisdiction.
- G. Flute Closures: Closed cell foam rubber, 1 inch thick; profiled to fit tight to the deck.

2.03 FABRICATED DECK ACCESSORIES

- A. Sheet Metal Deck Accessories: Metal closure strips and cover plates, 22 gage thick sheet steel; of profile and size as indicated; finished same as deck.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.
- B. On masonry surfaces provide minimum 4 inch bearing.
- C. On steel supports provide minimum 1-1/2 inch bearing.
- D. At mechanically fastened male/female side laps fasten at 24 inches on center maximum.
- E. Weld deck in accordance with AWS D1.3.
- F. At deck openings from 6 inches to 18 inches in size, provide 2 x 2 x 1/4 inch steel angle reinforcement. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld to deck at each flute.
- G. Where deck (other than cellular deck electrical raceway) changes direction, install 6 inch minimum wide sheet steel cover plates, of same thickness as deck. Fusion weld 12 inches on center maximum.
- H. At openings between deck and walls, columns, and openings, provide sheet steel closures and angle flashings to close openings.
- I. Close openings above walls and partitions perpendicular to deck flutes with single row of foam cell closures.
- J. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

END OF SECTION

SECTION 05 40 00
COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Section Includes:
 - 1. Exterior non-load-bearing wall framing.
 - 2. Roof rafter framing.
 - 3. Ceiling joist framing.
 - 4. Soffit framing.
- C. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for masonry shelf angles and connections.
 - 2. Section 092216 "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.
 - 3. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies.

1.02 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of cold-formed steel framing product and accessory.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Shop Drawings:
 - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
 - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency or a qualified testing agency.
 - 1. Steel sheet.
 - 2. Expansion anchors.
 - 3. Power-actuated anchors.
 - 4. Mechanical fasteners.
 - 5. Vertical deflection clips.
 - 6. Horizontal drift deflection clips
 - 7. Miscellaneous structural clips and accessories.

1.05 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

- B. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.01 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. Clark Western Building Systems, Inc.
 - 2. Design Shapes in Steel.
 - 3. Dietrich Metal Framing; a Worthington Industries Company.
 - 4. Marino/WARE.
 - 5. Olmar Supply, Inc.
 - 6. Quail Run Building Materials, Inc.
 - 7. Steel Construction Systems.
 - 8. Telling Industries, LLC.
 - 9. The Steel Network, Inc.
 - 10. United Metal Products, Inc.
 - 11. United Steel Manufacturing

2.02 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated.
 - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Interior Load-Bearing Wall Framing: Horizontal deflection of 1/240 of the wall height under a horizontal load of 5 lbf/sq. ft. (239 Pa).
 - b. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/360, 1/600 for masonry veneer of the wall height.
 - 3. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- C. Cold-Formed Steel Framing Design Standards:
 - 1. Wall Studs: AISI S211.
 - 2. Headers: AISI S212.
 - 3. Lateral Design: AISI S213.
- D. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.
- E. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.03 COLD-FORMED STEEL FRAMING, GENERAL

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
- B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
 1. Grade: As required by structural performance.
 2. Coating: G60 (Z180), A60 (ZF180)..
- C. Steel Sheet for Vertical Deflection or Drift Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
 1. Grade: 33 (230).
 2. Coating: G60 (Z180).

2.04 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 1. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).
 2. Flange Width: 1-5/8 inches (41 mm).
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 1. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).
 2. Flange Width: 1-1/4 inches (32 mm).
- C. Vertical Deflection Clips: Manufacturer's standard bypass or heaclips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
 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. AllSteel & Gypsum Products, Inc.
 - b. ClarkWestern Bulding Systems, Inc.
 - c. Dietrich Metal Framing; a Worthington Industries Company.
 - d. Marino/WARE.
 - e. SCAFCO Corporation
 - f. Steeler, Inc.
 - g. The Steel Network, Inc
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
 1. Minimum Base-Metal Thickness: 0.0538 inch (1.37 mm).
 2. Flange Width: 1 inch (25 mm) plus the design gap for 1-story structures.

2.05 ROOF-RAFTER FRAMING

- A. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
 1. Minimum Base-Metal Thickness: 0.0538 inch (1.37 mm).
 2. Flange Width: 1-5/8 inches (41 mm) minimum.

2.06 CEILING JOIST FRAMING

- A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, punched with standard holes,]with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).
 - 2. Flange Width: [1-5/8 inches (41 mm) minimum.

2.07 SOFFIT FRAMING

- A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).
 - 2. Flange Width: 1-5/8 inches (41 mm), minimum.

2.08 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 - 1. Supplementary framing.
 - 2. Bracing, bridging, and solid blocking.
 - 3. Web stiffeners.
 - 4. Anchor clips.
 - 5. End clips.
 - 6. Foundation clips.
 - 7. Stud kickers and knee braces.
 - 8. Hole reinforcing plates.
 - 9. Backer plates.

2.09 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated in accordance with ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

2.10 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A 780.

- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.
- D. Shims: Load bearing, high-density multimonomer plastic, nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch (1.6 mm).
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- H. Install insulation, specified in Section 072100 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

- I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
- J. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.03 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to bottom track, unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: As indicated.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deep-leg deflection tracks and anchor to building structure.
 - 2. Connect vertical deflection clips to bypassing studs and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches (1220 mm) apart. Fasten at each stud intersection.
 - 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 inches (450 mm) of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
 - a. Install solid blocking at 96-inch (2440-mm) centers.
 - 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 - 3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.04 JOIST INSTALLATION

- A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.
- B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
 - 1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm).
 - 2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.
- C. Space joists not more than 2 inches (51 mm) from abutting walls, and as follows:
 - 1. Joist Spacing: As indicated.
- D. Frame openings with built-up joist headers consisting of joist and joist track, or another combination of connected joists if indicated.

- E. Install bridging at intervals indicated on Shop Drawings. Fasten bridging at each joist intersection as follows:
 - 1. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.
- F. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.05 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace work where test results indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.06 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05 44 00
COLD-FORMED METAL TRUSSES

PART 1 - GENERAL

1.01 SUMMARY

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Section Includes:
 - 1. Cold-formed steel trusses for roofs.
- C. Related Requirements:
 - 1. Section 054000 "Cold-Formed Metal Framing" for cold-formed steel studs, joists, and rafters.

1.02 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Shop Drawings:
 - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel trusses; fabrication; and fastening and anchorage details, including mechanical fasteners.
 - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
 - 3. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Shop Drawings: At the start of construction, the Architect's consulting structural engineer will provide an electronic file of their review stamp to be placed by the shop drawing preparer near the bottom right corner of each shop drawing submitted.
- E. Delegated-Design Submittal: For cold-formed steel trusses.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency or a qualified testing agency.
 - 1. Steel sheet.
 - 2. Expansion anchors.
 - 3. Power-actuated anchors.
 - 4. Mechanical fasteners.
 - 5. Miscellaneous structural clips and accessories.
- D. Field quality-control reports.

1.05 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

- B. Product Tests: Mill certificates or data from a qualified testing agency, or in-house testing with calibrated test equipment, indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
- D. Professional Engineer Qualifications: A Professional Engineer who is legally qualified to practice in jurisdiction where project is located and who is experienced in providing engineering services of the kind indicated

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed steel trusses from corrosion, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.01 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. Aegis Metal Framing.
 - 2. Genesis Worldwide Inc.
 - 3. Marino/WARE.
 - 4. Nuconsteel, A Nucor Company.
 - 5. Steel Construction Systems.
 - 6. TrusSteel; an ITW company.
 - 7. USA Frametek.

2.02 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel trusses capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated.
 - 2. Deflection Limits: Design trusses to withstand design loads without deflections greater than the following:
 - a. Roof Trusses: Vertical deflection of 1/360 of the span.
 - 3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
- C. Cold-Formed Steel Framing Design Standards:
 - 1. Lateral Design: Design according to AISI S213.
 - 2. Roof Trusses: Design according to AISI S214.
- D. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.03 COLD-FORMED STEEL TRUSS MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
- B. Steel Sheet: ASTM A 1003, structural grade, Type H, metallic coated, of grade and coating weight as follows:
 - 1. Grade: ST33H or as required by structural performance.
 - 2. Coating: G60.

2.04 ROOF TRUSSES

- A. Roof Truss Members: Manufacturer's standard C-shaped steel sections.
 - 1. Connecting Flange Width: 1-5/8 inches minimum at top and bottom chords connecting to sheathing or other directly fastened construction.
 - 2. Minimum Base-Metal Thickness: 0.0329 inch.

2.05 ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003, structural grade, Type H, metallic coated, of same grade and coating weight used for truss members.
- B. Provide accessories of manufacturer's standard thickness and configuration unless otherwise indicated.

2.06 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and Appendix D in ACI 318, greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
- D. Power-Actuated Fasteners: Fastener system of type suitable for application, fabricated from corrosion-resistant materials, with capability to sustain, without failure, allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

2.07 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B , VOC compliant.
- B. Shims: Load bearing, of high-density multimonomer plastic, nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

2.08 FABRICATION

- A. Fabricate cold-formed steel trusses and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate trusses using jigs or templates.
 - 2. Cut truss members by sawing or shearing; do not torch cut.

3. Fasten cold-formed steel truss members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 4. Fasten other materials to cold-formed steel trusses by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace trusses to withstand handling, delivery, and erection stresses. Lift fabricated trusses to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine supporting substrates and abutting cold-formed steel trusses for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed steel trusses without reducing thickness of fire-resistive materials below that is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.03 INSTALLATION

- A. Install, bridge, and brace cold-formed steel trusses according to AISI S200, AISI S214, AISI's "Code of Standard Practice for Cold-Formed Steel Structural Framing," and manufacturer's written instructions unless more stringent requirements are indicated.
- B. Install cold-formed steel trusses and accessories plumb, square, and true to line, and with connections securely fastened.
 1. Fasten cold-formed steel trusses by welding or mechanical fasteners.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings; comply with requirements for spacing, edge distances, and screw penetration.
- C. Install temporary bracing and supports. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- D. Truss Spacing: As indicated.
- E. Do not alter, cut, or remove framing members or connections of trusses.
- F. Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacings indicated.

- G. Erect trusses without damaging framing members or connections.
- H. Coordinate with wall framing to align webs of bottom chords and load-bearing studs or continuously reinforce track to transfer loads to structure. Anchor trusses securely at all bearing points.
- I. Install continuous bridging and permanently brace trusses as indicated on Shop Drawings and designed according to CFSEI's TechNote 551e, "Design Guide: Permanent Bracing of Cold-Formed Steel Trusses."
- J. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual trusses no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.04 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections indicated on structural drawings.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Field and shop welds will be subject to testing and inspecting.
- D. Prepare test and inspection reports.

3.05 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal trusses are without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Shop fabricated steel and aluminum items.

1.02 RELATED REQUIREMENTS

- A. Section 09 90 00 - Painting and Coating: Paint finish.

1.03 REFERENCE STANDARDS

- A. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2008.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- D. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2010.
- E. ASTM A325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Tensile Strength (Metric); 2009.
- F. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2012.
- G. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2010.
- H. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- B. Slotted Channel Framing: ASTM A653, Grade 33.
- C. Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, galvanized to ASTM A153/A153M where connecting galvanized components.
- D. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.

- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by continuous welds.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED ITEMS

- A. Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; prime paint finish.
 - 1. Side Rails: 3/8 x 2 inches members spaced at 20 inches.
 - 2. Rungs: one inch diameter solid square bar spaced 12 inches on center.
 - 3. Space rungs 7 inches from wall surface.
 - 4. Provide brackets at top and bottom, welded to rails and bolted to building structure.
- B. Bollards: 6 inch steel pipe, 3,000 psi concrete filled, crowned cap, as detailed; prime paint finish.
- C. Steel Angle Vanity Support: ASTM A 36/A 36M steel angles, welded to support vanities with anchoring devices and sizes as indicated in shop drawings.

2.04 MANUFACTURED PRODUCTS

- A. Access panel: Provide Milcor or equal prime coated steel access panel with screw cam operated locks.
- B. Extruded Aluminum Overhead Hanger-rod Canopy.
 - 1. Decking & Fascia: Extruded aluminum, alloy 6063-T6.
 - 2. Decking Thickness: 2-3/4 inches by 0.078 inches thick.
 - 3. Fascia: 8 inches by 0.125 inches thick.
 - 4. Finish: Clear anodized.
 - 5. Product: Super Lumideck; Manufacturer: Mapes Canopies, Inc.

2.05 FINISHES - STEEL

- A. Prime paint all steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete or masonry.
 - 2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
- B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- C. Prime Painting: One coat.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Perform field welding in accordance with AWS D1.1/D1.1M.
- D. Obtain approval prior to site cutting or making adjustments not scheduled.

- E. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Roofing nailers.
- C. Fire retardant treated wood materials.
- D. Concealed wood blocking, nailers, and supports.

1.02 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- B. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2008.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2012.
- D. AWWA U1 - Use Category System: User Specification for Treated Wood; American Wood Protection Association; 2010.
- E. PS 1 - Structural Plywood; 2009.
- F. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce); 2005.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. LEED Submittals: Submit applicable LEED Submittal Form for each different product made of sustainably harvested wood, salvaged and reused wood, wood fabricated from recovered timber, as well as locally-sourced wood, as specified in Section 01 35 15.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Lumber fabricated from old growth timber is not permitted.
- C. Provide sustainably harvested wood; see Section 01 60 00 for requirements.

- D. Provide wood harvested within a 500 mile radius of the project site; see Section 01 60 00 for requirements for locally-sourced products.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

- A. Wall Sheathing: Glass mat faced gypsum, ASTM C1177/C1177M, square long edges, 5/8 inch Type X fire-resistant. See Section 05 40 00.
- B. Other Applications:
 - 1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
 - 2. Other Locations: PS 1, C-D Plugged or better.

2.04 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

2.05 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWWA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
- B. Fire Retardant Treatment:
 - 1. Interior Type A: AWWA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.02 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

3.03 INSTALLATION OF CONSTRUCTION PANELS

- A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.

3.04 CLEANING

- A. Waste Disposal: Comply with the requirements of Section 01 74 19.
 - 1. Comply with applicable regulations.
 - 2. Do not burn scrap on project site.
 - 3. Do not burn scraps that have been pressure treated.
 - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.
- B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 20 00
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Finish carpentry items.
- C. Hardware and attachment accessories.

1.02 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2012.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2009.
- C. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data:
 - 1. Provide data on fire retardant treatment materials and application instructions.
 - 2. Provide instructions for attachment hardware and finish hardware.
- C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Provide the information required by AWI/AWMAC/WI Architectural Woodwork Standards.
- D. Samples: Submit two samples of wood trim 12 inch long.
- E. LEED Report: Submit for wood products made from sustainably harvested wood, salvaged and reused wood, wood fabricated from recovered timber, and locally-sourced wood, as specified in Section 01 35 15.

1.04 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect work from moisture damage.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI/AWMAC/WI Architectural Woodwork Standards for Premium Grade.
- B. Interior Woodwork Items:

2.02 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.
- B. Provide wood harvested within a 500 mile radius of the project site.

2.03 FASTENINGS

- A. Fasteners: Of size and type to suit application; zinc plated finish in concealed locations and stainless steel finish in exposed locations.
- B. Concealed Joint Fasteners: Threaded steel.

2.04 WOOD TREATMENT

- A. Fire Retardant Treatment (FR-S Type): Chemically treated and pressure impregnated; capable of providing flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.

2.05 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. Shop prepare and identify components for book match grain matching during site erection.
- C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI Architectural Woodwork Standards requirements for grade indicated.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- D. Install hardware in accordance with manufacturer's instructions.

3.02 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Board insulation at perimeter foundation wall.
- C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 RELATED REQUIREMENTS

- A. Section 07 26 40: Spray Polyurethane Foam Insulating Air Barrier: Insulation Type 2.
- B. Section 07 53 00 - Elastomeric Membrane Roofing: Insulation specified as part of roofing system.

1.03 REFERENCE STANDARDS

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2011be1.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2012.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation at Perimeter of Foundation: Extruded polystyrene board.

2.02 FOAM BOARD INSULATION MATERIALS

- A. Insulation Type 1: Extruded Polystyrene Board Insulation: ASTM C578, Type X; Extruded polystyrene board with natural skin surfaces; with the following characteristics:
 - 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 - 2. Perimeter foundation wall insulation.
 - 3. Board Size: 24 x 96 inch.
 - 4. Board Thickness: 2 inches.
 - 5. Board Edges: Square.
 - 6. Compressive Resistance: 25 psi.
 - 7. Manufacturers:
 - a. Dow Chemical Co: www.dow.com.
 - b. Owens Corning Corp: www.owenscorning.com.
 - 8. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Insulation Type 2: See Section 07 26 40: Spray Polyurethane Foam.

2.03 BATT INSULATION MATERIALS

- A. Insulation Type 3 and 4: Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 - 1. Insulation at cold formed metal framing, eaves and soffits.
 - 2. Thickness: 6 inch.
 - 3. Facing: Type 3 - Unfaced; Type 4 - Aluminum foil, flame spread <25, one side.
 - 4. Manufacturers:
 - a. CertainTeed Corporation: www.certainteed.com.
 - b. Johns Manville Corporation: www.jm.com.
 - c. Owens Corning Corp: www.owenscorning.com.
- B. Insulation Type 5: Acoustical (Not Used)
- C. Insulation Type 6: Flexible mineral fiber preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
 - 1. Fire safing insulation.
 - 2. Manufacturers:
 - a. Thermafiber, Inc: www.thermafiber.com.

2.04 ACCESSORIES

- A. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.
- B. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation .
- B. Verify substrate surfaces are flat, free of honeycomb, fins, or irregularities.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Install boards horizontally on foundation perimeter.
 - 1. Install in running bond pattern.
 - 2. Butt edges and ends tightly to adjacent boards and to protrusions.
- B. Extend boards over expansion joints, unbonded to foundation on one side of joint.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- E. Install with factory applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.
- F. Tape insulation batts in place.
- G. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.
- H. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over member face.

- I. Tape seal tears or cuts in vapor retarder.
- J. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.

3.04 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 21 40

FOAMED-IN-PLACE MASONRY WALL INSULATION

PART 1 -GENERAL

1.01 SUMMARY

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Extent of insulation work is shown on drawings and indicated by provisions of this section.
- C. Applications of insulation specified in this section include the following:
 - 1. Foamed-in-Place masonry insulation for thermal, sound and fire resistance values

1.02 SUBMITTALS

- A. Product and technical presentation as provided by the manufacturer.
- B. Certified Test Reports: With product data, submit copies of certified test reports showing compliance with specified performance values, including R-values, fire performance and sound abatement characteristics.
- C. Material Safety Data Sheet: Submit Material Safety Data Sheet complying with OSHA Hazard Communication Standard, 29 CFR 1910 1200.

1.03 QUALITY ASSURANCE

- A. Manufacturing Standards: Provide insulation produced by a single and approved manufacturer. The product must come from the manufacturer pre-mixed to ensure consistency.
- B. Installer Qualifications for Foamed-In-Place Masonry Insulation: Engage an experienced dealer/applicator who has been trained and licensed by the product manufacturer and which has not less than ten years direct experience in the installation of the product used.
- C. Warranty: Upon request, a one year product and installation warranty will be issued by both the manufacturer and installer.
- D. Fire Performance Characteristics: Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by a testing agency acceptable to authorities having jurisdiction.
- E. Product must be classified by Underwriters Laboratory ® ("UL") as to Surface Burning Characteristics
- F. Fire Resistance Ratings: ASTM E-119
- G. Surface Burning Characteristics: ASTM E-84
- H. Combustion Characteristics: ASTM E-136

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Manufacturers of Foamed-in-Place Masonry Insulation: Subject to compliance with requirements, provide products from the following:
 - 1. "Core-Fill 500™"- Tailored Chemical Products, P.O. Drawer 4186, Hickory, N.C. 28663, (800) 627-1687
 - 2. Tailored Foam of Florida, Inc., 3900 Saint Johns Parkway, Sanford, FL 3277, Telephone: 407-332-0333 Fax: 407-830-9174
 - 3. Air Krete, Inc, P.O. Box 380, Weedsport, NY 13166
 - 4. CP Chemical Co. (Tripolymer), White Plains, NY.

2.02 INSULATING MATERIALS

- A. General: Provide insulating materials which comply with requirements indicated for materials, compliance with referenced standards, and other characteristics.
- B. Foamed-in-Place Masonry Insulation: Two component thermal insulation produced by combining a plastic resin and catalyst foaming agent surfactant which, when properly ratioed and mixed, together with compressed air produce a cold-setting foam insulation in the hollow cores of hollow unit masonry walls.
- C. Fire-Resistance Ratings: Minimum four (4) hour fire resistance wall rating (ASTM E-1 19) for 8" and 12" concrete masonry units when used in standard two (2) hour rated CMUs.
 - 1. Surface Burning Characteristics: Maximum flame spread, smoke developed and fuel contributed of 0, 5 and 0 respectively.
 - 2. Combustion Characteristics: Must be noncombustible, Class A building material.
 - 3. Thermal Values: "R" Value of 4.91/inch @ 32 degrees F mean; ASTM C-177
 - 4. Sound Abatement: Minimum Sound Transmission Class ("STC") rating of 53 and a minimum Outdoor Indoor Transmission Class ("OITC") rating of 44 for 8" wall assembly (ASTM E 90-90)

PART 3 EXECUTION

3.01 INSPECTION AND PREPARATION

- A. Application Assemblies:
 - 1. Block Walls: 6", 8", 10" or 12" concrete masonry units

3.02 INSTALLATION OF FOAMED-IN-PLACE INSULATION

- A. General: Install foamed-in-place insulation from interior, or as specified, prior to installation of interior finish work and after all masonry and structural concrete work is in place; comply with manufacturer's instructions.
- B. Installation: Fill all open cells and voids in hollow concrete masonry walls where shown on drawings. The foam insulation shall be pressure injected through a series of 5/8" to 7/8" holes drilled into every vertical column of block cells (every 8" on center) beginning at an approximate height of four (4) feet from finished floor level. Repeat this procedure at an approximate height of ten (10) feet above the first horizontal row of holes (or as needed) until the void is completely filled. Patch holes with mortar and score to resemble existing surface.

END OF SECTION

SECTION 07 26 16

UNDER-SLAB VAPOR BARRIER/RETARDER

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Vapor Barrier, seam tape, mastic, pipe boots, detail strip for installation under concrete slabs.

1.02 RELATED SECTIONS

- A. Section 03300 Cast-in-place Structural Concrete

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM E 1745-97(2004) Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs
 - 2. ASTM E 154-99(2005) Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs
 - 3. ASTM E 96-05 Standard Test Methods for Water Vapor Transmission of Materials
 - 4. ASTM E 1643-98(2005) Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs

1.04 SUBMITTALS

- A. Quality Control / Assurance
 - 1. Independent laboratory test results showing compliance with ASTM & ACI Standards.
 - 2. Manufacturer's samples, literature
 - 3. Manufacturer's installation instructions for placement, seaming and pipe boot installation

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Vapor Barrier
 - 1. Vapor Barrier must have the following qualities
 - a. Perm rating less than or equal to 0.01 perms (grains/(ft² *hr * in. Hg)) after conditioning as tested by:
 - 1) ASTM E 96
- B. Vapor Barrier Products
 - 1. Stego Wrap (15 mil) Vapor Barrier by STEGO INDUSTRIES LLC, San Clemente, CA (877) 464-7834 www.stegoindustries.com
 - 2. Griffolyn 15 mil Green Vapor Barrier by Reef Industries, Inc.
 - 3. VaporBlock 15 by Raven Industries, Inc.
- C. ACCESSORIES
 - 1. Seam Tape
 - a. Tape must have the following qualities:
 - 1) Water Vapor Transmission Rate ASTM E 96: 0.3 perms or lower
 - 2. Vapor Proofing Mastic
 - a. Mastic must have the following qualities:
 - 1) Water Vapor Transmission Rate ASTM E 96: 0.3 perms or lower
 - 3. Pipe Boots
 - a. Provide manufacturer's supplied pipe boot system or construct pipe boots from vapor barrier material, pressure sensitive tape and/or mastic per manufacturer's instructions.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Ensure that subsoil is approved by architect or geotechnical firm
 - 1. Level and tamp or roll aggregate, sand or tamped earth base.

3.02 INSTALLATION

- A. Install Vapor Barrier/Retarder:
 - 1. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643.
 - a. Unroll Vapor Barrier/Retarder with the longest dimension parallel with the direction of the pour.
 - b. Lap Vapor Barrier/Retarder over footings and seal to foundation walls.
 - c. Overlap joints 6 inches and seal with manufacturer's tape.
 - d. Seal all penetrations (including pipes) per manufacturer's instructions.
 - e. No penetration of the Vapor Barrier/Retarder is allowed except for reinforcing steel and permanent utilities.
 - f. Repair damaged areas by cutting patches of Vapor Barrier/Retarder, overlapping damaged area 6 inches and taping all four sides with tape.

END OF SECTION

SECTION 07 42 13
METAL WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 1000, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Manufactured metal panels for walls and soffits, with related flashings and accessory components.

1.02 RELATED REQUIREMENTS

- A. Section 05 40 00 - Cold-Formed Metal Framing: Wall panel substrate.
- B. Section 07 21 00 - Thermal Insulation.
- C. Section 07 90 05 - Joint Sealers.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate dimensions, layout, joints, construction details, methods of anchorage.
- C. Samples: Submit two samples of wall panel and soffit panel, 12 inch by 12 inch in size illustrating finish color, sheen, and texture.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- B. Store prefinished material off ground and protected from weather. Prevent twisting, bending, or abrasion, and provide ventilation to stored materials. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials that may cause discoloration or staining of products.

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a twenty year period after Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.
- C. Correct defective Work within a five year period after Substantial Completion, including defects in water tightness and integrity of seals.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Centria; Product CS-200, 12 width wall panel.
- B. Other Acceptable Manufacturers:
 - 1. MBCI: www.mbc.com.
 - 2. Metal Sales Manufacturing Corporation : www.metalsales.us.com.

3. Firestone; Product Una-Clad 12" Delta CFP.
4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MANUFACTURED METAL PANELS

- A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
 1. Provide exterior panels and soffit panels.
 2. Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall.
 3. Maximum Allowable Deflection of Panel: 1/90 of span.
 4. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
 5. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
 6. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
 7. Corners: Factory-fabricated in one continuous piece with minimum 18 inch returns.
 8. Exterior Panel Back Coating: Panel manufacturer's standard polyester wash coat.
- B. Exterior Panels:
 1. Profile: Vertical.
 2. Side Seams: Double-interlocked, tight-fitting, sealed with continuous bead of sealant.
 3. Material: Precoated steel sheet, minimum 22 gage thick.
 4. Panel Width: 12 inches.
 5. Color: As selected by Architect from manufacturer's metallic 2-coat line.
- C. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; brake formed to required angles.
- D. Expansion Joints: Same material, thickness and finish as exterior sheets; 24 gage; manufacturer's standard brake formed type, of profile to suit system.
- E. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.
- F. Anchors: Galvanized steel or Stainless steel.

2.03 MATERIALS

- A. Precoated Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M Structural Steel (SS) or Forming Steel (FS), with G90/Z275 coating; continuous coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.

2.04 ACCESSORIES

- A. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant.
- B. Sealants: As specified in Section 07 90 05.
- C. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot dip galvanized.
- D. Field Touch-up Paint: As recommended by panel manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that building framing members are ready to receive panels.
- B. Verify that water-resistive barrier has been installed over substrate completely and correctly.

3.02 INSTALLATION

- A. Install panels on walls and soffits in accordance with manufacturer's instructions.
- B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.
- C. Fasten panels to structural supports; aligned, level, and plumb.
- D. Locate joints over supports. Lap panel ends minimum 2 inches.
- E. Provide expansion joints where indicated.
- F. Use concealed fasteners unless otherwise approved by Architect.
- G. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

3.03 TOLERANCES

- A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.
- B. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch.

3.04 CLEANING

- A. Remove site cuttings from finish surfaces.
- B. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

END OF SECTION

SECTION 07 53 00
ELASTOMERIC MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Elastomeric roofing membrane, adhered conventional application.
- C. Insulation, flat and tapered.
- D. Flashings.
- E. Roofing stack boots, roofing expansion joints, and walkway pads.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood nailers and curbs.
- B. Section 07 62 00 - Sheet Metal Flashing and Trim: Counterflashings .

1.03 REFERENCE STANDARDS

- A. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2012.
- B. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2012.
- C. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces; 2011.
- D. FM DS 1-28 - Wind Design; Factory Mutual Research Corporation; 2007.
- E. NRCA ML104 - The NRCA Roofing and Waterproofing Manual; National Roofing Contractors Association; Fifth Edition, with interim updates.
- F. UL (RMSD) - Roofing Materials and Systems Directory; Underwriters Laboratories Inc.; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers; review preparation and installation procedures and coordination and scheduling necessary for related work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating membrane materials, flashing materials, insulation, vapor retarder, surfacing, and fasteners.
 - 1. LEED Submittal: Include testing documentation of solar reflectance index.
- C. Shop Drawings: Indicate joint or termination detail conditions and conditions of interface with other materials.
- D. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.
- E. Manufacturer's Field Reports: Indicate procedures followed and supplementary instructions given.
- F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- C. Applicator Qualifications: Company specializing in performing the work of this section with minimum 5 years experience and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.
- B. Store products in weather protected environment, clear of ground and moisture.
- C. Protect foam insulation from direct exposure to sunlight.

1.08 FIELD CONDITIONS

- A. Do not apply roofing membrane during unsuitable weather.
- B. Do not apply roofing membrane when ambient temperature is below 40 degrees F or above 95 degrees F.
- C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. EPDM Membrane Materials:
 - 1. Basis of Design: Carlisle SynTec; Sure-White EPDM: www.carlisle-syntec.com.
 - 2. Firestone Building Products, LLC: www.firestonebpc.com.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Insulation:
 - 1. Atlas Roofing Corporation: www.atlasroofing.com.
 - 2. Basis of Design: Carlisle SynTec.

2.02 ROOFING

- A. Elastomeric Membrane Roofing: One ply membrane, fully adhered, over insulation.
- B. Roofing Assembly Requirements:
 - 1. Solar Reflectance Index (SRI): 78, minimum, calculated in accordance with ASTM E1980, based on 3-year aged data.
 - a. Field applied coating may not be used to achieve specified SRI.
 - 2. Roof Covering External Fire-Resistance Classification: UL Class A.
 - 3. Factory Mutual Classification: Class I and windstorm resistance of I-90, in accordance with FM DS 1-28.
- C. Acceptable Insulation Types - Constant Thickness Application: Any of the types specified.
 - 1. Minimum 2 layers of polyisocyanurate board.

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

- A. Membrane: Ethylene-propylene-diene-terpolymer (EPDM); non-reinforced; complying with minimum properties of ASTM D 4637.
 - 1. Thickness: 0.060 inch.
- B. Seaming Materials: As recommended by membrane manufacturer.
- C. Flexible Flashing Material: Same material as membrane; conforming to the following:
 - 1. Thickness: 90 mil.
 - 2. Tensile Strength: 1,200 psi.
 - 3. Elasticity: 50 percent with full recovery without set.
 - 4. Color: White.

2.04 INSULATION

- A. Polyisocyanurate Board Insulation: Rigid cellular foam, complying with ASTM C1289, Type II, Class 1, cellulose felt or glass fiber mat both faces; Grade 1 and with the following characteristics:
 - 1. Compressive Strength: 16 psi
 - 2. Board Size: 48 x 96 inch.
 - 3. Thermal Resistance: R-value of 20.1.
 - 4. Board Edges: Square.
 - 5. Manufacturer: as approved by membrane manufacturer.

2.05 COVER BOARD

- A. Fiberglass Mat Gypsum Roof Board:
 - 1. Manufacturer: Georgia Pacific; Product: DensDeck Prime.
 - 2. Thickness: 1/2 inch.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.06 ACCESSORIES

- A. Prefabricated Roofing Expansion Joint Flashing: Sheet butyl over closed-cell foam backing seamed to galvanized steel flanges.
- B. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; same material as membrane.
- C. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, compatible with roofing materials; 6 inches wide; self adhering.
- D. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.
- E. Membrane Adhesive: As recommended by membrane manufacturer.
- F. Insulation Adhesive: As recommended by insulation manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is supported and secure.
- C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- D. Verify deck surfaces are dry and free of snow or ice.
- E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and nailing strips are in place.

3.02 METAL DECK PREPARATION

- A. Install preformed sound absorbing glass fiber insulation strips in acoustic deck flutes. Install in accordance with manufacturer's instructions.

3.03 INSULATION - UNDER MEMBRANE

- A. Attachment of Insulation: Mechanically fasten each layer of insulation to deck in accordance with roofing manufacturer's instructions and Factory Mutual requirements.
- B. Lay subsequent layers of insulation with joints staggered minimum 6 inch from joints of preceding layer.
- C. On metal deck, place boards parallel to flutes with insulation board edges bearing on deck flutes.
- D. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- E. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.
- F. Do not apply more insulation than can be covered with membrane in same day.

3.04 MEMBRANE APPLICATION

- A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
- B. Shingle joints on sloped substrate in direction of drainage.
- C. Fully Adhered Application: Apply adhesive to substrate at manufacturer's required rate. Fully embed membrane in adhesive except in areas directly over or within 3 inches of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.
- D. Overlap edges and ends and seal seams by contact adhesive, minimum 3 inches. Seal permanently waterproof. Apply uniform bead of sealant to joint edge.
- E. At intersections with vertical surfaces:
 - 1. Extend membrane over cant strips and up a minimum of 4 inches onto vertical surfaces.
 - 2. Fully adhere flexible flashing over membrane and up to nailing strips.
- F. Around roof penetrations, seal flanges and flashings with flexible flashing.
- G. Install roofing expansion joints where indicated. Make joints watertight.
 - 1. Install prefabricated joint components in accordance with manufacturer's instructions.
- H. Coordinate installation of roof drains and related flashings.
- I. Install oil resistant ECO/CO roof membrane overlay within 10 feet of kitchen exhaust systems.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field quality control and inspection.
- B. Require site attendance of roofing and insulation material manufacturers daily during installation of the Work.

3.06 CLEANING

- A. Remove bituminous markings from finished surfaces.
- B. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
- C. Repair or replace defaced or damaged finishes caused by work of this section.

3.07 PROTECTION

- A. Protect installed roofing and flashings from construction operations.

- B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Fabricated sheet metal items, including flashings and counterflashings.
- C. Precast concrete splash pads.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry: Through-wall flashings in masonry.
- B. Section 07 53 00 - Elastomeric Membrane Roofing: Roofing system.

1.03 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2011.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.
- C. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012)e1.
- D. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2003.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- C. Samples: Submit two samples 6 x 6 inch in size illustrating metal finish color.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual requirements and standard details, except as otherwise indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 FLASHING TYPES

- A. Flashing Type 1: 2 piece interlocking type. Not Used.
- B. Flashing Type 2: Masonry thru-wall type: Refer to Section 04 20 00, Unit Masonry.
- C. Flashing Type 3: Roofing base flashing type: Refer to Section 07 53 00, Elastomeric Membrane Roofing.

- D. Flashing Type 4: Formed metal flashing (other than Type 1): Materials and locations specified below.

2.02 SHEET MATERIALS (FLASHING TYPE 4)

- A. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 0.02 inch thick base metal, shop pre-coated with PVDF coating.
 - 1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; metallic 3-coat, thermally cured fluoropolymer finish system.
 - 2. Color: To match sheet metal roofing.
 - 3. Location: Trim and flashing around metal roofing, as shown on Drawings.

2.03 ACCESSORIES

- A. Fasteners: Stainless steel .
- B. Underlayment: Self-adhering rubber-modified asphalt sheet complying with ASTM D 1970; 22 mil total thickness; with strippable release film and woven polypropylene sheet top surface.
- C. Primer: Zinc chromate type.
- D. Protective Backing Paint: Zinc molybdate alkyd.
- E. Sealant: Type 1 specified in Section 07 90 05.
- F. Plastic Cement: ASTM D4586, Type I.

2.04 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- F. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

- A. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

D. Seal metal joints watertight.

END OF SECTION

SECTION 07 71 00
ROOF SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Manufactured roof specialties, including copings and fascias.
- C. Roof control and expansion joint covers.

1.02 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2011.
- B. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2003.
- C. SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems; Single Ply Roofing Industry; 2003. (ANSI/SPRI ES-1)

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.
- C. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.
- D. Samples: Submit two appropriately sized samples of coping and gravel stop.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual details.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Roof Edge Flashings and Copings:
 - 1. Basis of Design: W.P. Hickman Company; Extruded TerminEdge: www.wph.com.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Control and Expansion Joint Covers:
 - 1. GAF; Product ____: www.gaf.com.
 - 2. Johns Manville Corporation: www.jm.com.
 - 3. MM Systems Corp: www.mmsystemscorp.com.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COMPONENTS

- A. Roof Edge Flashings: Factory fabricated to sizes required; mitered, welded corners; concealed fasteners.
 - 1. Configuration: Fascia and edge securement for roof membrane;
 - 2. Pull-Off Resistance: Tested in accordance with SPRI ES-1 RE-1 and RE-2 to positive and negative design wind pressure as defined by applicable code.
 - 3. Material: Extruded aluminum, 0.08 inch thick, minimum.

4. Finish: 70 percent polyvinylidene fluoride.
5. Color: To match sanding seam metal roofing.
6. Products:
 - a. W.P. Hickman Company; Extruded TerminEdge: www.wph.com.
- B. Copings: Factory fabricated to sizes required; mitered, welded corners; concealed fasteners.
 1. Configuration: Concealed continuous hold down cleat at both legs; internal splice piece at joints of same material, thickness and finish as cap; concealed stainless steel fasteners.
 2. Pull-Off Resistance: Tested in accordance with SPRI ES-1 RE-3 to positive and negative design wind pressure as defined by applicable code.
- C. Control and Expansion Joint Covers: Composite construction of 6 inch wide flexible EPDM flashing of white color with closed cell urethane foam backing, each edge seamed to stainless steel sheet metal flanges, designed for nominal joint width of 1 inch. Include special formed corners, tees, intersections, and wall flashings, each sealed watertight.

2.03 FINISHES

- A. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; metallic 2-coat, thermally cured fluoropolymer finish system; color as scheduled.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install components in accordance with manufacturer's instructions.
- B. Coordinate installation of components of this section with installation of roofing membrane and base flashings.
- C. Coordinate installation of sealants and roofing cement with work of this section to ensure water tightness.

END OF SECTION

SECTION 07 72 00
ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 1000, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Manufactured curbs, equipment rails, and pedestals.
- C. Roof hatches.

1.02 RELATED REQUIREMENTS

- A. Section 07 62 00 - Sheet Metal Flashing and Trim: Roof accessory items fabricated from sheet metal.
- B. Section 07 71 00 - Roof Specialties: Other manufactured roof items.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Maintenance requirements.
- C. Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products under cover and elevated above grade.

PART 2 PRODUCTS

2.01 MANUFACTURED CURBS

- A. Manufactured Curbs, Equipment Rails, and Other Roof Mounting Assemblies:
Factory-assembled hollow sheet metal construction with fully mitered and welded corners, integral counterflashing, internal reinforcing, and top side and edges formed to shed water.
 - 1. Manufacture curb bottom and mounting flanges for installation directly on roof deck, not on insulation; match slope and configuration of roof deck.
 - 2. Provide the layouts and configurations shown on the drawings.

2.02 ROOF HATCHES

- A. Manufacturers - Roof Hatches:
 - 1. Basis of Design: Bilco Company; Type S (ladder access, standard size, solid cover): www.bilco.com.
 - 2. Dur-Red Products: www.dur-red.com.
 - 3. Milcor by Commercial Products Group of Hart & Cooley, Inc: www.milcorinc.com.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Roof Hatches: Factory-assembled steel frame and cover, complete with operating and release hardware.
 - 1. Style: Provide flat metal covers unless otherwise indicated.

2. Mounting: Provide frames and curbs suitable for mounting conditions indicated on the drawings.
- C. Frames/Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
 1. Material: Galvanized steel, 14 gage, 0.0747 inch thick.
 2. Finish: Factory prime paint.
 3. Insulation: 1 inch rigid glass fiber, located on outside face of curb.
 4. Curb Height: 12 inches from finished surface of roof, minimum.
- D. Metal Covers: Flush, insulated, hollow metal construction.
 1. Capable of supporting 40 psf live load.
 2. Material: Galvanized steel; outer cover 14 gage, 0.0747 inch thick, liner 22 gage, 0.03 inch thick.
 3. Finish: Factory prime paint.
 4. Insulation: 1 inch rigid glass fiber.
 5. Gasket: Neoprene, continuous around cover perimeter.
- E. Hardware: Steel, zinc coated and chromate sealed, unless otherwise indicated or required by manufacturer.
 1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf load.
 2. Hinges: Heavy duty pintle type.
 3. Hold open arm with vinyl-coated handle for manual release.
 4. Latch: Upon closing, engage latch automatically and reset manual release.
 5. Manual Release: Pull handle on interior.
 6. Locking: Padlock hasp on interior.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 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.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing weather integrity.

3.04 CLEANING

- A. Clean installed work to like-new condition.

3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 90 05
JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Sealants and joint backing.
- C. Precompressed foam sealers.

1.02 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants; 2010.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2011.
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2011a.
- D. ASTM D1667 - Standard Specification for Flexible Cellular Materials--Poly(Vinyl Chloride) Foam (Closed-Cell); 2005 (Reapproved 2011).
- E. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.
- C. LEED Report: Submit VOC content documentation for all non-preformed sealants and primers.
- D. Manufacturer's Installation Instructions: Indicate special procedures, surface preparation, and perimeter conditions requiring special attention.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum 5 years experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum 5 years experience.

1.05 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.06 COORDINATION

- A. Coordinate the work with all sections referencing this section.

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 SEALANTS

- A. Sealants and Primers - General: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.
- B. Type 1 - General Purpose Exterior Sealant: Silicone; ASTM C 920, Grade NS, Class 25, Uses M, G, and A; single component.
 - 1. Color: To be selected by Architect from manufacturer's full range.
 - 2. Joint Movement Range: +/- 50 percent.
 - 3. Product:
 - a. SilPruf NB SCS9000 manufactured by Momentive Performance Materials, Inc (formerly GE Silicones).
 - b. 890FTS manufactured by Pecora Corporation.
 - c. 890FTS TXTR manufactured by Pecora Corporation.
 - d. 795 manufactured by Dow Corning.
 - 4. Applications: Use for:
 - a. Control, expansion, and soft joints in masonry.
 - b. Joints between concrete and other materials.
 - c. Joints between metal frames and other materials.
 - d. Joints in manufactured masonry veneer system.
- C. Type 2 - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
 - 1. Color: Colors as selected.
 - 2. Applications: Use for:
 - a. Interior wall and ceiling control joints.
 - b. Joints between door and window frames and wall surfaces.
 - c. Other interior joints for which no other type of sealant is indicated.
- D. Type 3 - Coal tar extended, fuel resistant polyurethane sealant: Not Used.
- E. Type 4 - Fire Resistant Foam Sealant:
 - 1. Manufacturers:
 - a. Dow Corning: Product: 3-6548 RTV Foam.
- F. Type 5 - Exterior Expansion Joint Sealer: Not Used
- G. Type 6 - Bathtub/Tile Sealant: White silicone; ASTM C920, Uses I, M and A; single component, mildew resistant.
 - 1. Applications: Use for:
 - a. Joints between plumbing fixtures and floor and wall surfaces.
 - b. Joints between kitchen and bath countertops and wall surfaces.
- H. Type 7 - Butyl Sealant: Not Used
- I. Type 8 - Acoustical Sealant: Not Used.

2.02 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; open cell polyurethane or reticulated (soft) polyethylene; oversized 33 to 50 percent larger than joint width; Denver Foam manufactured by Backer Rod Manufacturing, Inc.

- D. Fire Rated Joint Filler: Pre-engineered, patented, flexible, textile fiberglass roll material with a fiberglass matt facing, containing approximately 30 percent by weight unexpanded vermiculite; Ultra Block manufactured by Backer Rod Manufacturing, Inc.
- E. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces and joint openings are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Measure joint dimensions and size joint backers to achieve the following:
 - 1. Width/depth ratio of 2:1.
 - a. Minimum joint depth: 1/4 inch; Maximum joint depth: 1/2 inch, unless otherwise required by manufacturer.
 - 2. Neck dimension no greater than 1/3 of the joint width.
 - 3. Surface bond area on each side not less than 75 percent of joint width.
- D. Install backer rod using blunt or rounded tool to a uniform (+/- 1/8 inch) depth without puncturing the material.
- E. Install bond breaker where joint backing is not used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- H. Tool joints concave.

3.04 CLEANING

- A. Clean adjacent soiled surfaces.

3.05 PROTECTION

- A. Protect sealants until cured.

3.06 SCHEDULE

- A. Exterior Joints for Which No Other Sealant Type is Indicated: Type 1; colors as selected.
- B. Interior Joints for Which No Other Sealant is Indicated: Type 2; color as selected.
- C. Penetrations of Fire Rated Construction: Type 1 with Ultra Block joint filler or Type 4.
- D. Joints Between Plumbing Fixtures and Walls and Floors, and Between Countertops and Walls: Type 6.

END OF SECTION

SECTION 08 06 72
DOOR HARDWARE SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. This Section references specification sections relating to commercial door hardware for the following:
 - 1. Swinging doors.
 - 2. Other doors to the extent indicated.
- C. Commercial door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
 - 2. Electromechanical and access control door hardware.
 - 3. Electromechanical and access control door hardware power supplies, back-ups and surge protection.
 - 4. Automatic operators.
 - 5. Cylinders specified for doors in other sections.

1.02 RELATED SECTIONS

- A. Section 08 11 13 - Hollow Metal Doors and Frames.
- B. Section 08 33 23 - Overhead Coiling Doors
- C. Section 08 33 33 - Coiling Counter Doors
- D. Section 08 43 13 - Aluminum Framed Storefronts.
- E. Section 08 71 00 - Door Hardware.

1.03 ALTERNATES

- A. Refer to Section 00 43 23 Alternates, for description of work under this Section affected by alternates.

1.04 REFERENCES

- A. 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. ICC/IBC - International Building Code.
 - 3. NFPA 70 - National Electrical Code.
 - 4. NFPA 80 - Fire Doors and Windows.
 - 5. NFPA 101 - Life Safety Code.
 - 6. NFPA 105 - Installation of Smoke Door Assemblies.
- B. Standards: Reference Related Sections for requirements regarding compliance with applicable industry standards.

1.05 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.
- C. 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.
- D. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.
- E. 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.
- F. 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. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.
- G. Warranties and Maintenance: Special warranties and maintenance agreements specified in the Related Sections.

1.06 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: Installers, trained by the primary product manufacturers, with a minimum 5 years documented experience installing both standard and electrified builders 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 in good standing 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 the Related Sections from a single source, qualified supplier unless otherwise indicated.

E. Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ANSI A117.1 requirements and guidelines as directed in the applicable model building code.

F. 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.

1.07 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".

1.08 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 and Frame Preparation: Division 08 Sections Steel and Aluminum 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.

1.09 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.

1.10 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

2.01 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets at the end of Part 3 of each referenced section that products are to supplied under.

1. 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:
 - a. 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.
- B. 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.

2.02 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.

2.03 FINISHES

- A. The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18 or traditional U.S. finishes shown by certain manufacturers for their products.

PART 3 EXECUTION

3.01 DOOR HARDWARE SETS

- A. The door 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. The supplier is responsible for handing and sizing all products as listed in the door hardware sets. Quantities listed are for each pair of doors, or for each single door.
- C. Products listed in the Door Hardware Sets are to be provided under and meet the requirements described in the specification sections noted.
 1. Section 08 71 00 - Door Hardware.
 2. Section 08 74 00 - Access Control Hardware.
 - a. Manufacturer's Abbreviations:
 - 1) MK - McKinney
 - 2) RO - Rockwood
 - 3) SA - Sargent
 - 4) BE - Stanley Security Solutions Inc (BE)
 - 5) RF - Rixson
 - 6) PE - Pemko
 - 7) SU - Securitron
 - 8) 00 - Other

HARDWARE SCHEDULE

SET: 00.15.10

Doors: FH110, FH116

2	Continuous Hinge	MCK-12HD SER-12 x LAR	CL	MK
1	Removable Mullion	L980S	PC	SA
1	Exit Device	16 55 56 8804 FLL LC	US32D	SA
1	Exit Device	16 55 8810 FLL	US32D	SA
4	Cylinder	1E-72/1E-74	626	BE
2	Door Closer	351 P10	EN	SA
2	Mop Plate	K1050 10" x 1" LDW 4BE	US32D	RO
2	Door Stop	471 EXP	US26D	RO
1	Threshold	271A x LAR MSES25SS		PE
1	Gasketing	S88D (Head & Jambs)		PE
1	Rain Guard	346C		PE
2	Sweep	3452CNB x LAR		PE
2	eLynx Frame Harness	QC-C1500P		MK
2	eLynx Door Harness	QC-C*** (Length / Type as Required)		MK
1	Power Supply	BPS (size & type as required)		SU
1	Wiring Diagram	Complete with point to point drawing		OT

Notes: A valid credential at the card reader (specified elsewhere) retracts the latches on the active door exit device allowing entry. Key override. Free egress at all times.

SET: 00.25.10

Doors: FH114, FH117

1	Continuous Hinge	MCK-12HD x LAR	CL	MK
1	Continuous Hinge	MCK-12HD SER-12 x LAR	CL	MK
1	Flush Bolt	2842	US26D	RO
1	Dust Proof Strike	570	US26D	RO
1	Fail Secure Electric Lock	RX 8271-24V LNL LC	US26D	SA
1	Cylinder	1E-72/1E-74	626	BE
1	Coordinator	1700	BLACK	RO
2	Door Closer	351 P10	EN	SA
2	Mop Plate	K1050 10" x 1" LDW 4BE	US32D	RO
2	Door Stop	471 EXP	US26D	RO
1	Threshold	271A x LAR MSES25SS		PE
1	Gasketing	S88D (Head & Jambs)		PE
1	Rain Guard	346C		PE
1	Sweep	3452CNB x LAR		PE
1	Astragal	357SP		PE
1	eLynx Frame Harness	QC-C1500P		MK
1	eLynx Door Harness	QC-C*** (Length / Type as Required)		MK
1	Power Supply	BPS (size & type as required)		SU
1	Wiring Diagram	Complete with point to point drawing		OT

Notes: Valid credential at reader momentarily releases the fail secure lockset allowing entry. Key override. Free egress at all times. If it is determined that access control isn't used at this time, change lock model to 8225 LNL.

SET: 25.04.07

Doors: FH106, FH130A, FH130B

6	Hinge	T4A3386 NRP 4-1/2" x 4-1/2"	US32D	MK
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2	Manual Flush Bolt	555	US26D	RO
1	Dustproof Strike	570	US26D	RO
1	Storeroom Lock	8204 LNL LC	US26D	SA
1	Cylinder	1E-72/1E-74	626	BE
2	Surface Overhead Holder/Stop	9ADJ-026	630	RF
2	Mop Plate	K1050 10" x 1" LDW 4BE	US32D	RO
1	Threshold	271A x LAR MSES25SS		PE
1	Gasketing	S88D (Head & Jambs)		PE
1	Rain Guard	346C		PE
2	Sweep	3452CNB x LAR		PE
1	Astragal	357SP		PE

SET: 25.04.66

Doors: FH136, FH402, FH404, FH406, FH408

3	Hinge	T4A3386 NRP 4-1/2" x 4-1/2"	US32D	MK
1	Storeroom Lock	8204 LNL LC	US26D	SA
1	Cylinder	1E-72/1E-74	626	BE
1	Door Closer	351 CPSH	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE	US32D	RO
1	Threshold	271A x LAR MSES25SS		PE
1	Gasketing	S88D (Head & Jambs)		PE
1	Sweep	3452CNB x LAR		PE

SET: 25.25.66

Doors: FH105A, FH108, FH109, FH134A, FH137, FH138, FH301A, FH301B

3	Hinge	T4A3386 NRP 4-1/2" x 4-1/2"	US32D	MK
1	Dormitory Lock	8225 LNL LC	US26D	SA
1	Cylinder	1E-72/1E-74	626	BE
1	Door Closer	351 CPSH	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE	US32D	RO
1	Threshold	271A x LAR MSES25SS		PE
1	Gasketing	S88D (Head & Jambs)		PE
1	Rain Guard	346C		PE
1	Sweep	3452CNB x LAR		PE

SET: 25.64.16

Doors: FH101, FH103

6	Hinge	T4A3386 NRP 4-1/2" x 4-1/2"	US32D	MK
2	Flush Bolt	2842	US26D	RO
1	Dustproof Strike	570	US26D	RO
1	Mortise Deadlock	4877 LC	US26D	SA
1	Cylinder	1E-72/1E-74	626	BE
2	Door Pull	111	US32D	RO
2	Push Plate	70F CFC	US32D	RO
1	Coordinator	1700	BLACK	RO
2	Door Closer	351 P10	EN	SA

2	Mop Plate	K1050 10" x 1" LDW 4BE	US32D	RO
2	Door Stop	471 EXP	US26D	RO
1	Threshold	271A x LAR MSES25SS		PE
1	Gasketing	S88D (Head & Jambs)		PE
2	Sweep	3452CNB x LAR		PE
1	Astragal	357SP		PE

SET: 25.64.60

Doors: FH131, FH133

3	Hinge	T4A3386 NRP 4-1/2" x 4-1/2"	US32D	MK
1	Mortise Deadlock	4877 LC	US26D	SA
1	Cylinder	1E-72/1E-74	626	BE
1	Door Pull	111	US32D	RO
1	Push Plate	70F CFC	US32D	RO
1	Door Closer	351 O/P9	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE	US32D	RO
1	Door Stop	471 EXP	US26D	RO
1	Threshold	271A x LAR MSES25SS		PE
1	Gasketing	S88D (Head & Jambs)		PE
1	Sweep	3452CNB x LAR		PE

SET: 45.13.10

Doors: FH115B

2	Continuous Hinge	MCK-12HD x LAR	CL	MK
1	Exit Device	16 NB8743 ETL LC	US32D	SA
1	Exit Device	16 NB8740 ETL LC	US32D	SA
3	Cylinder	1E-72/1E-74	626	BE
2	Door Closer	351 P10	EN	SA
2	Mop Plate	K1050 10" x 1" LDW 4BE	US32D	RO
2	Door Stop	409	US32D	RO
2	Silencer	608		RO

SET: 45.13.60

Doors: FH115A

1	Continuous Hinge	MCK-12HD x LAR	CL	MK
1	Exit Device	16 8843 ETL LC	US32D	SA
1	Cylinder	1E-72/1E-74	626	BE
1	Door Closer	351 P10	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE	US32D	RO
1	Door Stop	409	US32D	RO
3	Silencer	608		RO

SET: 55.04.50

Doors: FH102, FH118, FH132

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	8204 LNL LC	US26D	SA
1	Cylinder	1E-72/1E-74	626	BE
1	Kickplate	K1050 10" x 2" LDW 4BE	US32D	RO
1	Door Stop	409	US32D	RO
3	Silencer	608		RO

SET: 55.04.57

Doors: FH104

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	8204 LNL LC	US26D	SA
1	Cylinder	1E-72/1E-74	626	BE
1	Surface Overhead Holder/Stop	9ADJ-026	630	RF
1	Kickplate	K1050 10" x 2" LDW 4BE	US32D	RO
3	Silencer	608		RO

SET: 55.04.70

Doors: FH302

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	8204 LNL LC	US26D	SA
1	Cylinder	1E-72/1E-74	626	BE
1	Door Closer	351 O	EN	SA
1	Kickplate	K1050 10" x 2" LDW 4BE	US32D	RO
1	Door Stop	409	US32D	RO
1	Gasketing	S88D (Head & Jamb)		PE

SET: 55.37.10

Doors: FH111A, FH119A

2	Continuous Hinge	MCK-12HD x LAR	CL	MK
1	Flush Bolt	2842	US26D	RO
1	Dustproof Strike	570	US26D	RO
1	Classroom Lock	8237 LNL LC	US26D	SA
1	Cylinder	1E-72/1E-74	626	BE
1	Coordinator	1700	BLACK	RO
2	Door Closer	351 P10	EN	SA
2	Mop Plate	K1050 10" x 1" LDW 4BE	US32D	RO
1	Door Stop	409	US32D	RO
1	Door Stop	471 EXP	US26D	RO
2	Silencer	608		RO

SET: 55.37.50

Doors: FH112

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Lock	8237 LNL LC	US26D	SA

1	Cylinder	1E-72/1E-74	626	BE
1	Door Stop	409	US32D	RO
3	Silencer	608		RO

SET: 55.37.57

Doors: FH107, FH115.1

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Classroom Lock	8237 LNL LC	US26D	SA
1	Cylinder	1E-72/1E-74	626	BE
1	Surface Overhead Holder/Stop	9ADJ-026	630	RF
3	Silencer	608		RO

SET: 55.99.10

Doors: FH111B, FH119B

2	Continuous Hinge	MCK-12HD x LAR	CL	MK
2	Door Pull	111	US32D	RO
2	Push Plate	110x70C	US32D	RO
2	Door Closer	351 P10	EN	SA
2	Mop Plate	K1050 10" x 1" LDW 4BE	US32D	RO
2	Door Stop	409	US32D	RO
2	Silencer	608		RO

SET: 99.99.99

Doors: FH105B, FH105C, FH108A, FH109A, FH134B, FH134C, FH134D, FH137A, FH138A, FH301C, FH301D, FH301E, FH301F, FH403, FH405

1 All Hardware by Door Supplier 00

END OF SECTION

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Non-fire-rated steel doors and frames.
- C. Thermally insulated steel doors.

1.02 RELATED REQUIREMENTS

- A. Section 08 71 00 - Door Hardware.
- B. Section 09 90 00 - Painting and Coating: Field painting.

1.03 REFERENCE STANDARDS

- A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.
- B. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames; 2003.
- C. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 1998 (R2011).
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.
- E. ASTM C1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus; 2011.
- F. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames; 2006.
- G. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 2007.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- B. Maintain at the project site a copy of all reference standards dealing with installation.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store in accordance with NAAMM HMMA 840.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Steel Doors and Frames:

1. Assa Abloy Ceco, Curries, or Fleming: www.assaabloydss.com.
2. Republic Doors: www.republicdoor.com.
3. Steelcraft, an Ingersoll Rand brand; Product ____: www.steelcraft.com.
4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 DOORS AND FRAMES

A. Requirements for All Doors and Frames:

1. Accessibility: Comply with ANSI/ICC A117.1.
2. Door Top Closures: Flush with top of faces and edges.
3. Door Edge Profile: Beveled on both edges.
4. Door Texture: Smooth faces.
5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
6. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
7. Galvanizing for Units in Wet Areas: All components hot-dipped zinc-iron alloy-coated (galvannealed), manufacturer's standard coating thickness.
8. Finish: Factory primed, for field finishing.

- #### **B. Combined Requirements:** If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 STEEL DOORS

A. Exterior Doors :

1. Grade: ANSI A250.8 Level 4, physical performance Level A, Model 2, seamless.
2. Core: Polystyrene foam.
3. Top Closures for Outswinging Doors: Flush with top of faces and edges.
4. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A60/ZF180 coating.
5. Insulating Value: U-value of 0.50, when tested in accordance with ASTM C1363.

B. Interior Doors, Non-Fire-Rated:

1. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless.
2. Core: Cardboard honeycomb.
3. Thickness: 1-3/4 inches.

2.04 STEEL FRAMES

A. General:

1. Comply with the requirements of grade specified for corresponding door.
 - a. ANSI A250.8 Level 4 Doors: 12 gage frames.
2. Finish: Same as for door.
3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
4. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.

5. Frames Wider than 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.
- B. Exterior Door Frames: Fully welded.
 1. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
 2. Weatherstripping: Separate, see Section 08 71 00.
- C. Interior Door Frames, Non-Fire-Rated: Fully welded type.

2.05 ACCESSORY MATERIALS

- A. Louvers: Roll formed steel with overlapping frame; finish same as door components; factory-installed.
 1. Style: Sightproof inverted V blade.
- B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
- C. Astragals for Double Doors: Specified in Section 08 71 00.
 1. Exterior Doors: Steel, Z-shaped.
- D. Grout for Frames: Portland cement grout of maximum 4-inch slump for hand troweling; thinner pumpable grout is prohibited.
- E. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.
- F. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

2.06 FINISH MATERIALS

- A. Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.
- B. Coordinate frame anchor placement with wall construction.
- C. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- D. Coordinate installation of hardware.

3.04 TOLERANCES

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

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.
- B. Test sound control doors for force to close, latch, and unlatch; adjust as required to comply.

END OF SECTION

SECTION 08 33 23
OVERHEAD COILING DOORS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Insulated service doors.
- B. Related Sections:
 - 1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.
 - 2. Section 083333 "Coiling Counter Doors" for coiling counter doors.
 - 3. Section 083326 "Overhead Coiling Grilles" for open-curtain overhead coiling grilles.

1.02 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design overhead coiling doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance, Exterior Doors: Exterior overhead coiling doors shall withstand the wind loads, the effects of gravity loads, and loads and stresses within limits and under conditions indicated according to SEI/ASCE 7.
 - 1. Wind Loads:
 - a. Basic Wind Speed: 95 mph.
 - 2. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.
- C. Operability under Wind Load: Design overhead coiling doors to remain operable under design wind load, acting inward and outward.
- D. Operation Cycles: Provide overhead coiling door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type and size of overhead coiling door and accessory. Include the following:
 - 1. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
 - 2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
 - 3. For fire-rated doors, description of fire-release system including testing and resetting instructions.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Wiring Diagrams: For power, signal, and control wiring.
- C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.
 - 1. Include similar Samples of accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Curtain Slats: 12 inches long.

E. Delegated-Design Submittal: For overhead coiling doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Summary of forces and loads on walls and jambs.

1.04 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer and professional engineer.

1.05 CLOSEOUT SUBMITTALS

A. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

B. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.

1. Obtain operators and controls from overhead coiling door manufacturer.

C. 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.

PART 2 - PRODUCTS

2.01 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel sheet; complying with ASTM A 653/A 653M, with G90 (Z275) zinc coating; nominal sheet thickness (coated) of 0.028 inch and as required to meet requirements.
2. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within slat faces.
3. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.

B. Endlocks and Windlocks for Service Doors: Malleable-iron casings galvanized after fabrication, secured to curtain slats with galvanized rivets or high-strength nylon. Provide locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.

C. Bottom Bar for Service Doors: Consisting of two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from manufacturer's standard hot-dip galvanized steel, stainless steel, or aluminum extrusions to match curtain slats and finish.

D. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain, and a continuous bar for holding windlocks.

2.02 HOOD

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top

and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any

portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1. Galvanized Steel: Nominal 0.028-inch- thick, hot-dip galvanized steel sheet with G90 (Z275) zinc coating, complying with ASTM A 653/A 653M.

2.03 LOCKING DEVICES

- A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
 1. Lock Cylinders: Provide cylinders specified in Section 087100 "Door Hardware" and keyed to building keying system.
 2. Keys: Provide three for each cylinder.
- B. Chain Lock Keeper: Suitable for padlock.
- C. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.04 CURTAIN ACCESSORIES

- A. Smoke Seals: Equip each fire-rated door with smoke-seal perimeter gaskets for smoke and draft control as required for door listing and labeling by a qualified testing agency.
- B. Weatherseals: Equip each exterior door with weather-stripping gaskets fitted to entire perimeter of door for a weathertight installation, unless otherwise indicated.
 1. At door head, use 1/8-inch- thick, replaceable, continuous sheet secured to inside of hood.
 2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch- thick seals of flexible vinyl, rubber, or neoprene.
- C. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.

2.05 COUNTERBALANCING MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Spring Balance: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
- D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.06 ELECTRIC DOOR OPERATORS

- A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch,

- remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
1. Comply with NFPA 70.
 2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc.
- B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.
- C. Door Operator Location(s): Operator location indicated for each door.
1. Top-of-Hood Mounted: Operator is mounted to the right or left door head plate with the operator on top of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Headroom is required for this type of mounting.
- D. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 110513 "Common Motor Requirements for Equipment" unless otherwise indicated.
1. Electrical Characteristics:
 - a. Phase: Single phase.
 - b. Volts: 115/230 V.
 - c. Hertz: 60.
 2. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
 3. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
 4. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
 5. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
- E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
- F. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. For non-fire-rated doors, activation of device immediately stops and reverses downward door travel.
1. Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
 - a. Self-Monitoring Type: Four-wire configured device designed to interface with door operator control circuit to detect damage to or disconnection of sensor edge.
- G. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
1. Interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
- H. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf.
- I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount

mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

- J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.
- K. Radio-Control System: Consisting of the following:
 - 1. Three-channel universal coaxial receiver to open, close, and stop door; one per operator.
 - 2. Remote-antenna mounting kit.

2.07 INSULATED DOOR ASSEMBLY

- A. Insulated Service Door: Overhead coiling door formed with curtain of interlocking metal slats.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Overhead Door Corporation; 625 Series Insulated Service Door or comparable product by one of the following:
 - a. C.H.I. Overhead Doors.
 - b. Cookson Company.
 - c. Cornell Iron Works, Inc.
- B. Operation Cycles: Not less than 20,000.
 - 1. Include tamperproof cycle counter.
- C. Curtain R-Value: 7.7 deg F x h x sq. ft./Btu.
- D. Door Curtain Material: Galvanized steel.
- E. Door Curtain Slats: Flat profile slats of 2-5/8-inch center-to-center height.
 - 1. Insulated-Slat Interior Facing: Metal.
- F. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.
- G. Hood: Match curtain material and finish.
 - 1. Shape: Round.
 - 2. Mounting: Face of wall.
- H. Locking Devices: Equip door with locking device assembly and chain lock keeper.
 - 1. Locking Device Assembly: Cremone type, both jamb sides locking bars, operable from inside and outside with cylinders.
- I. Electric Door Operator:
 - 1. Usage Classification: Medium duty, up to 15 cycles per hour.
 - 2. Operator Location: Top of hood.
 - 3. Motor Exposure: Interior.
 - 4. Emergency Manual Operation: Chain type.
 - 5. Obstruction-Detection Device: Automatic pneumatic sensor edge on bottom bar ; self-monitoring type.
 - a. Sensor Edge Bulb Color: Black.
 - 6. Remote-Control Station: Interior.
 - 7. Other Equipment: Radio-control system.
- J. Door Finish:
 - 1. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.
 - 2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.08 GENERAL FINISH REQUIREMENTS

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

2.09 STEEL AND GALVANIZED-STEEL FINISHES

- A. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead coiling doors, hoods, and operators at the mounting locations indicated for each door.
- C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.03 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Perform installation and startup checks according to manufacturer's written instructions.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.04 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust seals to provide weathertight fit around entire perimeter.

3.05 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION

SECTION 08 33 33
COILING COUNTER DOORS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Coiling counter doors.
- B. Related Sections:
 - 1. Section 05 50 00 "Metal Fabrications" for miscellaneous steel supports.
 - 2. Section 08 33 23 "Overhead Coiling Doors" for non-insulated and insulated service doors.

1.02 PERFORMANCE REQUIREMENTS

- A. Operation Cycles: Provide overhead coiling door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type and size of overhead coiling door and accessory. Include the following:
 - 1. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
 - 2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Curtain Slats: 12 inches long.
 - 2. Bottom Bar: 6 inches long.
 - 3. Guides: 6 inches long.
 - 4. Brackets: 6 inches square.
 - 5. Hood: 6 inches square.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.

1.05 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain coiling counter doors from single source from single manufacturer.
 - 1. Obtain operators and controls from coiling counter door manufacturer.
- C. Regulatory Requirements: Comply with applicable provisions in ICC/ANSI A117.1.

PART 2 - PRODUCTS

2.01 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
 - 1. Stainless-Steel Door Curtain Slats: ASTM A 666, Type 304; sheet thickness of 0.025 inch and as required to meet requirements.
 - 2. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel sheet; complying with ASTM A 653/A 653M, with G90 (Z275) zinc coating; nominal sheet thickness (coated) of 0.028 inch and as required to meet requirements.
- B. Endlocks for Counter Doors: Manufacturer's standard locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.
- C. Bottom Bar for Counter Doors: Manufacturer's standard continuous channel or tubular shape, fabricated from manufacturer's standard hot-dip galvanized steel, stainless steel, or aluminum extrusions to match curtain slats and finish.
- D. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

2.02 HOOD

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
 - 1. Stainless Steel: 0.025-inch- thick stainless-steel sheet, Type 304, complying with ASTM A 666.
 - 2. Galvanized Steel: Nominal 0.028-inch- thick, hot-dip galvanized steel sheet with G90 (Z275) zinc coating, complying with ASTM A 653/A 653M.

2.03 LOCKING DEVICES

- A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
 - 1. Lock Cylinders: Provide cylinders specified in Section 087100 "Door Hardware" and keyed to building keying system.
 - 2. Keys: Provide three for each cylinder.
- B. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.04 CURTAIN ACCESSORIES

- A. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.
 - 1. Smoke Seals: Equip each smoke control door with smoke-seal perimeter gaskets for smoke and draft control as required for door listing and labeling by a qualified testing agency.
 - 2. Provide pull-down straps or pole hooks for doors more than 84 inches high.

2.05 COUNTERBALANCING MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Spring Balance: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
- D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.06 COUNTER DOOR ASSEMBLY

- A. Coiling Counter Door: Overhead coiling door formed with curtain of interlocking metal slats.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Overhead Door Corporation; 651 Series Overhead Coiling Counter Doors or comparable product by one of the following:
 - a. Cookson Company.
 - b. Cornell Iron Works, Inc.
- B. Operation Cycles: Not less than 20,000.
 - 1. Include tamperproof cycle counter.
- C. STC Rating: 27.
- D. Door Curtain Material: Stainless steel.
- E. Door Curtain Slats: Flat profile slats of 1-1/2-inch center-to-center height.
- F. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.
- G. Hood: Match curtain material and finish.
 - 1. Shape: Round.
 - 2. Mounting: Face of wall.
- H. Integral Frame, Hood, and Fascia for Counter Door: Stainless steel.
 - 1. Mounting: Face of wall.
- I. Sill Configuration for Counter Door: As indicated.
- J. Locking Devices: Equip door with locking device assembly.
 - 1. Locking Device Assembly: Cremone type, both jamb sides locking bars, operable from inside and outside with cylinders.
- K. Operation: Manual push up.
- L. Door Finish:
 - 1. Stainless-Steel Finish: No. 4 (polished directional satin).
 - 2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.07 GENERAL FINISH REQUIREMENTS

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

- 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.

2.08 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1. Run grain of directional finishes with long dimension of each piece.
 - 2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - 3. Directional Satin Finish: No. 4.

2.09 STEEL AND GALVANIZED-STEEL FINISHES

- A. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead coiling doors, hoods, and operators at the mounting locations indicated for each door.

3.03 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Perform installation and startup checks according to manufacturer's written instructions.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.04 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.

3.05 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION

SECTION 08 43 13
ALUMINUM-FRAMED STOREFRONTS

PART 2 PRODUCTS

1.01 STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
1. Glazing Rabbet: For 1 inch insulating glazing.
 2. Glazing Rabbet: For 1/4 inch monolithic glazing.
 3. Glazing Position: Centered (front to back).
 4. Finish: Class I natural anodized.
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 - b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
 - c. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
 5. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 6. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 7. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
 8. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
 9. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
 10. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
 11. Basis of Design: Subject to compliance with requirements, provide Kawneer North America; TRIFAB 450 for monolithic glazing, TRIFAB 451T for insulating glazing or comparable product by one of the following:
 - a. Other Acceptable Manufacturers:
 - 1) YKK AP America Inc.
 - 2) United States Aluminum Corp.

1.02 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, drainage holes and internal weep drainage system.
1. Framing members for interior applications need not be thermally broken.
 2. Glazing stops: Flush.

1.03 FABRICATION

END OF SECTION

SECTION 08 56 55
TICKET WINDOWS

PART 1 - GENERAL

1.01 SUMMARY

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Section Includes:
 - 1. Fixed, transaction ticket windows.

1.02 COORDINATION

- A. Coordinate installation of anchorages for ticket windows. 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 adjacent construction. Deliver such items to Project site in time for installation.

1.03 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.04 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 window units.
- B. Shop Drawings: For ticket windows.
 - 1. Include plans, elevations, sections, and attachments to other work.
 - 2. Full-size section details of framing members.
 - 3. Glazing details.
 - 4. Details of deal tray, transaction counter, and speaking aperture.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 - 1. Framing: 12-inch- long sections of frame members.

1.05 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Pack ticket windows in wood crates for shipment. Crate glazing separate from frames unless factory glazed.
- B. Label ticket window packaging with drawing designation.
- C. Store crated ticket windows on raised blocks to prevent moisture damage.

1.07 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.08 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace ticket windows that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Three (3) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 FIXED, TRANSACTION TICKET WINDOWS

- A. Provide fixed, framed transaction windows with operable sash or ventilator capable of allowing transfer of currency and documents.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide aluminum ticket window, catalog number SCW102N, manufactured by C. R. Laurence, Co. Inc.; or comparable product by one of the following:
 - a. Creative Industries, Inc.
 - b. Quikserv Corp.
- B. Configuration: One fixed-glazed panel.
- C. Framing: Fabricate perimeter framing, mullions, and glazing stops from aluminum as follows:
 - 1. Profile: Manufacturer's standard, with minimum face dimension indicated.
 - a. Minimum Face Dimension: 0.625 inches.
 - 2. Depth: Minimum Dimension: 1.390 inches.
- D. Transaction Counter: 16 gauge, stainless steel, 18 inches deep by width of ticket window, centered in opening.
- E. Glazing: 0.25" tempered glass.
- F. Materials:
 - 1. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666 or ASTM A 240/A 240M, austenitic stainless steel, Type 304.
 - 2. Aluminum Extrusions: ASTM B 221. Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength.
 - 3. Aluminum Sheet and Plate: ASTM B 209.

2.02 FABRICATION

- A. General: Fabricate ticket windows to provide a complete system for assembly of components and anchorage of window units.
 - 1. Prepare ticket windows for glazing unless preglazing at the factory is indicated.
- B. Framing: Provide snap-in cover for fastening channel..
- C. Glazing Stops: Stops integral with frame extrusion.
- D. Metal Protection: Separate dissimilar metals to protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
- E. Factory-cut openings in glazing for speaking apertures.

2.03 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. 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.

2.04 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.05 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1. Run grain of directional finishes with long dimension of each piece.
 - 2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - 3. Directional Satin Finish: No. 4.

2.06 ACCESSORIES

- A. Transaction Door: Half-round pivoting door, formed from stainless steel with exposed flanges for installation into sill framing.
- B. Speaking Apertures: No-draft stainless steel speaking louver.
 - 1. Shape: Circular.
 - 2. Product: Model 834A manufactured by C. R. Laurence, Co. Inc
- C. Compression-Type Glazing Strips and Weather Stripping: Unless otherwise indicated, provide compressible stripping for glazing and weather stripping, such as molded EPDM or neoprene gaskets complying with ASTM D 2000, Designations 2BC415 to 3BC620; molded PVC gaskets complying with ASTM D 2287; or molded, expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.
- D. Miscellaneous Glazing Materials: Provide material, size, and shape complying with requirements of glass manufacturers and with a proven record of compatibility with surfaces contacted in installation.
 - 1. Cleaners, Primers, and Sealers: Type recommended by sealant or gasket manufacturer.
 - 2. Setting Blocks: Elastomeric material with a Type A Shore durometer hardness of 85, plus or minus 5.
 - 3. Spacers: Elastomeric blocks or continuous extrusions with a Type A Shore durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
 - 4. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- E. Anchors, Clips, and Window Accessories: Stainless steel; hot-dip, zinc-coated steel or iron, complying with ASTM B 633.
- F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- G. Sealants: For sealants required within fabricated ticket windows, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, nonshrinking, and nonmigrating.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of ticket windows.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations of ticket window connections before ticket window installation.
- C. Inspect built-in and cast-in anchor installations, before installing ticket windows, to verify that anchor installations comply with requirements. Prepare inspection reports.
 - 1. Remove and replace anchors where inspections indicate that they do not comply with specified requirements. Reinspect after repairs or replacements are made.

2. Perform additional inspections to determine compliance of replaced or additional work.
Prepare anchor inspection reports.

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

3.02 INSTALLATION

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing ticket windows to in-place construction. Include threaded fasteners for inserts, security fasteners, and other connectors.
- B. Fasteners: Install ticket windows using fasteners recommended by manufacturer with head style appropriate for installation requirements, strength, and finish of adjacent materials. Provide stainless-steel fasteners in stainless-steel materials.
- C. Sealants: Comply with requirements in Section 07 90 05 "Joint Sealers" for installing sealants, fillers, and gaskets.
 1. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction unless otherwise indicated.
 2. Seal frame perimeter with sealant to provide weathertight construction unless otherwise indicated.
- D. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended in writing by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

3.03 ADJUSTING

- A. Remove and replace defective work, including ticket windows that are warped, bowed, or otherwise unacceptable.

3.04 CLEANING AND PROTECTION

- A. Clean surfaces promptly after installation of ticket windows. Take care to avoid damaging the finish. Remove excess glazing and sealant compounds, dirt, and other substances.
- B. Clean glass of preglazed ticket windows promptly after installation.
- C. Provide temporary protection to ensure that ticket windows are without damage at time of Substantial Completion.

END OF SECTION

SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.01 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. Cylinders specified for doors in other sections.
- C. Related Sections:
 - 1. Section 06 10 00 - Rough Carpentry.
 - 2. Section 08 06 10 - Door Schedule.
 - 3. Section 08 06 71 - Door Hardware Schedule.
 - 4. Section 08 11 13 - Hollow Metal Doors and Frames.
 - 5. Section 28 13 00 - 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. ANSI/SDI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swing Door Assemblies.
 - 3. ASTM E1886 - Test Method for Performance of Exterior Windows, Curtin Walls, Doors and Shutters Impacted by Missiles and Exposed to Cyclic Pressure Differentials.
 - 4. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure difference.
 - 5. ASTM E1996 - Standard specification for performance of exterior windows, curtain walls, doors and storm shutters impacted by Windborne Debris in Hurricanes.
 - 6. FEMA 361 2008 - Design and Construction Guidance for Community Safe Rooms.
 - 7. ICC 500 - ICC/NSSA Standard for the Design and Construction of Storm Shelters.
 - 8. ICC/IBC - International Building Code.
 - 9. NFPA 70 - National Electrical Code.
 - 10. NFPA 80 - Fire Doors and Windows.
 - 11. NFPA 101 - Life Safety Code.
 - 12. NFPA 105 - Installation of Smoke Door Assemblies.
 - 13. TAS-201-94 - Impact Test Procedures.
 - 14. TAS-202-94 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components using Uniform Static Air Pressure.
 - 15. TAS-203-94 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
- 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

1.02 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.
 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. Proof of Certification: Provide copy of manufacturer(s) official certification or accreditation document indicating proof of status as a qualified and authorized provider of the primary Integrated Wiegand Access Control Products.
- D. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.
- E. Informational Submittals:
1. LEED Submittals: Manufacturer's product information and applicable sustainability program credits that are available to contribute towards a LEED rated project certification.
 - a. Credit MR 4.1 and 4.2: Manufacturer's or fabricator's certificate indicating percentage of post-consumer recycled content by weight and pre-consumer recycled content by weight for each Product specified under this Section. Use materials with recycled content such that the sum of the post-consumer recycled content plus one-half of the pre-consumer content constitutes an additional 10% beyond MR Credit 4.1 (total of 20% based on cost) of the total values of the material in the project as follows:
 - 1) Floor Closers: 63%
 - 2) Pivots: 78%
 - 3) Cylindrical Locks: 58%
 - 4) Mortise Locks: 57%
 - 5) Exit Devices: 54%

- 6) Door Closers: 51%
- 7) Overhead Stops: 46%
- b. Low-Emitting Materials EQ 4.2: Provide products that reduce the quantity of indoor air contaminants that are odorous, irritating, and/or harmful to the comfort and well-being of installers and occupants; products shall not produce VOC emissions.
- 2. 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.
- F. 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. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.
- G. Warranties and Maintenance: Special warranties and maintenance agreements specified in this Section.

1.03 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: Installers, trained by the primary product manufacturers, with a minimum 3 years documented experience installing both standard and electrified builders 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 in good standing 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.
 - 1. Scheduling Responsibility: Preparation of door hardware and keying schedules.
- D. Integrated Wiegand, Wireless, and IP-Enabled Access Control Products Supplier Qualifications: Integrated access control products and accessories are required to be supplied and installed through current members of the ASSA ABLOY "Authorized Channel Partner" (ACP) and "Certified Integrator" (CI) programs. Suppliers and Installers are to be factory trained, certified, and a direct purchasers of the specified products and be responsible for commissioning and servicing the installed equipment indicated for the Project.
- E. Automatic Operator Supplier Qualifications: Power operator products and accessories are required to be supplied and installed through current members of the manufacturer's "Power Operator Preferred Installer" program. Suppliers are to be factory trained, certified, and a direct purchaser of the specified power operators and be responsible for the installation and maintenance of the units and accessories indicated for the Project.
- F. Source Limitations: Obtain each type and variety of Door Hardware specified in this Section from a single source, qualified supplier 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.
- G. Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ANSI A117.1 requirements and guidelines as directed in the model building code including, but not limited to, the following:
1. NFPA 70 "National Electrical Code", including electrical components, devices, and accessories listed and labeled as defined in Article 100 by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 2. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1 as follows:
 - a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
 - b. Door Closers: Comply with the following maximum opening-force requirements indicated:
 - 1) Interior Hinged Doors: 5 lbf applied perpendicular to door.
 - 2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 - c. Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.
 3. NFPA 101: Comply with the following for means of egress doors:
 - a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
 - b. Thresholds: Not more than 1/2 inch high.
 4. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252 (neutral pressure at 40" above sill) or UL-10C.
 - a. Test Pressure: Positive pressure labeling.
- H. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- I. 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.
- J. 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, arrange for manufacturers' representatives to hold 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.

1.04 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".

1.05 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: Related Division 08 Sections (Steel, Aluminum and Wood) 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.

1.06 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. Ten years for extra heavy duty cylindrical (bored) locks and latches.
 3. Seven years for heavy duty cylindrical (bored) locks and latches.
 4. Five years for standard duty cylindrical (bored) locks and latches.

5. Five years for exit hardware.
6. Ten years for manual door closers.
7. Two years for electromechanical door hardware.

1.07 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.
- B. Continuing Service: Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (6) months full maintenance including repair and replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Provide parts and supplies as used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.01 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.
 1. 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:
 - a. 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.
 2. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.
 - a. Permanent cylinders, cores, and keys to be installed by Owner.
- B. 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.

2.02 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 hinges unless Hardware Sets indicate standard weight.

- b. Interior Doors: Standard weight, steel, ball bearing hinges unless Hardware Sets indicate heavy weight.
- c. Tornado Resistant Assemblies: At a minimum, provide heavy weight hinges with stainless steel screws used in accordance with and specified as part of a Severe Storm Shelter Opening meeting ICC 500 and FEMA 361.
- 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 following applications:
 - 1) Out-swinging exterior doors.
 - 2) Out-swinging access controlled doors.
- 5. Acceptable Manufacturers:
 - a. Hager Companies (HA).
 - b. McKinney Products (MK).
 - c. Stanley Hardware (ST).
- B. Continuous Geared Hinges: ANSI/BHMA A156.26 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. Provide concealed flush mount (with or without inset), full surface, or half surface, in standard and heavy duty models, as specified in the Hardware Sets. Concealed continuous hinges to be U.L. listed for use on up to and including 90 minute rated door installations and U.L. listed for windstorm components where applicable. Factory cut hinges for door size and provide with removable service power transfer panel where indicated at electrified openings.
 - 1. Acceptable Manufacturers:
 - a. McKinney Products (MK).
 - b. Pemko Manufacturing (PE).
 - c. Stanley Hardware (ST).

2.03 POWER TRANSFER DEVICES

- A. Electrified Quick Connect Transfer Hinges: Provide electrified transfer hinges with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
 - 1. Acceptable Manufacturers:
 - a. Hager Companies (HA) - ETW-QC (# wires) Option.
 - b. McKinney Products (MK) - QC (# wires) Option.
- B. Electrified Quick Connect Continuous Geared Transfer Hinges: Provide electrified transfer continuous geared hinges with a 12" removable service panel cutout accessible without de-mounting door from the frame. Furnish with Molex™ standardized plug connectors with sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
 - 1. Acceptable Manufacturers:
 - a. McKinney Products (MK) - SER-QC (# wires) Option.
 - b. Pemko Manufacturing (PE) - SER-QC (# wires) Option.
- C. Provide mortar guard enclosure on steel frames installed at masonry openings for each electrical hinge specified.

- D. Electric Door Hardware Cords: Provide electric transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.
1. Acceptable Manufacturers:
 - a. McKinney Products (MK) - Inner Door Cord 3 inches: QC-C003P.
 - b. McKinney Products (MK) - Inner Door Cord 3 foot door: QC-C206P.
 - c. McKinney Products (MK) - Inner Door Cord 4 foot door: QC-C306P.
 - d. McKinney Products (MK) - Inner Door Cord 15 feet: QC-C1500P.
 - e. McKinney Products (MK) - Hinge to Junction Panel 15 feet: QC-C1500P.
 2. Provide one each of the following tools as part of the base bid contract:
 - a. McKinney Products (MK) - Electrical Connecting Kit: 52-3000.
 - b. McKinney Products (MK) - Connector Hand Tool: 52-0439.

2.04 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified automatic, self-latching, and manual flush bolts and surface bolts. Manual flush bolts to be furnished with top rod of sufficient length to allow bolt location approximately six feet from the floor. Furnish dust proof strikes for bottom bolts. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
1. Acceptable Manufacturers:
 - a. Door Controls International (DC).
 - b. McKinney Architectural Hardware (MK).
 - c. Rockwood Manufacturing (RO).
 - d. Trimco (TC).
 - B. Coordinators: ANSI/BHMA A156.3 certified door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Coordinators fabricated from steel with nylon-coated strike plates and built-in adjustable safety release.
 1. Acceptable Manufacturers:
 - a. Door Controls International (DC).
 - b. McKinney Architectural Hardware (MK).
 - c. Rockwood Manufacturing (RO).
 - d. Trimco (TC).
 - C. Door Push Plates and Pulls: ANS/BHMA A156.6 certified door pushes and pulls of type and design specified below or 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, 4-inches wide by 16-inches high, with square corners and beveled edges, secured with exposed screws unless otherwise indicated.
 2. Straight Pull Design: Minimum 1-inch round diameter stainless steel bar or tube stock pulls with 2 1/2-inch projection from face of door unless otherwise indicated.
 3. Offset Pull Design: Minimum 1-inch round diameter stainless steel bar or tube stock pulls with 2 1/2-inch projection and offset of 90 degrees unless otherwise indicated.
 4. Push Bars: Minimum 1-inch round diameter horizontal push bars with minimum clearance of 2 1/2-inch projection from face of door unless otherwise indicated.

5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
 - a. Acceptable Manufacturers:
 - 1) McKinney Architectural Hardware (MK).
 - 2) Rockwood Manufacturing (RO).
 - 3) Trimco (TC).

2.05 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. Stanley Best (BE).
- C. Cylinders: Original manufacturer cylinders complying with the following:
 1. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
 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.
- D. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
 1. Removable Cores: Core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware. Provide removable core (small or large format) as specified in Hardware Sets.
- E. Keying System: Each type of lock and cylinders to be factory keyed. Conduct specified "Keying Conference" to define and document keying system instructions and requirements. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner. Incorporate decisions made in keying conference, and as follows:
 1. Master Key System: Cylinders are operated by a change key and a master key.
 2. Grand Master Key System: Cylinders are operated by a change key, a master key, and a grand master key.
 3. Great-Grand Master Key System: Cylinders are operated by a change key, a master key, a grand master key, and a great-grand master key.
 4. Existing System: Master key or grand master key locks to Owner's existing system.
 5. Keyed Alike: Key all cylinders to same change key.
- F. Key Quantity: Provide the following minimum number of keys:
 1. Top Master Key: One (1)
 2. Change Keys per Cylinder: Two (2)
 3. Master Keys (per Master Key Group): Two (2)
 4. Grand Master Keys (per Grand Master Key Group): Two (2)
 5. Construction Control Keys (where required): Two (2)
 6. Permanent Control Keys (where required): Two (2)
- G. Construction Keying: Provide construction master keyed cylinders or temporary keyed construction cores where specified. Provide construction master keys in quantity as required by project Contractor. Replace construction cores with permanent cores. Furnish permanent cores for installation as directed under specified "Keying Conference".

- H. Key Registration List: Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
- I. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall expansion capacity of 150% of the number of locks required for the project.
 - 1. Acceptable Manufacturers:
 - a. Lund Equipment (LU).
 - b. Telkee (TK).
- J. Key Control Software: Provide one network version of "Key Wizard" branded key management software package that includes one year of technical support and upgrades to software at no charge. Provide factory key system formatted for importing into "Key Wizard" software.

2.06 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified mortise locksets furnished in the functions as specified in the Hardware Sets. Locksets to be manufactured with a corrosion resistant, stamped 12 gauge minimum formed steel case and be field-reversible for handing without disassembly of the lock body. Lockset trim (including knobs, levers, escutcheons, roses) to be the product of a single manufacturer. Furnish with standard 2 3/4" backset, 3/4" throw anti-friction stainless steel latchbolt, and a full 1" throw stainless steel bolt for deadbolt functions.
 - 1. Acceptable Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ML2000 Series.
 - b. Sargent Manufacturing (SA) - (R)8200 Series.
 - c. Schlage (SC) - L9000 Series.
 - d. Stanley Best (BE) - 47H Series.
- B. Lock Trim Design: As specified in Hardware Sets.
- C. Knurling: Where specified provide knurling or abrasive coating to all levers on doors leading to hazardous areas such as mechanical rooms, boiler and furnace rooms, janitor closets, and as otherwise required by the Illinois Accessibility Code.

2.07 ELECTROMECHANICAL LOCKING DEVICES

- A. Electromechanical Mortise Locksets, Grade 1 (Heavy Duty): Subject to same compliance standards and requirements as mechanical mortise locksets, electrified locksets to be of type and design as specified below.
 - 1. Electrified Lock Options: Where indicated in the Hardware Sets, provide electrified options including: outside door lock/unlock trim control, latchbolt and lock/unlock status monitoring, and request-to-exit signaling. Unless otherwise indicated, provide electrified locksets standard as fail secure.
 - 2. Acceptable Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ML20900 Series.
 - b. Sargent Manufacturing (SA) - 8200 Series.
 - c. Schlage (SC) - L9000 EL/EU/RX Series.
 - d. Stanley Best (BE) - 47HW EL/EU Series.

2.08 AUXILIARY LOCKS

- A. Mortise Deadlocks, Small Case: ANSI/BHMA A156.5, Grade 1, certified small case mortise type deadlocks constructed of heavy gauge wrought corrosion resistant steel. Steel or stainless steel bolts with a 1" throw and hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other specified locksets.

1. Acceptable Manufacturers:
 - a. Corbin Russwin Hardware (RU) - DL4100 Series.
 - b. Sargent Manufacturing (SA) - 4870 Series.
 - c. Schlage (SC) - L460 Series.
 - d. Stanley Best (BE) - 48H Series.

2.09 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.
- 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.

2.10 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
 1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
 2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
 - a. Fire Exit Removable Mullions: Provide keyed removable mullions for use with fire exit devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252. Mullions to be used only with exit devices for which they have been tested.
 3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
 4. Flush End Caps: Provide heavy weight impact resistant flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.
 5. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty trim with cold forged escutcheons, beveled edges, and four threaded studs for thru-bolts.
 - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets. Provided free-wheeling type trim where indicated.
 - b. Where function of exit device requires a cylinder, provide an interchangeable core type keyed cylinder (Rim or Mortise) as specified in Hardware Sets.

6. Vertical Rod Exit Devices: Provide and install interior surface and concealed vertical rod exit devices as Less Bottom Rod (LBR) unless otherwise indicated.
 7. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
 8. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
 9. Rail Sizing: Provide exit device rails factory sized for proper door width application.
 10. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Mounting rails to be formed from smooth stainless steel, brass or bronze architectural materials no less than 0.072" thick, with push rails a minimum of 0.062" thickness. Painted or aluminum metal rails are not acceptable. Exit device latch to be investment cast stainless steel, pullman type, with deadlock feature.
1. Acceptable Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
 - b. Sargent Manufacturing (SA) - 80 Series.
 - c. Von Duprin (VD) - 35A/98/99 XP Series.
 - d. Yale Locks and Hardware (YA) - 7000 Series.
- C. Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish. Provide keyed removable feature, stabilizers, and mounting brackets as specified in the Hardware Sets. At openings designed for severe wind load conditions due to hurricanes or tornadoes, provide manufacturers approved mullion and accessories to meet applicable state and local windstorm codes.
1. Acceptable Manufacturers:
 - a. Corbin Russwin Hardware (RU) - 700/900 Series.
 - b. Sargent Manufacturing (SA) - 980S Series.
 - c. Von Duprin (VD) - 9954 Series.
 - d. Yale Locks and Hardware (YA) - M200 Series.

2.11 ELECTROMECHANICAL CONVENTIONAL EXIT DEVICES

- A. Electrified Conventional Push Rail Devices (Heavy Duty): Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified below.
1. Acceptable Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
 - b. Sargent Manufacturing (SA) - 80 Series.
 - c. Von Duprin (VD) - 35A/98/99 Series.
 - d. Yale Locks and Hardware (YA) - 7000 Series.
- B. Electrified Options: As indicated in hardware sets, provide electrified exit device options including: electric latch retraction, electric dogging, outside door trim control, exit alarm, delayed egress, latchbolt monitoring, lock/unlock status monitoring, touchbar monitoring and request-to-exit signaling. Unless otherwise indicated, provide electrified exit devices standard as fail secure.
- C. Hurricane and Tornado Resistance Compliance: Electromechanical conventional exit devices and electrified tube steel removable mullions to be U.L. listed for windstorm components where applicable. Provide the appropriate hurricane or tornado resistant products that have been independent third party tested, certified, and labeled to meet state and local windstorm building codes applicable to project.

2.12 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 and UBC 7-2 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 provisions for door opening force and delayed action closing.
 4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 - a. Where closers are indicated to have mechanical dead-stop, provide heavy duty arms and brackets with an integral positive stop.
 - b. Where closers are indicated to have mechanical hold open, provide heavy duty units with an additional built-in mechanical holder assembly designed to hold open against normal wind and traffic conditions. Holder to be manually selectable to on-off position.
 - c. Where closers are indicated to have a cushion-type stop, provide heavy duty arms and brackets with spring stop mechanism to cushion door when opened to maximum degree.
 5. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt or security type fasteners as specified in the door Hardware Sets.
- B. Door Closers, Surface Mounted (Heavy Duty): 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 or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units and high impact, non-corrosive plastic covers standard.
1. Acceptable Manufacturers:
 - a. Corbin Russwin Hardware (RU) - DC8000 Series.
 - b. Sargent Manufacturing (SA) - 351 Series.
 - c. Norton Door Controls (NO) - 7500 Series.
 - d. Yale Locks and Hardware (YA) - 4400 Series.

2.13 AUTOMATIC DOOR OPERATORS

- A. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for compliance with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation devices.
1. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.
- B. Electromechanical Door Operators: Self-contained units powered by permanent magnet DC motor, with closing speed controlled mechanically by gear train, connections for power, activation and safety device wiring, and manual operation including spring closing when power is off.

- C. Electrohydraulic Door Operators: Self-contained low-pressure units with separate cylinders for power and checking, connections for power, activation, and safety device wiring and manual operation including spring closing when power is off.
- D. Brackets and Reinforcements: Manufacturer's standard, fabricated from aluminum with nonferrous shims for aligning system components.
- E. Standard: Certified ANSI/BHMA A156.19.
 - 1. Performance Requirements:
 - a. Opening Force if Power Fails: Not more than 15 lbf required to release a latch if provided, not more than 30 lbf required to manually set door in motion, and not more than 15 lbf required to fully open door.
 - b. Entrapment Protection: Not more than 15 lbf required to prevent stopped door from closing or opening.
- F. Configuration: Surface mounted. Door operators to control single swinging and pair of swinging doors.
- G. Operation: Power opening and spring closing operation capable of meeting ANSI A117.1 accessibility guideline. Provide time delay for door to remain open before initiating closing cycle as required by ANSI/BHMA A156.19. When not in automatic mode, door operator to function as manual door closer with fully adjustable opening and closing forces, with or without electrical power.
 - 1. On-off switch to control power to be key switch operated.
- H. Features: Operator units to have full feature adjustments for door opening and closing force and speed, backcheck, motor assist acceleration from 0 to 30 seconds, time delay, vestibule interface delay, obstruction recycle, and hold open time from 0 up to 30 seconds.
- I. Provide outputs and relays on board the operator to allow for coordination of exit device latch retraction, electric strikes, magnetic locks, card readers, safety and motion sensors and specified auxiliary contacts.
- J. Activation Devices: Provide activation devices in accordance with ANSI/BHMA A156.19 standard, for condition of exposure indicated and for long term, maintenance free operation under normal traffic load operation. Coordinate activation control with electrified hardware and access control interfaces. Activation switches are standard SPST, with optional DPDT availability.
- K. Signage: As required by cited ANSI/BHMA A156.19 standard for the type of operator.
 - 1. Acceptable Manufacturers:
 - a. Besam Automated Entrance Systems (BE) - SW100 Series.
 - b. LCN Closers (LC) - 4640 Series.
 - c. Norton Door Controls (NO) - 6900 PowerMatic Series.
 - d. Sargent Manufacturing (SA) - MPower CL4000 Series.

2.14 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 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. Metal Protection Plates: ANSI/BHMA A156.6 certified metal protection plates (kick, armor, or mop), beveled on four edges (B4E), fabricated from the following.
 - a. Stainless Steel: 050-inch thick, with countersunk screw holes (CSK).

- b. Brass or Bronze: .050-inch thick, with countersunk screw holes (CSK).
- c. Laminate Plastic or Acrylic: 1/8-inch thick, with countersunk screw holes (CSK).
- 4. Fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets.
- 5. Metal Door Edging: Door protection edging fabricated from a minimum .050-inch thick metal sheet, formed into an angle or "U" cap shapes, surface or mortised mounted onto edge of door. Provide appropriate leg overlap to account for protection plates as required. Height to be as specified in the Hardware Sets.
- 6. Acceptable Manufacturers:
 - a. McKinney Architectural Hardware (MK).
 - b. Rockwood Manufacturing (RO).
 - c. Trimco (TC).

2.15 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. McKinney Architectural Hardware (MK).
 - 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. Rixson Door Controls (RF).
 - b. Rockwood Manufacturing (RO).
 - c. Sargent Manufacturing (SA).

2.16 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. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.

- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Acceptable Manufacturers:
 - 1. McKinney Weatherstripping Products (MW).
 - 2. Pemko Manufacturing (PE).
 - 3. Reese Enterprises, Inc. (RS).

2.17 ELECTRONIC ACCESSORIES

- A. Key Switches: Key switches furnished standard with stainless steel single gang face plate with a 12/24VDC bi-color LED indicator. Integral backing bracket permits integration with any 1 1/4" or 1 1/2" mortise type cylinder. Key switches available as momentary or maintained action and in narrow face plate options.
 - 1. Acceptable Manufacturers:
 - a. Security Door Controls (SD) - 800 Series.
 - b. Securitron Door Controls (SU) - MK Series.
- B. Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
 - 1. Acceptable Manufacturers:
 - a. Security Door Controls (SD) - 630 Series.
 - b. Securitron Door Controls (SU) - BPS 12/24 Series.

2.18 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.

2.19 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.
- D. Antimicrobial Finishes: Where specified, finishes on locksets, latchsets, exit devices and push/pull trim to incorporate an FDA recognized. Silver Ion, antimicrobial coating (MicroShield™) listed for use on equipment as a suppressant to the growth and spread of a broad range of bacteria, algae, fungus, mold and mildew.

PART 3 - EXECUTION

3.01 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.

3.02 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.03 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. Integrated Wiegand access control products are required to be installed through current members of the ASSA ABLOY "Certified Integrator" (CI) program.
- D. Power Operator products and accessories are required to be installed through current members of the manufacturer's "Power Operator Preferred Installer" program.
- E. 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.
- F. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- G. 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.

3.04 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.

3.05 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.

3.06 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, and provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.07 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.08 DOOR HARDWARE SCHEDULE

- 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. Refer to Section 080671, Door Hardware Schedule, for hardware sets.

END OF SECTION

SECTION 08 80 00

GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Glass.
- C. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 25 00 - Weather Barriers.
- B. Section 07 90 05 - Joint Sealers: Sealant and back-up material.
- C. Section 08 43 13 - Aluminum-Framed Storefronts: Glazing furnished by storefront manufacturer.

1.03 REFERENCE STANDARDS

- A. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2011).
- B. ASTM C1036 - Standard Specification for Flat Glass; 2011e1.
- C. ASTM C1048 - Standard Specification for Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass; 2012.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- C. Samples: Submit two samples 12 x 12 inch in size of glass units.
- D. Samples: Submit 3 inch long bead of glazing sealant, color as selected.
- E. Manufacturer's Certificate: Certify that Type 1 and Type 2 glass meets or exceeds specified requirements.

1.05 QUALITY ASSURANCE

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

1.06 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Laminated Glass: Provide a five (5) year warranty to include coverage for delamination, including replacement of failed units.

PART 2 PRODUCTS

2.01 GLAZING TYPES

- A. Type 1 - Sealed Insulating Glass Units: Vision glazing, low-E.
 - 1. Application: Exterior glazing where indicated.

2. Substitutions: Refer to Section 01 60 00 - Product Requirements.
 - a. Other products of the basis of design manufacturer and products of other manufacturers will be considered provided the overall performance is within the specified range(s) and the overall appearance is not significantly different from that of the specified product.
 - b. Architect's decision on substitutions is final.
 3. Between-lite space filled with air.
 4. Thermal Resistance (U-Value): 0.29 winter/0.28 summer, nominal.
 5. Total Solar Heat Gain Coefficient: 0.30, nominal.
 6. Total Visible Light Transmittance: 49 percent, minimum.
 7. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
 - a. Tint and Coating: Guardian CrystalGray with SunGuard SN 68 on #2 surface.
 8. Inboard Lite: Annealed float glass, 1/4 inch thick.
 - a. Tint: None (clear).
 9. Basis of Design: Guardian Industries Corp: www.sunguardglass.com. Subject to compliance with requirements, provide comparable products by one of the following:
 - a. PPG Industries, Inc.
 - b. AGC Flat Glass North America, Inc.
 - c. Pilkington North America Inc.
- B. Type 2 - Sealed Insulating Glass Units: Safety glazing:
1. Applications: Provide this type of glazing in the following locations:
 - a. Glazed sidelights and panels next to doors.
 - b. Other locations required by applicable federal, state, and local codes and regulations.
 - c. Other locations indicated on the drawings.
 2. Type: Same as other vision glazing except use fully tempered float glass for both outboard and inboard lites.
- C. Type 3 - Single Vision Glazing:
1. Applications: All interior glazing unless otherwise indicated.
 2. Type: Annealed float glass.
 3. Tint: Clear.
 4. Thickness: 1/4 inch.
 5. Glazing Method: Gasket glazing.
- D. Type 4 - Single Vision Glazing:
1. Applications: As shown and scheduled.
 2. Type: Fully tempered float glass.
 3. Tint: Clear.
 4. Thickness: 1/4 inch.
 5. Glazing Method: Gasket glazing.

2.02 EXTERIOR GLAZING ASSEMBLIES

- A. Air and Vapor Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier:
1. In conjunction with vapor retarder and joint sealer materials described in other sections.
 2. To maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

2.03 GLASS MATERIALS

- A. Float Glass: All glazing is to be float glass unless otherwise indicated.
1. Annealed Type: ASTM C1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).

2. Fully Tempered Types: ASTM C1048.
3. Thicknesses: As indicated; for exterior glazing comply with specified requirements for wind load design regardless of specified thickness.

2.04 SEALED INSULATING GLASS UNITS

- A. Manufacturers:
 1. Any of the manufacturers specified for float glass.
 2. Substitutions: Refer to Section 01 60 00 - Product Requirements.
- B. Sealed Insulating Glass Units: Types as indicated.
 1. Locations: Exterior, except as otherwise indicated.
 2. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 3. Edge Spacers: Aluminum, mitered and spigoted corners.
 4. Edge Seal: Glass to elastomer.
 5. Purge interpane space with dry hermetic air.

2.05 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness, ASTM C864 Option I. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Glazing Tape: Preformed butyl compound ; 10 to 15 Shore A durometer hardness; coiled on release paper; black color.
 1. Manufacturers:
 - a. Pecora Corporation: www.pecora.com.
 - b. Tremco Global Sealants: www.tremcosealants.com.
 - c. Substitutions: Refer to Section 01 60 00 - Product Requirements.
- C. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option I; black color.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION - EXTERIOR/INTERIOR DRY METHOD (GASKET GLAZING)

- A. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
- B. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- C. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.03 MANUFACTURER'S FIELD SERVICES

- A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
- B. Monitor and report installation procedures and unacceptable conditions.

3.04 CLEANING

- A. Remove glazing materials from finish surfaces.
- B. Remove labels after Work is complete.

C. Clean glass and adjacent surfaces.

END OF SECTION

SECTION 08 91 00

LOUVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 1000, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Louvers, frames, and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 90 05 - Joint Sealers.
- B. Section 23 31 00 - HVAC Ducts and Casings: Ductwork attachment to louvers .

1.03 REFERENCE STANDARDS

- A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2010.
- B. AMCA 511 - Certified Ratings Program for Air Control Devices; Air Movement and Control Association International, Inc.; 2010.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.
- C. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, tolerances; head, jamb and sill details; blade configuration, screens, blankout areas required, and frames.
- D. Samples: Submit two samples 2 by 2 inches in size illustrating finish and color of exterior surfaces.
- E. Test Reports: Independent agency reports showing compliance with specified performance criteria.

1.05 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wall Louvers:
 - 1. Airolite Company, LLC: www.airolite.com.
 - 2. American Warming and Ventilating: www.awv.com.
 - 3. Construction Specialties, Inc: www.c-sgroup.com.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 LOUVERS

- A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified under AMCA 511.
 - 1. Wind Load Resistance: Design to resist positive and negative wind load as required by code without damage or permanent deformation.
 - 2. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.
 - 3. Screens: Provide insect screens at intake louvers and bird screens at exhaust louvers.

- B. Stationary Louvers at exterior walls: Horizontal blade, extruded aluminum construction, with intermediate mullions matching frame.
 - 1. Free Area: 50 percent, minimum.
 - 2. Blades: Stormproof.
 - 3. Frame: 4 inches deep, channel profile; corner joints mitered and, with continuous recessed caulking channel each side.
 - 4. Metal Thickness: Frame 0.081 inch; blades 0.081 inch.
 - 5. Finish: Clear anodized; finish welded units after fabrication.

2.03 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), .
- B. Bird Screen: Interwoven wire mesh of steel, 0.063 inch diameter wire, 1/2 inch open weave, square design.
- C. Insect Screen: 18 x 16 size aluminum mesh.
- D. Polyvinylidene Fluoride Coating: Minimum 70 percent Kynar 500/Hylar 500 resin, three coat finish, complying with AAMA 2604.

2.04 ACCESSORIES

- A. Blank-Off Panels: Aluminum face and back sheets, polyisocyanurate foam core, 1 inch thick, painted black on exterior side; provide where duct connected to louver is smaller than louver frame, sealing off louver area outside duct.
- B. Screens: Frame of same material as louver, with reinforced corners; removable, screw attached; installed on inside face of louver frame.
- C. Fasteners and Anchors: Stainless steel.
- D. Flashings: Of same material as louver frame, formed to required shape, single length in one piece per location.
- E. Sealant: Type 1, as specified in Section 07 90 05.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install louver assembly in accordance with manufacturer's instructions.
- B. Install louvers level and plumb.
- C. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
- D. Secure louver frames in openings with concealed fasteners.
- E. Install perimeter sealant and backing rod in accordance with Section 07 90 05.
- F. Coordinate with installation of mechanical ductwork.

3.02 CLEANING

- A. Strip protective finish coverings.
- B. Clean surfaces and components.

END OF SECTION

SECTION 09 05 61

COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. This section applies to all floors identified in the contract documents as to receive the following types of floor coverings:
 - 1. Resilient tile and sheet.
 - 2. Carpet tile.
 - 3. Fluid-Applied Flooring.
- C. Preparation of new concrete floor slabs for installation of floor coverings.

1.02 SUBMITTALS

- A. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
 - 1. Moisture and pH limits and test methods.
 - 2. Manufacturer's required bond/compatibility test procedure.
- B. Adhesive Bond and Compatibility Test Report.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
 - 1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
 - 2. Latex or polyvinyl acetate additions are permitted; gypsum content is prohibited.
 - 3. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
- B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.
- C. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of pH found, and suitable for adhesion of flooring without further treatment.
 - 1. Thickness: 1/8 inch, maximum.
 - 2. If testing agency recommends any particular products, use one of those.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

- A. Perform following operations in the order indicated:
 - 1. Preliminary cleaning.

2. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
3. Specified remediation, if required.
4. Patching, smoothing, and leveling, as required.
5. Other preparation specified.
6. Adhesive bond and compatibility test.
7. Protection.

B. Remediations:

1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating over entire suspect floor area.
3. Excessive pH: If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.02 PRELIMINARY CLEANING

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.

3.03 INTERNAL RELATIVE HUMIDITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F2170 Procedure A and as follows.
- D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.
- F. Report: Report the information required by the test method.

3.04 PREPARATION

- A. See individual floor covering section(s) for additional requirements.
- B. Comply with requirements and recommendations of floor covering manufacturer.
- C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
- D. Do not fill expansion joints, isolation joints, or other moving joints.

3.05 ADHESIVE BOND AND COMPATIBILITY TESTING

- A. Comply with requirements and recommendations of floor covering manufacturer.

3.06 APPLICATION OF REMEDIAL FLOOR COATING

- A. Comply with requirements and recommendations of coating manufacturer.

3.07 PROTECTION

- A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 1000, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Metal stud wall framing.
- C. Metal channel ceiling framing.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 05 40 00 - BPD - Cold-Formed Metal Framing: Exterior wind-load-bearing metal stud framing.

1.03 REFERENCE STANDARDS

- A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2002 (Reapproved 2007).
- B. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2011a.
- C. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2011.
- D. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2011.
- E. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2011.
- F. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2007.
- G. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2010a.
- H. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2011.
- I. ASTM C1629/C1629 - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2006.
- J. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
- K. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2010.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

- D. Test Reports: For all stud framing products that do not comply with ASTM C645 or C 754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.
- E. LEED Submittals:
 - 1. For gypsum wallboard, submit documentation of recycled content and location of manufacture.
 - 2. For steel products, submit documentation of steel mill process, location of mill, and location of manufacture.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board application and finishing.
- B. Copies of Documents at Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
 - 1. See PART 3 for finishing requirements.

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
 - 2. Marino: www.marinoware.com.
 - 3. Phillips Manufacturing Company: www.phillipsmfg.com.
- B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/360 at 7.5 psf.
 - 1. Exception: The minimum metal thickness and section properties requirements of ASTM C 645 are waived provided steel of 40 ksi minimum yield strength is used, the metal is continuously dimpled, the effective thickness is at least twice the base metal thickness, and maximum stud heights are determined by testing in accordance with ASTM E 72 using assemblies specified by ASTM C 754.
 - 2. Studs: "C" shaped with flat or formed webs 20 gage minimum.
 - 3. Runners: U shaped, sized to match studs.
 - 4. Ceiling Channels: C shaped.
 - 5. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
- C. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
- D. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and braced with continuous bridging both sides.

2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 - 1. CertainTeed Corporation: www.certainteed.com.
 - 2. Georgia-Pacific Gypsum: www.gpgypsum.com.
 - 3. Lafarge North America Inc: www.lafargenorthamerica.com.
 - 4. National Gypsum Company: www.nationalgypsum.com.
 - 5. USG Corporation: www.usg.com.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.

- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - a. Mold-resistant board is required at all locations.
 - 3. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 - 4. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 5/8 inch.
 - c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
- C. Impact-Rated Wallboard: Tested to Level 3 soft-body and hard-body impact in accordance with ASTM C 1629.
 - 1. Application: Up to 8 feet above finish floor in areas scheduled to receive gypsum board.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. Paper-Faced Type: Gypsum wallboard as defined in ASTM C1396/C1396M.
 - 4. Type: Fire-resistance rated Type X, UL or WH listed.
 - 5. Thickness: 5/8 inch
 - 6. Edges: Tapered.
 - 7. Products:
 - a. National Gypsum Company; Gold Bond Hi-Impact Brand XP Wallboard.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
 - 1. Application: Vertical surfaces behind thinset tile, except in wet areas.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. Type: Type X, in locations indicated.
 - 4. Type X Thickness: 5/8 inch.
 - 5. Edges: Tapered.
- E. Ceiling Board: Special sag-resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Ceilings, unless otherwise indicated.
 - 2. Thickness: 5/8 inch.
 - 3. Edges: Tapered.

2.04 ACCESSORIES

- A. Finishing Accessories: ASTM C1047, galvanized steel, rolled zinc, or rigid plastic, unless otherwise indicated.
 - 1. Types: As detailed or required for finished appearance.
 - 2. Special Shapes: In addition to conventional cornerbead and control joints, provide L-bead at exposed panel edges.
- B. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.
 - 1. Tape: 2 inch wide, coated glass fiber tape for joints and corners in wet areas.
 - 2. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 - 3. Powder-type vinyl-based joint compound.
- C. High Build Drywall Surfacers: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.

- D. Screws for Attachment to Steel Members Less Than 0.03 inch In Thickness, to Wood Members, and to Gypsum Board: ASTM C1002; self-piercing tapping type; cadmium-plated for exterior locations.
- E. Screws for Attachment to Steel Members From 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws for application of gypsum board to loadbearing steel studs.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
 - 1. Level ceiling system to a tolerance of 1/1200.
 - 2. Laterally brace entire suspension system.
 - 3. Install bracing as required at exterior locations to resist wind uplift.
- C. Studs: Space studs as indicated.
 - 1. Extend partition framing to structure in typical conditions, 6 inches above ceiling at perimeter wall conditions and as indicated.
 - 2. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

3.03 BOARD INSTALLATION

- A. Comply with ASTM C 840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.05 JOINT TREATMENT

- A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 2. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
 - 3. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
 - 4. Level 0: Temporary partitions and surfaces indicated to be finished in later stage of project.
- B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.

- C. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

END OF SECTION

SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Suspended metal grid ceiling system.
- C. Acoustical units.

1.02 REFERENCE STANDARDS

- A. ASTM C635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2007.
- B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 2008.
- C. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2011.
- D. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2008e1.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other ceiling finishes, and mechanical and electrical items installed in the ceiling.
- C. Product Data: Provide data on suspension system components and acoustical units.
- D. Samples: Submit two samples 6 x 6 inch in size illustrating material and finish of acoustical units.
- E. Samples: Submit two samples each, 6 inches long, of suspension system main runner, cross runner, and perimeter molding.
- F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- G. LEED Submittal: Documentation of recycled content and location of manufacture.

1.05 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 ACOUSTICAL UNITS

- A. Manufacturers:
 - 1. Basis of Design: Armstrong World Industries, Inc: www.armstrong.com.
 - 2. CertainTeed Corporation: www.certainteed.com.
 - 3. USG: www.usg.com.

4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Acoustical Units - General: ASTM E1264, Class A.
- C. Acoustical Panels Type ACP-1: Ceramic and mineral fiber composite with the following characteristics:
 1. Size: 24 x 24 inches.
 2. Thickness: 5/8 inches.
 3. Composition: Ceramic and mineral fiber composite.
 4. NRC Range: 0.55 as specified in ASTM E1264.
 5. Ceiling Attenuation Class (CAC): 38, determined as specified in ASTM E1264.
 6. Edge: Square.
 7. Surface Color: White.
 8. Product: Ceramaguard Fine Fissured Perforated, Model # 607 by Armstrong.
 9. Suspension System: Exposed grid Type 1.

2.02 SUSPENSION SYSTEM(S)

- A. Manufacturers:
 1. Armstrong World Industries, Inc: www.armstrong.com.
 2. USG: www.usg.com.
 3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Suspension Systems - General: ASTM C635; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
- C. Exposed Steel Suspension System Type 1: Formed G90 hot-dipped galvanized steel, commercial quality cold rolled; intermediate-duty.
 1. Profile: Tee; 15/16 inch wide face.
 2. Construction: Double web.
 3. Finish: White painted.
 4. Product: Prelude Plus XL by Armstrong.

2.03 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Perimeter Moldings: Same material and finish as grid.
 1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
- C. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- D. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- E. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

- F. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- G. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- H. Do not eccentrically load system or induce rotation of runners.
- I. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
 - 2. Overlap and rivet corners.

3.02 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install units after above-ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
 - 1. Make field cut edges of same profile as factory edges.

3.03 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 09 65 66
RESILIENT ATHLETIC FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Rubber tile flooring, adhesively installed.
- C. Resilient base.
- D. Water-jet cut logo inlay.
- E. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.
- B. Section 09 05 61 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed data sheets for products specified.
- C. Shop Drawings: Fabrication and installation details, and layout, colors, logos and equipment locations.
- D. LEED Submittal: Documentation of recycled content and location of manufacture.
- E. Selection Samples: Manufacturer's color charts for flooring materials specified , indicating full range of colors and textures available.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer certified in writing by the flooring manufacturer to be qualified for installation of specified flooring system.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.
- B. Store materials in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.

1.06 FIELD CONDITIONS

- A. Maintain temperature in spaces to receive adhesively installed resilient flooring within range of 70-95 degrees F for not less than 48 hours before the beginning of installation and for not less than 48 hours after installation has been completed. Subsequently, do not allow temperature in installed spaces to drop below 50 degrees F or to go above 100 degrees F.

PART 2 PRODUCTS

2.01 PREFORMED ATHLETIC FLOORING

- A. Manufacturers:
 - 1. Nora; Norament 992 Granno.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Rubber Tile Flooring: Virgin rubber material formed into square tiles , laid with adhesive.

1. Thickness: Minimum 3/8 in.
2. Size: Nominal 36 in square.
3. Surface Texture: Lightly textured.
4. Color: As selected from manufacturer's standards.

2.02 ACCESSORIES

- A. Leveling Compound: Latex-modified cement formulation as recommended by flooring manufacturer for substrate conditions.
- B. Adhesive: Water-resistant type recommended by flooring manufacturer for project conditions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates for conditions detrimental to installation of athletic flooring. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of athletic flooring to substrate.
- C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
 1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- D. Verify that concrete sub-floor surfaces are dry enough and ready for resilient flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F710; obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

- A. Concrete: Use leveling compound as necessary to achieve substrate flatness of plus or minus 1/8 inch within 10 ft radius.
- B. Remove coatings that are incompatible with flooring adhesives, using methods recommended by flooring manufacturer.
- C. Broom clean areas to receive athletic flooring immediately before beginning installation.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Comply with manufacturer's recommendations and approved shop drawings.
- C. Rubber Tile Flooring:
 1. Lay out center lines in spaces to receive tile flooring, based on location of principal walls. Start tile installation from center, and adjust as necessary to avoid tiles less than one-half width at perimeter.
 2. Lay tiles square with room axis, matching for color and pattern by selecting from cartons and mixing as recommended by manufacturer.
 3. Install water-cut logo floor tile pieces as shown on Drawings.

3.04 CLEANING

- A. Clean flooring using methods recommended by manufacturer.

3.05 PROTECTION

- A. Protect finished athletic flooring from construction traffic to insure that it is without damage upon completion of the work.

END OF SECTION

SECTION 09 67 00
FLUID-APPLIED FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Fluid-applied flooring and base.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available .
- C. Samples: Submit two samples, 6 x 6 inch in size illustrating color and texture for each floor material for each color specified.
 - 1. Provide three different textures for each color.
- D. Manufacturer's Installation Instructions: Indicate special procedures.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, and suggested schedule for cleaning.
- F. LEED Submittal: Documentation of recycled content and location of manufacture.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum 5 years documented experience.
- B. Applicator Qualifications: Company specializing in performing work of this section with minimum 5 years experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store resin materials in a dry, secure area.
- B. Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.06 FIELD CONDITIONS

- A. Maintain minimum temperature in storage area of 55 degrees F.
- B. Store materials in area of installation for minimum period of 24 hours prior to installation.
- C. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Trowel applied multi-component epoxy urethane flooring systems.
- B. Fluid-Applied Flooring Type PE-1: Urethane, single component, thermosetting, with flake broadcast on base coat..
 - 1. Product: Basis of Design: StonTec TRF manufactured by Stonhard.
 - 2. Thickness: Nom. 1/8 to 3/16 inch.
 - 3. Broadcast flakes with urethane sealer.

2.02 ACCESSORIES

- A. Cant Strips: Molded material compatible with flooring.
- B. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.
- C. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive flooring.
- B. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of materials to sub-floor surfaces.
- C. Verify that concrete sub-floor surfaces are ready for flooring installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by flooring materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.
- B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Grind irregularities above the surface level. Prohibit traffic until filler is cured.
- C. Vacuum clean substrate.
- D. Apply primer to surfaces required by flooring manufacturer.

3.03 INSTALLATION - FLOORING

- A. Apply in accordance with manufacturer's instructions.
- B. Apply each coat to minimum thickness indicated.
- C. Finish to smooth level surface.
- D. Cove at vertical surfaces.

3.04 PROTECTION

- A. Prohibit traffic on floor finish for 48 hours after installation.
- B. Barricade area to protect flooring until cured.

3.05 SCHEDULE

- A. All locations:
 - 1. Type PE-1: Light texture #2.
 - 2. Color: Custom Blend: Vi-Tech-92C

END OF SECTION

SECTION 09 68 13
TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Carpet tile, fully adhered.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 01 74 19 - Construction Waste Management and Disposal: Reclamation/Recycling of new carpet tile scrap.
- C. Section 09 05 61 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, cleaning, and preparation.

1.03 REFERENCE STANDARDS

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2010e1.
- B. CRI (CIS) - Carpet Installation Standard; Carpet and Rug Institute; 2009.
- C. CRI (GLA) - Green Label Testing Program - Approved Adhesive Products; Carpet and Rug Institute; Current Edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- D. LEED Report: Submit data documenting VOC content of carpet tile and adhesives; copy of current CRI Approved Products Listing is acceptable.
- E. Manufacturer's Installation Instructions: Indicate special procedures.
- F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet with minimum three years experience.

1.06 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Carpet Tile Type WOC-1: Tip-sheared loop, manufactured in one color dye lot.
 - 1. Product: Ruffian II manufactured by Mannington.
 - 2. Tile Size: 24 x 24 inch, nominal.

3. Color: See Finish Schedule.

2.02 ACCESSORIES

- A. Sub-Floor Filler: White premix latex; type recommended by flooring material manufacturer.
- B. Edge Strips: Embossed aluminum, Architect to select color.
- C. Adhesives: Acceptable to carpet tile manufacturer, compatible with materials being adhered; maximum VOC of 50 g/L; CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
- C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for flooring installation by testing for moisture and pH.
 1. Test in accordance with Section 09 05 61.
 2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

- A. Prepare floor substrates for installation of flooring in accordance with Section 09 05 61.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions and CRI Carpet Installation Standard.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in square pattern or as scheduled and shown, with pile direction alternating to next unit, set parallel to building lines.
- F. Fully adhere carpet tile to substrate.
- G. Trim carpet tile neatly at walls and around interruptions.
- H. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 90 00
PAINTS AND COATINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Surfaces to be finished are indicated in this section and on the Drawings.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 05 50 00 - Metal Fabrications: Shop-primed items.
- C. Section 05 51 00 - Metal Stairs: Shop-primed items.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; current edition, www.paintinfo.com.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Master Painters and Decorators Association; 2004.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of all products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system (copy of relevant MPI Manual page is acceptable).
- C. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.
- D. Samples: Submit one paper "drop" samples, 8-1/2 by 11 inches in size, illustrating colors selected for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the work of this section with minimum 5 years experience.
- B. Material Safety Data Sheets: At project site maintain file of MSDS sheets for each product used; become familiar with and follow manufacturer's stated application and safety requirements.

1.06 MOCK-UP

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.
- B. Provide wall panel, 8 feet long by 10 feet wide, illustrating coating color, texture, and finish.
- C. Locate where directed.
- D. Mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

1.09 EXTRA MATERIALS

- A. See Section 01 60 00 - Product Requirements, for additional provisions.
- B. Supply 1 gallon of each color; store where directed.
- C. Label each container with color in addition to the manufacturer's label.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide all paint and coating products used in any individual system from the same manufacturer.
- B. Provide all paint and coating products from the same manufacturer to the greatest extent possible.
- C. In the event that a single manufacturer cannot provide all specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
- D. Paints: Acceptable manufacturers are limited to the following:
 - 1. Benjamin Moore & Co: www.benjaminmoore.com.
 - 2. Sherwin-Williams: www.sherwin-williams.com.
 - 3. Glidden Professional: www.gliddenprofessional.com.
- E. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS - GENERAL

- A. Volatile Organic Compound (VOC) Content:
 - 1. Provide coatings that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. Ozone Transport Commission (OTC) Model Rule, Architectural, Industrial, and Maintenance Coatings; www.otcair.org; specifically:
 - 1) Opaque, Flat: 50 g/L, maximum.

- 2) Opaque, Nonflat: 150 g/L, maximum.
- 3) Opaque, High Gloss: 250 g/L, maximum.
- 4) Varnishes: 350 g/L, maximum.
- c. Architectural coatings VOC limits of State in which the project is located.
2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- B. Paints and Coatings: Provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI Categories, except as otherwise indicated.
 1. Provide ready mixed paints and coatings .
 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

2.03 PAINT SYSTEMS

- A. Provide Premium Grade systems (2 top coats) as defined in MPI Architectural Painting Specification Manual, except as otherwise indicated.
- B. Provide colors as directed by Architect.
 1. Allow for minimum of five colors for each system, unless otherwise indicated, without additional cost to Owner.
 2. Extend colors to surface edges; colors may change at any edge as directed by Architect.

2.04 EXTERIOR PAINT SYSTEMS

- A. SYSTEM E-1:
 1. Substrate: Structural Steel and Metal Fabrications:
 2. Applications include but are not limited to structural steel.
 3. Manufacturers and products:
 - a. Sherwin Williams:
 - 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series
 - 2) 2nd Coat: S-W A-100 Exterior Latex Gloss, A8 Series
 - 3) 3rd Coat: S-W A-100 Exterior Latex Gloss, A8 Series
 - b. Benjamin Moore:
 - 1) 1st Coat: Moore PO6 Super Spec HP Alkyd Metal Primer
 - 2) 2nd Coat: 096 MoorGlo Acrylic Semi-Gloss House Paint
 - 3) 3rd Coat: 096 MoorGlo Acrylic Semi-Gloss House Paint
 - c. Glidden Professional:
 - 1) 1st Coat: Devoe Coatings DEVFLEX Direct-to-Metal 4020 primer
 - 2) 2nd Coat: Glidden Professional Fortis 450 6407 topcoat
 - 3) 3rd Coat: Glidden Professional Fortis 450 6407 topcoat
- B. SYSTEM E-2:
 1. Substrate: Hollow metal door frames:
 2. Finish: Gloss.
 3. Manufacturers and Products:
 - a. Sherwin Williams:
 - 1) 1st Coat: DTM Acrylic Primer/Finish, B66W1
 - 2) 2nd Coat:DTM Acrylic Gloss Coating, B66W100
 - 3) 3rd Coat: DTM Acrylic Gloss Coating, B66W100
 - b. Benjamin Moore:
 - 1) 1st Coat: Moorcraft Super Spec DTM Alkyd Satin, Z163

- 2) 2nd Coat: Moorcraft Super Spec Urethane Gloss Enamel, Z22
 - 3) 3rd Coat: Moorcraft Super Spec Urethane Gloss Enamel, Z22
 - c. Glidden Professional:
 - 1) 1st Coat: DEVGUARD 4360 Low VOC Universal Primer
 - 2) 2nd Coat: DEVGUARD 4309 Rust Preventative Gloss Enamel
 - 3) 3rd Coat: DEVGUARD 4309 Rust Preventative Gloss Enamel
- C. SYSTEM E-3:
1. Substrate: Galvanized Metal, Not Chromate Passivated:
 2. Applications include but are not limited to railings, lintels and bollards.
 3. Manufacturers and Products:
 - a. Sherwin Williams:
 - 1) 1st Coat: S-W Pro Industrial Pro-Cryl® Primer, B66-310 Series
 - 2) 2nd Coat: S-W ProMar® 200 Latex Semi-Gloss, B31W2200 Series
 - 3) 3rd Coat: S-W ProMar® 200 Latex Semi-Gloss, B31W2200 Series
 - b. Benjamin Moore:
 - 1) 1st Coat: Moore P04 Super Spec HP Acrylic Metal Primer
 - 2) 2nd Coat: Moore N096 MoorGlo Acrylic Semi-Gloss House Paint
 - 3) 3rd Coat: Moore N096 MoorGlo Acrylic Semi-Gloss House Paint
 - c. Glidden Professional:
 - 1) 1st Coat: Devoe Coatings DEVFLEX Direct-to-Metal 4020 primer
 - 2) 2nd Coat: Glidden Professional Fortis 450 6407 topcoat
 - 3) 3rd Coat: Glidden Professional Fortis 450 6407 topcoat

2.05 INTERIOR PAINT SYSTEMS

A. SYSTEM I-1:

1. Substrate: Concrete Masonry Units
2. Manufacturers and Products:
 - a. Sherwin Williams:
 - 1) 1st Coat: S-W PrepRite® Block Filler, B25W25
 - 2) 2nd Coat: S-W ProMar® 200 Latex Semi-Gloss, B20W2200 Series
 - 3) 3rd Coat: S-W ProMar® 200 Latex Semi-Gloss, B20W2200 Series
 - b. Benjamin Moore:
 - 1) 1st Coat: Moore 160 Super Spec Latex Block Filler
 - 2) 2nd Coat: 333 Regal AquaGlo Acrylic Semi-Gloss Enamel
 - 3) 3rd Coat: 333 Regal AquaGlo Acrylic Semi-Gloss Enamel
 - c. Glidden Professional:
 - 1) 1st Coat: Glidden Professional Block Filler 3010 primer
 - 2) 2nd Coat: Glidden Professional Diamond 450 7400 topcoat
 - 3) 3rd Coat: Glidden Professional Diamond 450 7400 topcoat

B. SYSTEM I-2

1. Substrate: Concrete Masonry Units (Epoxy paint, Semi-gloss finish)
2. Manufacturers and Products:
 - a. Sherwin Williams:
 - 1) 1st Coat: S-W Heavy Duty Block Filler, B42W46
 - 2) 2nd Coat: S-W Pro Industrial HB/ Waterbased Epoxy, B71W111/B71W100 Series
 - 3) 3rd Coat: S-W Pro Industrial HB/ Waterbased Epoxy, B71W111/B71W100 Series
 - b. Benjamin Moore:
 - 1) 1st Coat: Super Spec HP Waterborne Epoxy Block Filler P31

- 2) 2nd Coat: Super Spec HP Acrylic Epoxy Coating P43
 - 3) 3rd Coat: Super Spec HP Acrylic Epoxy Coating P43
 - c. Glidden Professional:
 - 1) 1st Coat: Tru-Glaze 4015 Block Filler
 - 2) 2nd Coat: Tru-Glaze WB 4426 Water-Based Epoxy
 - 3) 3rd Coat: Tru-Glaze WB 4426 Water-Based Epoxy
- C. SYSTEM I-3
- 1. Substrate: Structural Steel and Metal Fabrications:
 - 2. Finish: Semi-Gloss.
 - 3. Manufacturers and Products:
 - a. Sherwin Williams:
 - 1) 1st Coat: S-W Pro Industrial Pro-Cryl® Primer, B66-310 Series
 - 2) 2nd Coat: S-W ProMar® 200 Latex Semi-Gloss, B31W2200 Series
 - 3) 3rd Coat: S-W ProMar® 200 Latex Semi-Gloss, B31W2200 Series
 - b. Benjamin Moore:
 - 1) 1st Coat: Moore P04 Super Spec HP Acrylic Metal Primer
 - 2) 2nd Coat: N333 Regal AquaGlo Acrylic Semi-Gloss Enamel
 - 3) 3rd Coat: N333 Regal AquaGlo Acrylic Semi-Gloss Enamel
 - c. Glidden Professional:
 - 1) 1st Coat: Devco Coatings DEVFLEX Direct-to-Metal 4020 primer
 - 2) 2nd Coat: Glidden Professional Diamond 450 7400 topcoat
 - 3) 3rd Coat: Glidden Professional Diamond 450 7400 topcoat
- D. SYSTEM I-4
- 1. Substrate: Hollow metal door frames:
 - 2. Finish: Gloss.
 - 3. Manufacturers and Products:
 - a. Sherwin Williams:
 - 1) 1st Coat: DTM Acrylic Primer/Finish, B66W1
 - 2) 2nd Coat: DTM Acrylic Gloss Coating, B66W100
 - 3) 3rd Coat: DTM Acrylic Gloss Coating, B66W100
 - b. Benjamin Moore:
 - 1) 1st Coat: Moorcraft Super Spec DTM Alkyd Satin, Z163
 - 2) 2nd Coat: Moorcraft Super Spec Urethane Gloss Enamel, Z22
 - 3) 3rd Coat: Moorcraft Super Spec Urethane Gloss Enamel, Z22
 - c. Glidden Professional:
 - 1) 1st Coat: DEVGUARD 4360 Low VOC Universal Primer
 - 2) 2nd Coat: DEVGUARD 4309 Rust Preventative Gloss Enamel
 - 3) 3rd Coat: DEVGUARD 4309 Rust Preventative Gloss Enamel
- E. SYSTEM I-5
- 1. Substrate: Galvanized Metal, Not Chromate Passivated:
 - 2. Applications include but are not limited to railings and exposed ductwork.
 - 3. Manufacturers and Products:
 - a. Sherwin Williams:
 - 1) 1st Coat: S-W Pro Industrial Pro-Cryl® Primer, B66-310 Series
 - 2) 2nd Coat: S-W ProMar® 200 Latex Semi-Gloss, B31W2200 Series
 - 3) 3rd Coat: S-W ProMar® 200 Latex Semi-Gloss, B31W2200 Series
 - b. Benjamin Moore:
 - 1) 1st Coat: Moore P04 Super Spec HP Acrylic Metal Primer
 - 2) 2nd Coat: N333 Regal AquaGlo Acrylic Semi-Gloss Enamel

- 3) 3rd Coat:N333 Regal AquaGlo Acrylic Semi-Gloss Enamel
 - c. Glidden Professional:
 - 1) 1st Coat: Devoe Coatings DEVFLEX Direct-to-Metal 4020 primer
 - 2) 2nd Coat:Glidden Professional Diamond 450 7400 topcoat
 - 3) 3rd Coat:Glidden Professional Diamond 450 7400 topcoat
- F. SYSTEM I-6
1. Substrate: Gypsum Board (Satin Finish):
 2. Applications include but are not limited to walls, ceilings, soffits, bulkheads, and column covers.
 3. Manufacturers and Products:
 - a. Sherwin Williams:
 - 1) 1st Coat:S-W PrepRite 200 Int. Latex Primer, B28 Series
 - 2) 2nd Coat:S-W ProMar® 200 Latex Eggshell, B20Series
 - 3) 3rd Coat:S-W ProMar® 200 Latex Semi-Gloss, B31Series
 - b. Benjamin Moore:
 - 1) 1st Coat: Moore P04 Super Spec HP Acrylic Metal Primer
 - 2) 2nd Coat:N319 Regal Acrylic Latex Eggshell Finish Enamel
 - 3) 3rd Coat:N319 Regal Acrylic Latex Eggshell Finish Enamel
 - c. Glidden Professional:
 - 1) 1st Coat: Glidden Professional High Hide 1000 primer
 - 2) 2nd Coat:Glidden Professional Diamond 450 7300 topcoat
 - 3) 3rd Coat:Glidden Professional Diamond 450 7300 topcoat
- G. SYSTEM I-7
1. Substrate: Gypsum Board (Epoxy Finish):
 2. Manufacturers and Products:
 - a. Sherwin Williams:
 - 1) 1st Coat:PrepRite 200 Int Latex Primer
 - 2) 2nd Coat:ProIndustrial Precat. WB Epoxy, S-G, Series K46
 - 3) 3rd Coat:ProIndustrial Precat. WB Epoxy, S-G, Series K46
 - b. Benjamin Moore:
 - 1) 1st Coat:Super Spec HP Waterborne Polyamide Epoxy Metal Primer P42-70
 - 2) 2nd Coat:Super Spec HP Acrylic Epoxy Coating P43
 - 3) 3rd Coat:Super Spec HP Acrylic Epoxy Coating P43
 - c. Glidden Professional:
 - 1) 1st Coat: Glidden Professional High Hide 1000 primer
 - 2) 2nd Coat: Devoe Coatings TRU-GLAZE WB Epoxy 4426 topcoat
 - 3) 3rd Coat: Devoe Coatings TRU-GLAZE WB Epoxy 4426 topcoat
- H. SYSTEM I-8
1. Substrate: Concrete Floor (Sealed):
 2. Manufacturers and Products:
 - a. W. R. Meadows:
 - 1) 1st Coat:CS-309/30 Concrete Curing and Sealing Compound

PART 3 EXECUTION

3.01 SCOPE -- SURFACES TO BE FINISHED

- A. Paint all exposed surfaces except where indicated not to be painted or to remain natural; the term "exposed" includes areas visible through permanent and built-in fixtures when they are in place.
- B. Paint the surfaces described in PART 2, indicated on the Drawings, and as follows:

1. If a surface, material, or item is not specifically mentioned, paint in the same manner as similar surfaces, materials, or items, regardless of whether colors are indicated or not.
 2. Paint surfaces behind movable equipment and furnishings the same as similar exposed surfaces.
 3. Paint surfaces to be concealed behind permanently installed fixtures, equipment, and furnishings, using primer only, prior to installation of the permanent item.
 4. Paint back sides of access panels and removable and hinged covers to match exposed surfaces.
 5. Finish top, bottom, and side edges of exterior doors the same as exposed faces.
 6. Paint all insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment occurring in finished areas to match background surfaces, unless otherwise indicated.
 7. Paint shop-primed mechanical and electrical items occurring in finished areas.
 8. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
 9. Paint interior surfaces of air ducts and convectors and baseboard heating cabinets with flat, nonspecular black paint where visible through registers, grilles, or louvers.
 10. Paint dampers exposed behind louvers, grilles, to match face panels.
 11. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
- C. Do Not Paint or Finish the Following Items:
1. Items fully factory-finished unless specifically noted; factory-primed items are not considered factory-finished.
 2. Items indicated to receive other finish.
 3. Items indicated to remain naturally finished.
 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 5. Anodized aluminum.
 6. Polished and brushed stainless steel items.
 7. Brick, precast concrete, integrally colored plaster.
 8. Polished and brushed stainless steel, anodized aluminum, bronze, terne, and lead.
 9. Acoustical materials.
 10. Concealed piping, ductwork, and conduit.

3.02 EXAMINATION

- A. Verify that surfaces are ready to receive Work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials; report incompatible primer conditions and submit recommended changes for Architect's approval.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 1. Plaster and Gypsum Board: 12 percent.
 2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
 3. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
- E. Measure the pH factor of concrete, masonry, and mortar before starting any finishing process, using the method specified in MPI Architectural Painting Manual.
 1. Report results in writing to Architect before starting work.

2. If results of test indicates need for remedial action, provide written description of remedial action. If a different primer or paint systems is required, state the total cost of the change. Do not proceed with remedial action or change without receiving written authorization from Architect.

3.03 PREPARATION

- A. Prepare surfaces as specified in MPI Architectural Painting Specification Manual and as follows for the applicable surface and coating; if multiple preparation treatments are specified, use as many as necessary for best results; where the Manual references external standards for preparation (e.g. SSPC standards), prepare as specified in those standards; comply with coating manufacturer's specific preparation methods or treatments, if any.
- B. Coordinate painting work with cleaning and preparation work so that dust and other contaminants do not fall on newly painted, wet surfaces.
- C. Surface Appurtenances: Prior to preparing surfaces or finishing, remove electrical plates, hardware, light fixtures, light fixture trim, escutcheons, machined surfaces, fittings, and similar items already installed that are not to be painted.
 1. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before preparation and finishing.
 2. After completing painting in each space or area, reinstall items removed using workers skilled in the trades involved.
- D. Surfaces: Correct defects and clean surfaces which affect work of this section.
- E. Marks: Seal with shellac those which may bleed through surface finishes.
- F. Impervious Surfaces: Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Concrete, Cement Plaster and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- H. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
- I. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- J. Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
- K. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
- L. Interior Wood Items to Receive Transparent Finish: Sand wood to obtain a uniform appearance before immediately starting work. Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.
- M. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.04 APPLICATION

- A. Apply products in accordance with manufacturer's instructions and as specified or recommended by MPI Manual, using the preparation, products, sheens, textures, and colors as indicated.
 - 1. Remove, refinish, or repaint work not complying with requirements.
- B. Do not apply finishes over dirt, rust, scale, grease, moisture, scuffed surfaces, or other conditions detrimental to formation of a durable coating film; do not apply finishes to surfaces that are not dry.
- C. Use applicators and methods best suited for substrate and type of material being applied and according to manufacturer's instructions.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate; provide total dry film thickness of entire system as recommended by manufacturer.
 - 1. Number of coats and film thickness required are the same regardless of application method.
 - 2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance.
 - 3. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive dry film thickness equivalent to that of flat surfaces.
- E. Apply finish to completely cover surfaces with uniform appearance without brush marks, runs, sags, laps, ropiness, holidays, spotting, cloudiness, or other surface imperfections.
 - 1. Before applying finish coats, apply a prime coat of material recommended by manufacturer, unless the surface has been prime coated by others; where evidence of suction spots or unsealed areas in first coat appear, recoat primed and sealed surfaces to ensure finish coat with no burn through or other defects due to insufficient sealing.
 - 2. Apply first coat to surface that has been cleaned, pretreated, or otherwise prepared as soon as practical after preparation and before subsequent surface deterioration.
 - 3. Do not apply succeeding coats until the previous coat has cured as recommended by manufacturer.
 - 4. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat will not cause the undercoat to lift or lose adhesion.
 - 5. If manufacturer's instructions recommend sanding to produce a smooth, even surface, sand between coats.
 - 6. Before applying next coat vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
 - 7. Pigmented (Opaque) Finishes: Provide smooth, opaque surface of uniform finish, color, appearance, and coverage.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection.
- B. Owner will provide field inspection.

3.06 CLEANING AND PROTECTION

- A. Collect waste material which may constitute a fire hazard, place in closed metal containers, and remove daily from site.
- B. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from site.

- C. Protect other work, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting as approved by Architect.
- D. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
- E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in MPI Manual.

END OF SECTION

SECTION 10 11 01
VISUAL DISPLAY BOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Markerboards and Tackboards.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Blocking and supports.

1.03 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2009.
- B. ASTM A424 - Standard Specification for Steel, Sheet, for Porcelain Enameling; 2009a.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data on markerboard, tackboard, tackboard surface covering, trim, and accessories.
- C. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.
- D. Samples: Submit two samples 2 by 2 inch in size illustrating materials and finish, color and texture of markerboard, tackboard, tackboard surfacing, and trim.
- E. Maintenance Data: Include data on regular cleaning, stain removal .

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year warranty for markerboard to include warranty against discoloration due to cleaning, crazing or cracking, and staining.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Visual Display Boards:
 - 1. Claridge Products and Equipment, Inc: www.claridgeproducts.com.
 - 2. Polyvision Corporation (Nelson Adams): www.polyvision.com.
 - 3. Aarco Products, Inc. .
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 VISUAL DISPLAY BOARDS

- A. Markerboards: Porcelain enamel on steel, laminated to core.
 - 1. Color: White.
 - 2. Metal Face Sheet Thickness: 0.024 inch (24 gage).
 - 3. Core: Particleboard, manufacturer's standard thickness, laminated to face sheet.
 - 4. Backing: Aluminum foil, laminated to core.
 - 5. Size: As indicated on drawings.
 - 6. Frame: Extruded aluminum, with concealed fasteners.

7. Frame Finish: Anodized, natural.
 8. Accessories: Provide chalk tray.
- B. Tackboards: Fine-grained, homogeneous natural cork.
1. Cork Thickness: 1/8 inch.
 2. Backing: Fiberboard, 3/8 inch thick, laminated to tack surface.
 3. Size: As indicated on drawings.
 4. Frame: Same type and finish as for chalkboard.
- C. Combination Units and Units Made of More Than One Panel: Factory-assembled markerboards and tackboards in a single frame, of materials specified above.

2.03 MATERIALS

- A. Porcelain Enameled Steel Sheet: ASTM A424, Type I, Commercial Steel, with fired-on vitreous finish.
- B. Particleboard: ANSI A208.1; wood chips, set with waterproof resin binder, sanded faces.
- C. Foil Backing: Aluminum foil sheet, 0.005 inch thick.
- D. Adhesives: Type used by manufacturer.

2.04 ACCESSORIES

- A. Cleaning Instruction Plate: Provide instructions for chalkboard cleaning on a metal plate fastened to perimeter frame near chalkrail.
- B. Chalk Tray: Aluminum, manufacturer's standard profile one piece full length of chalkboard, molded ends; concealed fasteners, same finish as frame.
- C. Mounting Brackets: Concealed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install boards in accordance with manufacturer's instructions.
- B. Secure units level and plumb.

3.03 CLEANING

- A. Clean board surfaces in accordance with manufacturer's instructions.

3.04 SCHEDULE

- A. Type A1: typical markerboard/tackboard combination, sizes as shown.
- B. Type B1: Tackboard, sizes as shown.

END OF SECTION

SECTION 10 21 13.19
SOLID COMPOSITE TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Solid composite toilet compartments.
- C. Urinal screens.

1.02 RELATED REQUIREMENTS

- A. Section 10 28 00 - Toilet, Bath, and Laundry Accessories.

1.03 REFERENCE STANDARDS

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2010.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.
- C. Product Data: Provide data on panel construction, hardware, and accessories.
- D. Samples: Submit two samples of partition panels, ____x____ inch in size illustrating panel finish, color, and sheen.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Toilet Compartments:
 - 1. Basis of Design: Bobrick; Product 1090 Sierra series.
 - 2. Substitutions: Section 01 60 00 - Product Requirements.

2.02 COMPONENTS

- A. Toilet Compartments: Solid molded composite panels, doors, and pilasters, floor-mounted headrail-braced.
- B. Door and Panel Dimensions:
 - 1. Door and Stile Thickness: 3/4 inch.
 - 2. Door Width: 24 inch.
 - 3. Door Width for Handicapped Use: 36 inch, out-swinging.
 - 4. Panel Thickness: 1/2 inch.
 - 5. Height: 58 inch.
 - 6. Thickness of Pilasters: 1 inch.

2.03 ACCESSORIES

- A. Pilaster Shoes: Formed ASTM A666, Type 304 stainless steel with satin finish, 3 in high, concealing floor fastenings.
- B. Head Rails: Hollow anodized aluminum tube, 1 x 1-5/8 inch size, with anti-grip strips and cast socket wall brackets.

- C. Pilaster Brackets: Polished stainless steel.
- D. Wall Brackets: Continuous type, polished stainless steel.
- E. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
 - 1. For attaching panels and pilasters to brackets: Through-bolts and nuts; tamper proof.
- F. Hardware: Polished stainless steel:
 - 1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
 - 2. Door Latch: Slide type with exterior emergency access feature.
 - 3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
 - 4. Coat hook with rubber bumper; one per compartment, mounted on door.
 - 5. Provide door pull for outswinging doors.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify correct spacing of and between plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.
- E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch.
- B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.
- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

SECTION 10 28 00

TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Accessories for toilet rooms, showers, and utility rooms.

1.02 RELATED REQUIREMENTS

- A. Section 10 21 13.19 - Solid Composite Toilet Compartments.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2012.
- B. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2004 (Reapproved 2010).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Products listed are made by Bobrick and Bradley Corporation.
- B. Other Acceptable Manufacturers:
 - 1. A & J Washroom Accessories Inc: www.ajwashroom.com.
 - 2. American Specialties, Inc: www.americanspecialties.com.
 - 3. Bradley Corporation: www.bradleycorp.com.
 - 4. Substitutions: Section 01 60 00 - Product Requirements.
- C. All items of each type to be made by the same manufacturer.

2.02 FINISHES

- A. Stainless Steel: No. 4 satin brushed finish, unless otherwise noted.
- B. Galvanizing for Items Other than Sheet: Comply with ASTM A123/A123M; galvanize ferrous metal and fastening devices.

2.03 TOILET ROOM ACCESSORIES

- A. Toilet Paper Dispenser: Jumbo Roll Dispenser
 - 1. Provided by Owner, installed by Contractor.
 - 2. Product: Kimberly-Clark Model No. 09608.
- B. Not Used
- C. Paper Towel Dispenser: Jumbo Roll Dispenser

1. Provided by Owner, installed by Contractor.
 2. Product: Kimberly-Clark Model No. 09996
- D. Electric Hand Dryer:
1. Manufacturers:
 - a. American Dryer, Inc; ExtremeAir GXT: www.americandryer.com.
 - b. Excel Dryer; Product Xlerator: www.exceldryer.com.
 - c. World Dryer Corporation; Product SMARTdri: www.worlddryer.com.
 2. Substitutions: Section 01 60 00 - Product Requirements.
- E. Waste Receptacle: Recessed and Semi-Recessed, stainless steel, seamless lower door for access to container, reinforced panel full height of door, continuously welded bottom pan and seamless exposed flanges.
1. Liner: Removable, heavy-duty vinyl liner, attached at a minimum of 4 points with stainless steel grommets and hooks.
 2. Minimum capacity: 12 gallons.
 3. E-1 (Recessed) Product: B-346 manufactured by Bradley.
 4. E-2 (Semi-Recessed) Product: B-346-10 manufactured by Bradley.
- F. Soap Dispenser: Soap lather dispenser, wall-mounted, surface, with black ABS cover .
1. Provided by Owner, installed by Contractor.
 2. Product: Kimberly-Clark Model No. 92148
- G. Mirrors: Stainless steel framed, 6 mm thick laminated glass mirror.
1. Series B- 290 manufactured by Bobrick.
 2. Size: shown on Drawings.
 3. Frame: 0.05 inch angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; No.4 finish.
 4. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
- H. Grab Bars: Stainless steel, 1-1/2 inches outside diameter, minimum 0.05 inch wall thickness, nonslip grasping surface finish, concealed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar.
1. Length and configuration: As indicated on drawings.
 2. Product: B-6806 Series manufactured by Bobrick.
- I. Not Used
- J. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
1. Product: B-254 manufactured by Bobrick.
- K. Diaper Changing Station: Wall-mounted folding diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285.
1. Style: Horizontal.
 2. Material: Stainless steel shell with polyethylene body.
 3. Mounting: Surface.
 4. Manufacturers:
 - a. Bradley Corporation : www.bradleycorp.com.
 - b. Koala Kare Products : www.koalabear.com.
 - c. Substitutions: See Section 01600 - Product Requirements.
- L. Shower Curtain Rod: Stainless steel tube, 1-1/4 inch outside diameter, 0.05 inch wall thickness, satin-finished, with 2-9/16 inch outside diameter, minimum 0.04 inch thick satin-finished stainless steel flanges, for concealed mounting.
1. Product: B-6047 manufactured by Bobrick.

- M. Shower Curtain:
 - 1. Material: Opaque vinyl, 0.008 inch thick, matte finish, with antibacterial treatment, flameproof and stain-resistant.
 - 2. Shower curtain hooks: Chrome-plated or stainless steel spring wire designed for snap closure.
 - 3. Product: 204-2 & 204-1 manufactured by Bobrick.
- N. Not Used
 - 1. Seat: Phenolic or polymeric composite one-piece seat or seat slats, of white color.
 - 2. Size: ADA compliant.
 - 3. Product: B-5181 Series manufactured by Bobrick.
- O. Wall-Mounted Soap Dish: Heavy duty, seamless stainless steel, recessed, without grab bar, satin finish; with concealed mechanical fastening suitable for substrate and backplate.
 - 1. Product: B-4390 manufactured by Bobrick.
- P. Robe Hook: Heavy-duty stainless steel, single-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.
 - 1. Product: B-7671 manufactured by Bobrick.
- Q. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
 - 1. Hooks: 4, 0.06 inch stainless steel rag hooks under shelf.
 - 2. Mop/broom holders: 3 spring-loaded rubber cam holders under shelf.
 - 3. Length: 34 inches.
 - 4. Product: B-239 x 34 manufactured by Bobrick.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. Verify that field measurements are as indicated on drawings.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights and Locations: As required by accessibility regulations and as indicated on drawings

3.04 SCHEDULE

- A. Toilet Paper Dispenser: Double Jumbo Roll; Provide as shown.
- B. Not Used
- C. Paper Towel Dispenser: Provide one for each sink in the following locations:
 - 1. Consession Stands
- D. Electric Hand Dryer: Provide as shown in toilet rooms.
- E. Waste Receptacle: Provide as shown in toilet rooms.
- F. Soap Dispenser: Provide as shown in toilet rooms.

- G. Mirrors: As shown in toilet rooms.
- H. Grab Bars: 1-1/2 inch diameter. Provide as shown in toilet rooms.
- I. Not Used
- J. Sanitary Napkin Disposal Unit: Provide as shown in toilet rooms.
- K. Diaper Changing Station: Provide as shown in toilet rooms.
- L. Shower Curtain Rod: Provide as shown in locker room showers.
- M. Shower Curtain: Provide as shown in locker room showers.
- N. Not Used
- O. Wall-Mounted Soap Dish: Provide as shown in locker room showers.
- P. Robe Hook: Provide as shown in locker room showers.
- Q. Combination Utility Shelf/Mop and Broom Holder: Provide as shown in custodial closets.

END OF SECTION

SECTION 10 44 00
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Fire extinguishers.
- C. Fire extinguisher cabinets.
- D. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.
- B. Section 04 20 00 - Unit Masonry BPD: Roughed-in wall openings.
- C. Section 09 90 00 - Painting and Coating: Field paint finish.

1.03 REFERENCE STANDARDS

- A. NFPA 10 - Standard for Portable Fire Extinguishers; 2010.
- B. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate cabinet physical dimensions.
- C. Product Data: Provide extinguisher operational features, color and finish, and anchorage details.
- D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

1.05 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Extinguishers:
 - 1. JL Industries, Inc .
 - 2. Larsen's Manufacturing Co .
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Fire Extinguisher Cabinets and Accessories:
 - 1. JL Industries, Inc: www.jlindustries.com.
 - 2. Larsen's Manufacturing Co: www.larsensmfg.com.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
 - 1. Provide extinguishers labeled by UL for the purpose specified and indicated.

- B. Wet Chemical Type Fire Extinguishers: Stainless steel tank, pressurized, with low “pH” potassium acetate and potassium citrate solution including hose and nozzle.
 - 1. Class: K.
 - 2. Size: 2.5 gallon.
 - 3. Finish: Stainless steel.
- C. Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gage.
 - 1. Class: A:B:C.
 - 2. Size: 10 pound.
 - 3. Finish: Baked polyester powder coat, red color.

2.03 FIRE EXTINGUISHER CABINETS

- A. Metal: Formed primed steel sheet; 0.036 inch thick base metal.
- B. Cabinet Configuration: Semi-recessed type.
 - 1. Sized to accommodate accessories.
 - 2. Exterior nominal dimensions of ____ inch wide x ____ inch high x ____ inch deep.
 - 3. Trim: Flat, 3/8 inch wide face.
- C. Door: 12 gage steel door, reinforced for flatness and rigidity; lock with key access. Hinge doors for 180 degree opening with continuous piano hinge. Provide roller type catch.
- D. Door Glazing: Glass, clear, 1/8 inch thick tempered. Set in resilient channel gasket glazing.
- E. Cabinet Mounting Hardware: Appropriate to cabinet. Pre-drill for anchors.
- F. Finish of Cabinet Exterior Trim and Door: Primed for field paint finish.
- G. Finish of Cabinet Interior: White enamel.

2.04 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, galvanized and enamel finished.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install cabinets plumb and level in wall openings, 48 inches from finished floor to the top of the cabinet.
- C. Secure rigidly in place.
- D. Place extinguishers in cabinets.

3.03 SCHEDULES

- A. Corridors: Water Type 2A, 2 1/2 gallon (11 L) capacity, polished chrome finish, placed in 12 inch (300 mm) wide x 30 inch (760 mm) high x 10 inch (250 mm) deep recessed polished stainless steel cabinet; locate 2 per floor.
- B. Corridors: Dry Chemical Typs, 10 pound, placed in recessed field painted cabinet, as shown.
- C. Kitchen and Culinary Arts Classroom: Wet Chemical Type, Class K, 2-1/2 gallon capacity, mounted on wall bracket, location as directed, one per room.

END OF SECTION

SECTION 10 51 00

LOCKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Mobile and fixed locker units with hinged doors.
- C. Metal tops and filler panels.
- D. Locker benches.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete base construction.
- B. Section 06 20 00 - Finish Carpentry: Finish top and end panels.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on locker types, sizes and accessories.
- C. Shop Drawings: Indicate locker plan layout, numbering plan.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect locker finish and adjacent surfaces from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Team Lockers:
 - 1. Art Metal Products: www.artmetalproducts.com.
 - 2. Lyon Workspace Products: www.lyonworkspace.com.
 - 3. Penco Products, Inc: www.pencoproducts.com.
 - 4. Republic Storage Systems Co: www.republicstorage.com.
 - 5. WEC Manufacturing, Inc.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Baseball Lockers, (mobile and fixed):
 - 1. Mid-Minnesota Wire (GearGrid Product Line), 670 SW 15th Street, Forest Lake, MN 55025. Toll-free 888-643-6694. Phone 651-464-4468. Fax 651-464-4780. Web site www.geargrid.com. Email sales@geargrid.com.

2.02 MATERIALS

- A. Sheet Steel: ASTM A653/A653M SS Grade 33/230, with G60/Z180 coating, stretcher leveled; to the following minimum thicknesses:
 - 1. Body and Shelf: 24 gage, 0.024 inch.
 - 2. Door Outer Face: 16 gage.
 - 3. Door Frame: 16 gage, 0.060 inch.
 - 4. Hinges: 14 gage, 0.075 inch.
 - 5. Base: 20 gage, 0.036 inch.
 - 6. Sloping Top: 20 gage, 0.036 inch.

7. Trim: 20 gage, 0.036 inch.

- B. Accessories For Each Locker: Two single prong wall hooks, coat hanger bar.
- C. Locker Benches: Stationary type; bench top of laminated birch species wood, stained, sealed and varnished; pedestals of chrome steel, 18 inches high.

2.03 LOCKER UNITS - TYPE 1 & TYPE 2 (TEAM LOCKERS)

- A. Width: 24 inches.
- B. Depth: 18 inches.
- C. Height: 72 inches.
- D. Configuration: single tier.
- E. Mounting: Free standing and surface mounted.
- F. Base: Fabricate for concrete base.
 - 1. Base Height: 4 inch.
- G. Locking: Equipped for padlock hasps.
- H. Ventilation Method: Expanded metal door panel.
- I. Class: Conventional.
- J. Locker Body: Formed and flanged; with steel stiffener ribs; electric spot welded.
- K. Frames: Formed channel shape, welded and ground flush, welded to body, resilient gaskets and latching for quiet operation.
- L. Doors: Hollow channel edge construction, 1-3/16 inch thick; welded construction, channel reinforced top and bottom with intermediate stiffener ribs, grind and finish edges smooth.
- M. Hinges: Two for doors under 42 inches high; three for doors over 42 inches high; weld securely to locker body and door.
- N. Locking device supplied by Owner.
- O. Number Plates: Provide rectangular shaped aluminum plates. Form numbers 3/4 inch high of block font style with ADA designation, in contrasting color.
- P. Form recess for operating handle and locking device.
- Q. Finish edges smooth without burrs.
- R. Fabricate metal tops, ends and closure pieces.
- S. Provide end panels and filler strips.

2.04 FINISHING

- A. Standard Finish: Components to be cleaned using a phosphatized bath, clear water rinse and electro-statically coated with a durable TGIC powder coating.
- B. Paint locker units as follows:
 - 1. Locker Types 1, 2, 3, and 4: Custom color: "Dover Blue"

2.05 BENCHES

- A. Standard Bench: Select hardwood seat with clear lacquer finish, 9.5 inches wide by 1.25 inch thick with two heavy duty steel tube legs with flanges top and bottom, anchored to the floor.
 - 1. Length as shown.
- B. ADA Bench: 42 inch long select hardwood seat with clear lacquer finish, 20 inches wide by 1.25 inch thick with four heavy duty steel tube legs with flanges top and bottom, anchored to the floor.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that prepared bases are in correct position and configuration.
- B. Verify bases are properly sized.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install lockers plumb and square.
- C. Place and secure on prepared base.
- D. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 lb.
- E. Bolt adjoining locker units together to provide rigid installation.
- F. Install end panels, filler panels, and sloped tops.
- G. Install accessories.
- H. Replace components that do not operate smoothly.

3.03 CLEANING

- A. Clean locker interiors and exterior surfaces.

END OF SECTION

SECTION 11 40 00
FOODSERVICE EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Provide all material, labor, equipment and services required to execute and complete all items of work relating to the food service equipment, both existing and new, all as required to make the resulting facility a fully functional and reliable operating unit in accordance with this Specification. All food service equipment shall be furnished as specified, delivered prepaid, unloaded and uncrated, assembled with all components and accessories connected within the equipment, set-in-place in proper location as indicated on the drawings, leveled and fastened to the wall, ceiling or floor as required, left ready for final utility connections by the General Contractor. The work shall include:
 - 1. To prevent extended warehousing of all food service equipment, no pre-ordering of equipment is permitted; schedule ordering of the equipment so that warehousing of the equipment shall not be required for longer than 60 days prior to delivery to the site for installation.
 - 2. All food service equipment shall have a manufacturer extended warranty covering parts and labor for a period of two years which shall take effect only after acceptance and beneficial use by the owner. All labor shall be performed by a factory authorized and qualified representative.
 - 3. A “complete and thorough” demonstration and start-up for each item of equipment must be conducted by a qualified manufacturer representative to the Owner's food service and maintenance personnel in the use, sanitation and maintenance of the equipment.
- C. Furnishing scheduled items of custom fabricated food service equipment, as specified, utilizing a food service equipment fabricator listed with the National Sanitation Foundation (NSF) for custom equipment fabrication.
- D. Delivery of food service equipment in factory fabricated containers designed to protect equipment and finish until final installation. Delivery of food service equipment shall be coordinated with the construction schedule as developed by the General Contractor. If necessary, delivery of the food service equipment shall be by means other than common carrier to expedite delivery and to maintain project schedule.
- E. Warehousing of the food service equipment in a bonded warehouse and redelivery of the food service equipment from the storage facility to the project site, or arrangement for secured storage at the project site as coordinated with the Owner to assure availability of the food service equipment to maintain project schedule.
- F. Field installation of the food service equipment, including buy-out equipment at the project site including on-site receiving and unloading, uncrating from packing containers, conveyance of the food service equipment from the receiving area to the installation location, erection and assembly of the food service equipment, including field welding and polishing of sub-assemblies and installation of fixtures and components, and setting-in-place in final location left ready for final utility connection by the General Contractor.
- G. Removal and disposal of all packing material.
- H. All costs for special tools, crane rental or usage costs or rigging as may be required for delivery or installation of the food service equipment as specified.

- I. Furnish materials and install copper insulated refrigeration lines from compressor location to evaporator coils, expansion valves, etc., for all refrigeration units and ice makers specified with remote or refrigeration systems other than self-contained.
- J. All work is to be performed by skilled labor utilizing the proper trades having respective jurisdiction thereto. All work shall be performed at hours required to maintain consistent work schedules with all other trades as coordinated by the General Contractor without additional cost to the Owner.
- K. Preparation of dimensioned utility rough-in floor plans coordinated with the Contract Documents and site conditions and the food service equipment manufacturers' utility connection points, for all food service equipment as specified.
- L. Assist the General Contractor in the preparation of "chalk-line" mark-up of utility rough-in locations on the building floor at the job site.
- M. Take complete financial responsibility for any and all additional expenses that may be borne by the Owner resulting from incomplete or inaccurate rough-in drawings or instructions for the final rough-in dimensioning at the job site.
- N. Provide complete manufacturers' and fabricator shop drawings of all related items of food service equipment.
- O. Provide competent on-site supervision for the coordination of work with the General Contractor and to assist and supervise the erection, assembly, and installation of the food service equipment, this shall include any moving, shifting, or disassembly of the food service equipment as required to enable the General Contractor to perform its work free of obstruction.
- P. Attend all job conferences and meetings as required by the Owner.
- Q. Maintaining coordination and control over the form, fit, function, and utility requirements of all food service equipment, from placement of purchase orders through Final Acceptance by the Owner.
- R. Provide competent on-site final testing, demonstration and instruction in the use and service of all items of food service equipment to the Owner in the form of a qualified manufacturer's representative for each item of required food service equipment.
- S. Providing the Owner with access to the custom equipment fabricator's shop for inspection of construction and materials used at any time during the progress of fabrication.
- T. Field verification of all measurements at the project site prior to the fabrication of custom fabricated and buy-out equipment and correct any deviation from the dimensions indicated on any plans, shop drawing, etc. which may affect the final form or fit of any item of food service equipment as a result of final building conditions and actual field dimensions.
- U. All food service equipment shall conform to field verified dimensions and to the finished building conditions with edges scribed and sealed to wall surfaces, fitting to and around building obstructions, etc. All joints, seams, or surfaces shall be fully sealed with General Electric or equivalent clear silicone sealer.
- V. Field verification of delivery access into and through the building to the final equipment location, including access and clearance through hallways, doorways, elevators (cab size and weight restrictions), etc. furnish food service equipment in sections or sub-assemblies as required for access.
- W. Keeping the premise free from accumulation of waste material and rubbish caused by his work. At the completion of each workday all waste material and rubbish must be removed and all areas swept broom clean.
- X. Physical damage to equipment, building, or previous work completed or in the process of completion shall be repaired or replaced.

- Y. Furnish as part of and affixed to the food service equipment, accessories, components and fixtures furnished standard with the equipment as specified or listed as an option and shall include the following:
 - 1. PLUMBING ACCESSORIES: Pop-up, lever or basket type waste outlets, tailpieces, standing or connected overflows, faucets and spray units, vacuum breakers, shut-off and control valves, fittings, etc.
 - 2. STEAM AND GAS ACCESSORIES: Steam supply valves, thermostats, pressure reducing and regulating valves, shut-off and control valves, temperature and pressure gauges, copper steam coils or injector assemblies, traps, fittings, etc.
 - 3. ELECTRICAL ACCESSORIES: Terminal blocks, conduit, wiring, signal and pilot lamps, on-off and control switches, control panels, magnetic contactor assemblies, heating elements, junction boxes, outlet boxes and receptacles, cord and plug sets, etc.
 - 4. REFRIGERATION ACCESSORIES: Copper insulated refrigeration tubing, valves, fittings, hangers, high and low pressure control switches, solenoid valves, evaporator coils, expansion valves, condensing units, condensate evaporators, etc.
- Z. All built-in accessories, components and fixtures shall be factory installed at the time of fabrication and shall comply with all applicable codes, regulations, etc.
- AA. All electrical wiring, plumbing lines, gas lines (except exposed threaded pipe gas manifolds at cooking appliances), steam lines, refrigeration lines, etc. shall be concealed in the floor, walls or above the finished ceiling in an acceptable manner and in compliance with all applicable codes, etc. Where it is impractical to run lines within the floor, walls or above the finished ceiling, lines shall be enclosed in a stainless steel (or alternate "smooth and cleanable" Owner approved material with appropriate access for service or replacement. In situations of an island arrangement or where equipment is not situated with access to a wall surface, lines must be installed in the floor in an approved manner including in-ground conduit for refrigeration and beverage lines. In no case shall any lines be "exposed".

1.02 WORK BY THE ELECTRICAL CONTRACTOR

- A. Rough-in utility connections including proper voltage, phase and amperage required to satisfactorily operate all items of food service equipment.
- B. Final connection of the food service equipment from the rough-in location to the connection point on all food service equipment and necessary connection points.
- C. Furnish materials and install all interconnecting wiring as required for the food service equipment, this shall include inter-wiring of control panels furnished as a part of a fixture or appliance, on-off switches for light fixtures furnished as a part of a fixture or appliance, inter-wiring of control devices to motors furnished as a part of a fixture or appliance, time clock circuits for freezers from remote condensing unit to evaporator coil, heated pressure relief ports in walk-in freezer, electrical receptacles furnished as a part of a fixture or appliance, light fixtures in exhaust hoods and walk-in refrigeration to on-off switches and conduit junction boxes, inter-wiring of food waste disposer from control device to disposer motor, etc. all as required to complete the installation of the food service equipment.
- D. Furnishing materials and installation of all interconnecting wiring as required for the food service exhaust ventilation and fire suppression systems; this shall include wiring of electrically operated gas supply shut-off valves for fire suppression systems, fire suppression system wiring to building fire alarm, heat detector electrical detection device to automatically start exhaust fans, supply and exhaust fans and control devices including on-off switches located in kitchen, light fixtures, etc.
- E. All electrical components for the exhaust and supply ventilation system (including condensate hoods and pant leg vent systems) including, electrical disconnects, starters, exhaust fan on-off

switch with indicator lights located in kitchen, supply fan controller with indicator lights located in kitchen, etc.

- F. Furnish materials and install heat tracing tape to all condensate lines within walk-in freezer.
- G. Furnishing and installation of all accessories, components and fixtures other than those specified as part of the food service equipment, to include but not be limited to, electrical circuit breakers or fuses, electrical receptacles, disconnect switches, on-off switches or other fittings and appurtenances that are required to connect the food service equipment in accordance with manufacturers instructions and result in proper operation.
- H. Utility disconnection and termination of discontinued services of existing food service equipment to be terminated or relocated, and modification or preparation of utility services for existing food service equipment to be relocated at the new location.
- I. Furnishing and installing electrical plug and cord sets where indicated.
- J. Electrical contactors or shunt-trip circuit breakers to interrupt electrical power to all electrically operated food service cooking appliances.
- K. In-floor, flush mounted, waterproof electrical receptacles of type and capacity to match plug and cord sets for all mobile food service counter equipment.
- L. Ceiling mounted, retractable drop cords to accommodate food service equipment in an island arrangement, of the type and capacity to match plug and cord sets of the food service appliances.

1.03 WORK BY THE PLUMBING CONTRACTOR

- A. Rough-in utility connections including gas, steam, hot and cold water, and floor receptors and drains in proper sizes, pressures and quantities required to satisfactorily operate all items of food service equipment.
- B. Final connection of the food service equipment from the rough-in location to the connection point on all food service equipment and necessary outlets.
- C. Furnish materials and wrap and insulate with foam pipe insulation the heat tracing tape on all condensate lines within a freezer environment.
- D. Furnish materials and install all interconnecting plumbing as required for the food service equipment, this shall include faucets, drains, drains with connected overflow, shut-off valves, vacuum breakers, flow or pressure control valves, gauges, bleeder tubes, piping from disposer control devise to disposer cone and disposer body inlets, piping for steam operated equipment from boiler take-off valve at steam generator to steam inlet connection at appliance, etc. all as required to complete the installation of the food service equipment.
- E. Furnish materials and install interconnecting chrome plated exposed piping for hose reel and hose bibs including installation of check valves and vacuum breaker in supply line; this shall include chrome plated bleeder outlet if required by local health department regulations or local plumbing codes.
- F. Furnishing and installation of all accessories, components and fixtures other than those specified as part of the food service equipment, to include but not be limited to stop cocks, traps, pipe, shut-off valves, pressure reducing valves or other fittings and appurtenances that are required to connect the food service equipment in accordance with manufacturers instructions and result in proper operation.
- G. Furnishing and installing chrome plated indirect waste outlet piping for food service equipment, from the waste outlet connection on the food service equipment to the building waste receptacle (floor sink, etc.).
- H. Flushing and sanitizing of lines before making final connections to the food service equipment.

1.04 WORK BY THE MECHANICAL CONTRACTOR

- A. Supply and exhaust ventilation for indoor refrigeration condensing units based on 750 cfm for each air cooled compressor horsepower and 250 cfm for each water cooled compressor horsepower.

1.05 WORK BY THE GENERAL CONTRACTOR

- A. Masonry bases, floor curbs, structural pads, floor depressions, roof curbs, flues and fireproof duct shafts or enclosures.
- B. Installation of floor pans in floor depression with floor pans set flush and finished watertight around entire perimeter at juncture with floor surface.
- C. Conduit for refrigeration lines (PVC if embedded in concrete or smooth aluminum if exposed) with 24" radius sweep bends including sleeves any through walls, floors and ceilings.

1.06 BIDDING INSTRUCTIONS AND QUALIFICATION OF BIDDER

- A. Items of food service equipment described in this specification are considered the basis of design of the base bid and must be bid accordingly without exception. Any substituted item proposed as part of this bid must be submitted two weeks prior to the due date of the bid for "pre-approval" and must meet the conditions of the base bid; this shall include all materials and material finishes, fabrication methods, electrical, plumbing, and mechanical components, electrical control devices, hardware, accessories, and options, exactly as specified without exception. Submission of "pre-approved" substituted items of equipment must be submitted as a part of the base bid, including any add or deduct price to the base bid. A determination as to the acceptability of the substituted item will be the responsibility of the owner or his designated representative. It will be the full and complete responsibility of the food service equipment contractor to pay any and all costs incurred in adapting any substituted item to the mechanical, electrical, exhaust ventilation, or structural systems of the building, or any other cost increase incurred as a result of engineering changes to the mechanical, electrical, exhaust ventilation, architectural, structural, or food service drawings. Should any item be determined not to be an acceptable substitution to the base bid, it shall be the responsibility of the food service equipment contractor to remove and replace the substituted item with the base bid item, as specified, at no additional cost to the owner. Failure to follow this instruction will disqualify the bid. The contract is to be awarded as follows:
 - 1. The competence and responsibility of the bidder.
 - 2. An itemized cost breakdown of each scheduled item of food service equipment is required, as specified, in order that the owner may, at his option, delete any item or supply any portion thereof, or increase the quantity of any item without affecting the cost quoted for the remaining items. "Pre-approved" substituted items must be submitted as an add or deduct alternate in addition to the base bid.
 - 3. The owner is not obligated to accept the lowest or any other bid. The award of the contract and choice of the food service equipment contractor shall be at the Owner's discretion.
- B. Each bidder shall be responsible to visit the project site of the proposed work and fully acquaint himself with conditions as they exist.
- C. Each bidder is responsible to attend any pre-bid meeting as required by the owner.
- D. Each bidder shall be responsible to examine and review the contract document drawings and specifications. Should the bidder find during examination of the drawings and specifications any discrepancies, omissions, ambiguities, or conflicts in or among the contract documents or shall be in doubt as to their meaning, the owner shall be notified no later than four working days prior to bid opening for clarification.

- E. The failure or omission by any bidder to receive or examine any form, instrument or document or to visit the project site shall in no way relieve him from obligation with respect to his bid. No claims for any extras will be allowed due to unintentional errors, conflicts, or omissions in the contract documents drawings or specifications.

1.07 SUBMITTALS

- A. Product Data: For each buy-out item of food service equipment indicated. Include manufacturer's model number and accessories and requirements for access and maintenance clearances, water and drainage, power or fuel, and service connections including roughing-in dimensions.
- B. Shop Drawings: For food service equipment not manufactured as standard production and catalog items by manufacturers. Shop drawings shall include the following information:
 - 1. Dimensioned rough-in plans scaled at 1/4"=1'-0", accurately locating connection points and indicating utility data for all mechanical, electrical, and supply and exhaust ventilation requirements, including all items of new and existing food service equipment to be reused.
 - 2. Dimensioned plans scaled at 1/2"=1'-0", accurately locating and indicating the finished size of masonry bases, floor depressions in structural slabs, stub walls, curbs, and finished openings for pass-thru equipment in walls, etc.
 - 3. Dimensioned plans and detailed drawings of all custom fabricated food service equipment scaled at 3/4"-1'-0" for plan and elevation views, and 1-1/2"=1'-0" for sectional views.
- C. Copies of original maintenance and repair manuals, including a list of all authorized service agencies responsible for each item of food service equipment.

1.08 QUALITY ASSURANCE

- A. Manufacturer's qualifications shall include a firm that has regularly engaged in the manufacturing of food service equipment of the same type, capacity, performance, and size as specified, and whose products have been in similar service for not less than five years.
- B. Custom fabricator qualifications for custom food service equipment shall include a skilled sheet metal shop with a minimum of five years experience in custom sheet metal food service equipment fabrication of similar type as specified. All custom food service equipment shall be fabricated at the same shop.
- C. Installer's qualifications shall include a firm with at least three years of successful installation experience on projects with a similar scope to that as required for this project.
- D. Food service equipment dealers qualifications shall include a firm which is regularly engaged in the purchasing of food service equipment as is a manufacturer authorized agent of the specified equipment for not less than five years. The dealer shall also employ a full time project management staff to oversee the purchase of the equipment in compliance with the specifications, coordinate the form and fit of the equipment to the project site conditions, attend all project meetings, coordinate shop drawing review, coordinate installation with the trades, coordinate factory training, and address all issues as they relate to the satisfactory completion of the facility in compliance with the specifications and related documentation.
- E. Codes and Standards: All food service equipment furnished and installed under this specification shall be manufactured in strict compliance with the following publications or the current or revised related publication as well as all state, national, and local codes and agencies having jurisdiction over same:
 - 1. National Electrical Manufacturer Association NEMA
 - a. ICS-77 Industrial Controls and Systems
 - 2. National Fire Protection Association NFPA
 - a. 12.1 General Information and Requirements

- b. 17.4 Local Application System
 - c. 17.13 Water Sprinkler Systems
 - 3. National Sanitation Foundation NSF
 - a. 11-76 Food Service Equipment
 - b. 4-73 Commercial Cooking and Warming Equipment
 - c. C-2-72 Special Equipment and/or Devices
 - 4. Underwriters Laboratories UL
 - a. 57-78 Electric Lighting Fixtures
 - b. 197-78 Commercial Electric Cooking Appliances
 - c. 300 Fire Extinguishing Systems
 - 5. International Mechanical Code 2006 (IMC)
 - 6. 2009 Federal Regulations for Refrigeration
- F. All food service equipment shall be manufactured in strict compliance with standards as set forth by the National Sanitation Foundation (NSF), including fabrication of custom built equipment and shall be listed with same and shall bear their seal. Any item of food service equipment lacking the NSF seal will be rejected.
- G. All electrically operated food service equipment shall be constructed in strict compliance with standards as set forth by the Underwriters Laboratories (UL) and shall utilize approved components and assemblies and shall bear the label thereof.
- H. Custom fabricated food service equipment shall be constructed to the standards as set forth by the National Association of Food Equipment Manufacturers (NAFEM).
- I. All refrigeration equipment and all pressurized vessels shall be constructed, approved, inspected, registered and stamped and installed in strict compliance with the American Society of Mechanical Engineers (ASME), state and local codes for Unfired Pressure Vessels, and all other agencies having jurisdiction thereof.
- J. Product Options: Drawings indicate food service equipment based on the specific products indicated. Other manufacturers' equipment with equivalent size and performance characteristics may be considered.
- K. Pre installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings." Review methods and procedures related to food service equipment including, but not limited to, the following:
- 1. Review access requirements for equipment delivery.
 - 2. Review equipment storage and security requirements.
 - 3. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
 - 4. Review structural loading limitations.
 - 5. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- 1.09 DELIVERY, STORAGE, AND HANDLING
- A. Deliver food service equipment as factory-assembled units with protective crating and covering.
 - B. Store food service equipment in original protective crating and covering and in a dry location.
- 1.10 PROJECT CONDITIONS
- A. Field Measurements: Verify dimensions of food service equipment installation areas by field measurements before equipment fabrication and indicate measurements on Shop Drawings and Coordination Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.11 COORDINATION

- A. Coordinate equipment layout and installation with other work, including light fixtures, HVAC equipment, and fire-suppression system components.
- B. Coordinate location and requirements of service-utility connections.
- C. Coordinate size, location, and requirements of concrete bases, positive slopes to drains, floor depressions, and insulated floors. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete".
- D. Coordinate installation of roof curbs, equipment supports, and roof penetrations, as specified in Division 7 Section "Roof Accessories".

1.12 WARRANTIES

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. All buy-out food service equipment herein specified shall have all parts and labor warranted, in writing, from the date of Final Acceptance by the Owner against defective parts, materials, workmanship, and design for a period of time as stated within the manufacturers standard published warranty, but no less than two years.
- C. All custom fabricated food service equipment shall be warranted as stated above except for a period of two years.
- D. Refrigeration equipment shall include start-up and two year parts and labor warranty on the entire refrigeration system and manufacturers five year parts warranty on hermetic and semi-hermetic sealed compressors.

PART 2 - PRODUCTS

2.01 MATERIALS AND WORKMANSHIP

- A. Stainless steel shall be type 302 or type 304 extra low carbon non-magnetic austenitic 18% chrome, 8% nickel alloy steel. Gauges shall be U.S. Standard of Thickness set forth below:

GAUGE	THICKNESS	GAUGE	THICKNESS
10	.1346	16	.0598
11	.1196	18	.0478
12	.1046	20	.0359
14	.0747	22	.0299
- B. All sheets shall be of maximum length to permit fabrication from one sheet. All thickness must meet the above gauge thickness within tolerances set forth by the ANSI after polishing. Finished sheets exceeding these tolerances shall be rejected as not meeting this Specification.
- C. Galvanealed steel shall be ARMCO steel or an approved grade of copper bearing steel. All exterior galvanealed parts, exposed members of framework, and wrought steel pipe shall be properly primed, degreased and finished with two coats of synthetic aluminum bronze.
- D. Structural steel members used for framing, consisting of angles, bands, bars, and channels, shall be ductile in quality, free of hard spots, runs, checks, cracks, and other surface defects, and shall be smooth galvanized by the hot dip process with all surplus removed, free of runs, blisters, excess splatter, and uncoated spots or patches.
- E. White metal shall consist of corrosion resistant metal containing not less than 21% nickel. All castings shall be rough ground, polished and buffed to a bright luster and shall be free from pit marks, runs, checks, burrs, and other imperfections.

- F. Stainless steel pipe and tubing shall be seamless or welded of gauge specified and of true roundness. Seamless tubing shall be thoroughly and correctly annealed and ground smooth. Welded tubing shall be thoroughly heat treated and properly quenched to eliminate carbide precipitation, drawn true to size and roundness and polished to match stainless steel sheets.
- G. Welding shall be of the electric submerged or concealed arc type, heliarc wherever practical. Where welding rods are required, they shall be of the same composition as materials to be joined, coated with a non-carbonaceous flux.
- H. Plywood and Lumber: Close grain exterior grade mahogany or birch plywood.
- I. Sealant: ASTM C 920; Type S, Grade NS, Class 25, Use NT. Provide elastomeric sealant NSF certified for end-use application indicated. Provide sealant that, when cured and washed, meets requirements of Food and Drug Administration's 21 CFR, Section 177.2600 for use in areas that come in contact with food.
 - 1. Color: As selected by Architect from manufacturer's full range of colors.
 - 2. Backer Rod: Closed-cell polyethylene, in diameter larger than joint width.
- J. Plastic: Except for plastic laminate, provide plastic materials and components complying with NSF 51.
- K. Sound Dampening: NSF-certified, nonabsorbent, hard drying, and sound-deadening coating. Provide coating compounded for permanent adhesion to metal in 1/8-inch (3-mm) thickness that does not chip, flake, or blister.
- L. Gaskets: NSF certified for end-use application indicated; of resilient rubber, neoprene, or PVC that is nontoxic, stable, odorless, nonabsorbent, and unaffected by exposure to foods and cleaning compounds.

2.02 ACCESSORIES

- A. Cabinet Hardware: Provide NSF-certified, stainless steel hardware for equipment items as indicated.
- B. Casters: NSF-certified, standard-duty, stainless-steel, swivel stem casters with 5-inch (125-mm) diameter wheels, polyurethane tires with 1-inch (25-mm) tread width, and 300-lb (90-kg) load capacity per caster. Provide brakes on 2 casters per unit.

2.03 FABRICATION

- A. All welds shall be strong and ductile, nonporous, free of pits and cracks. Parts, which are to be welded, shall be homogeneous, of a like color and finish to adjoining material. Excess metal and carbide precipitation shall be ground off, finished smooth and polished. Unexposed welds shall be pacified to prevent attrition. Brazed or soldered joints are unacceptable. Where galvanizing has been damaged due to the welding or grinding process, these areas shall be galvawelded to replace finish.
- B. All exposed surfaces of the food service equipment shall be free from bolts, screws, and rivet fastenings. Wherever bolts are required, they shall be of similar composition and finish as the metal to which they are applied.
- C. Wherever practical, all food service equipment and fixtures shall be factory or shop fabricated of one-piece construction, shipped to the project site as one unit, completely assembled.
- D. Items of food service equipment or fixtures too large to enter or transverse the building to the installation location in one assembly shall be constructed in sections and shall be furnished with field joints. Where field joints are necessary, all adjoining exposed surfaces shall be field welded at the project site as specified above for welding. Where conditions make welded field joints impractical, each sub-assembly shall be fabricated with off-set draw angles welded to the underside of each adjoining top surface and drawn together to a "hairline" seam with 1/4"-20

stainless steel bolts with lock washers and chrome plated acorn nuts. Bolted field joints will be permitted only where specifically shown on Drawings or specified for a particular item.

- E. Wherever shear edges occur they shall be free of burrs, fins, or irregular projections and shall be finished to prevent cutting or laceration when the hand is drawn over such shear edges. Brake bends shall be free of undue and where such bends do mar the uniform surface appearance of the material, such marks shall be removed by suitable grinding, polishing, and finishing. In no case where miters or bullnose corners occur is overlapping materials acceptable.

2.04 GENERAL FABRICATION STANDARDS

A. TOPS

1. Tops shall be fabricated of 14 gauge stainless steel, unless otherwise specified. All edges shall be bullnose or formed as specified with all joints butt-edged and electrically welded ground smooth and polished so no evidence of welding will appear. Soldered corners to achieve round corner construction will not be accepted.
2. Tops adjacent to walls, columns, or other equipment shall be turned up integrally into a backsplash as specified. All interior corners shall be covered on a 3/4" radius, both horizontally and vertically, forming spherical corners. Ends of backsplashes shall be fully enclosed to the low point of the top edge, fully welded, ground smooth and polished.

B. SUPPORT FRAMING

1. Around the entire perimeter on the underside of all tops and set back 1" from the down-turned edge shall be a fully welded frame assembly fabricated of 1-1/2" x 1-1/2" x 1/8" galvanized angle iron, or material as specified. Provide intermediate cross bracing fabricated of the same material as the angle framing and fully weld to perimeter frame on centers not to exceed 24". Tack weld the entire frame assembly to the underside of the top surface.

C. SINKS

1. Sinks shall be fabricated of 14 gauge stainless steel with all interior corners covered on a 3/4" radius, both horizontally and vertically, forming spherical corners.
2. Exposed edges of sink shall be finished with a 1-1/2" diameter, 180 degree rolled edge, rear and sides adjacent to adjoining surfaces shall have a backsplash turned up 10" high at a 90 degree angle on a 3/4" radius, and turned back 2-1/2" on a 45 degree angle, then down 1/2" at 90 degrees along back.
3. Multiple sink compartments shall be divided with double wall, 14 gauge stainless steel partitions, 1" wide, rounded to a 3/4" radius on top and all corners. Finish bottom, back and front with 14 gauge stainless steel to form one continuous sink with no overlapping joints or open spaces between sink compartments.
4. Integral drainboards shall be constructed of 14 gauge stainless steel. The front portion shall continue the 1-1/2" diameter, 180 degree rolled rim of the sink bowl on a continuous level horizontal plane. The surface of the drainboard shall be pitched from 2-1/2" at the end away from the sink to 3" at the sink bowl. Sink and drainboard backsplash shall be continuous and level on the horizontal plane. All interior corners, both vertical and horizontal shall be covered on a 3/4" radius. Drainboards shall be reinforced with 1" x 4" x 1/2", 12 gauge stainless steel "hat" channels, extending front to rear, tack welded to underside of drainboard, for weld anchoring leg gussets.
5. Provide cross rails extending front to rear between legs, cross rails shall not extend along rear at sink to prevent interference with plumbing.
6. Built-in sink compartments shall be fabricated as an integral part of fixture with sink fully welded with adjacent top, weld ground smooth and polished.

D. PAINTING

1. Galvanized steel shall be cleaned and degreased with mineral spirits, primed with a minimum of two coats of primer, and spray finished with a minimum of two coats of gray epoxy enamel paint.

2.05 STAINLESS STEEL FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
 1. Remove or blend tool and die marks and stretch lines into finish.
 2. Grind and polish surfaces to produce uniform, directional textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
 3. Concealed Surfaces: Minimum of 80 grit finish.
 4. Exposed Surfaces: No. 4 finish (bright, directional polish), of 180 grit.
 5. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 6. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances, service-utility connections and other conditions affecting installation and performance of food service equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Examine roughing-in for piping, mechanical and electrical systems to verify actual locations of connections before installation.

3.02 INSTALLATION

- A. Set each item of fixed food service equipment securely in place, level and adjust to correct height. Anchor to supporting surface where required for sustained operation and use without shifting or dislocation. Provide concealed anchoring where possible. Adjust work surfaces to a level tolerance of 1/16" maximum offset and slope drainage surfaces at 1/16" per foot.
- B. Complete field assembly of field joints by welding or bolting utilizing the method as indicated with the fixture. Grind all field welds smooth and polish. Set and trim all gaskets to be installed as part of field assembly.
- C. Treat enclosed spaces that are inaccessible after food service equipment installation by covering all horizontal surfaces with powdered borax at a rate of 4 ounces per square foot.
- D. Provide closure trim pieces fabricated of 16 gauge stainless steel or of material and finish as specified, trim shall be one piece constructions furnished to seal both horizontal and vertical junctures and openings where the conditions given below occur:
- E. Food service equipment is installed into wall openings. Trim shall apply to both sides of wall opening with all corners fully welded, ground smooth and polished.
 1. Two or more items of food service equipment are butted together.
 2. Food service equipment is installed against wall, columns, other equipment, etc. resulting in a gap or juncture exceeding 1/4" in width.
 3. An open gap of any size between the juncture or joint between adjoining items of food service equipment, wall or column surfaces, etc. which might result in the penetration or collection of grease or vermin.
- F. Provide cut-outs and openings in food service equipment as required to extend plumbing, electric, steam or gas lines through the food service equipment either for interconnection of utility lines or final connection.

- G. Seal around each item of food service equipment with sealant for gaps or spaces less than 1/4" in width and with stainless steel trim for gaps or spaces exceeding 1/4" in width. Closure strips shall conform to the shape and size of the surfaces or juncture to be sealed and shall be neatly scribed for a tight fit.

3.03 PROTECTION AND CLEANING

- A. Provide final protection and maintain conditions in a manner acceptable to Owner, Manufacturer and Installer that ensure food service equipment is without damage or deterioration at the time of Substantial Completion.
- B. After completion of the food service equipment installation and completion of other major work in the food service area remove protective coverings and clean and sanitize all food service equipment both internally and externally. Restore exposed and semi-exposed finished to remove abrasions or other surface damage polish exposed metal surfaces and touch-up painted surfaces. Replace work which cannot be successfully restored.

3.04 COMMISSIONING

- A. Delay start-up of the food service equipment until utility services have been installed, completed, and tested, balanced, and adjusted for pressure, voltage, etc. and until water and steam lines have been treated and cleaned for sanitation. Before start-up of the food service equipment lubricate in accordance with manufacturers instructions.
 - 1. Coordinate food service equipment start-up with service-utility testing, balancing and adjustments. Do not operate steam lines before they have been cleaned and sanitized.
 - 2. Remove protective coverings and clean and sanitize equipment both inside and out and re-lamp equipment with integral lighting. Where applicable, comply with manufacturer's written cleaning instructions.
- B. Provide on-site demonstration and formal technical training by the manufacturer's technical representative for each item of food service equipment as required to instruct the Owner and its personnel in the safe operation and sanitation and maintenance of the food service equipment.
- C. Test each item of food service equipment for proper operation.
 - 1. Repair or replace equipment that is defective in operation including units that operate below required capacity or that operate with excessive noise or vibration.
 - 2. Test refrigeration equipment's ability to maintain specified operating temperature under heavy-use conditions. Repair or replace equipment that does not maintain specified operating temperature.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 4. Test motors and rotating equipment for proper rotation and lubricate moving parts according to manufacturer's written instructions.
 - 5. Test water, drain, gas, steam, oil, refrigerant and liquid-carrying components for leaks. Repair or replace leaking components.
 - 6. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing and preventive maintenance for each food service equipment item.
 - 7. Review data in the operation and maintenance manuals. Refer to Division 1 Section "Contract Closeout".
 - 8. Review data in the operation and maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data".
 - 9. Schedule training with Owner through Construction Manager with at least seven days advance notice.

3.05 SCHEDULE OF EQUIPMENT

- A. Equipment Schedule: Refer to all Contract Documents pertaining to the food service areas. Equipment itemized along with brands and model numbers and salient features establish the standard for construction, operation and engineering criteria.
- B. Equipment indicated below is intended to establish the standard of quality of the food service equipment. Alternate products by other manufacturers may be considered if equivalent in design, performance, durability and function.
- C. As a condition of this specification, the Food Service Equipment Contractor is required to participate in the review and approval of all contract documents (rough-in drawings, manufacturer's shop drawings, brochure booklets, etc.) at the office of the Food Service Consultant (1001 Baltimore Pike, Lower Level, Springfield, PA. 19064). Upon completion of each review process, the Food Service Equipment Contractor will distribute all documents in a timely manner as directed by the General Contractor.

Item No:1

Quantity:2

Description:Prep Table with Double Sink

Mfg: Advance Tabco

Model No:DL-30-72, TA-61 (sink on right)

Supplemental Information:

14 gauge stainless steel top, Type 304, with no-drip edge, 10 inch backsplash, satin finish, sound deadened. Stainless steel sinks integrally welded to top, (16"x20"x8") and (16"x20"x4"). Stainless steel perforated drain basket at shallow sink.

18 gauge stainless steel shelf, Type 430, satin finish, cast aluminum clamps to secure shelf to legs.

Legs: 1-5/8 inch diameter, tubular stainless steel with 1 inch adjustable stainless steel bullet feet.

Item No:2

Quantity:1

Description:Prep Table with Double Sink

Mfg: Advance Tabco

Model No:DL-30-72, TA-61 (44" length)

Supplemental Information:

14 gauge stainless steel top, Type 304, with no-drip edge, 10 inch backsplash, satin finish, sound deadened. Stainless steel sinks integrally welded to top, (16"x20"x8") and (16"x20"x4"). Stainless steel perforated drain basket at shallow sink.

18 gauge stainless steel shelf, Type 430, satin finish, cast aluminum clamps to secure shelf to legs.

Legs: 1-5/8 inch diameter, tubular stainless steel with 1 inch adjustable stainless steel bullet feet.

Item No:3

Quantity:3

Description:Wall Mounted Hand Sinks

Mfg:Advance Tabco

Model No:7-PS-60

Options:

14" wide x 10" front-to-back x 5" deep bowl, 20 gauge stainless steel construction with 4" O.C. splash-mounted gooseneck faucet with aerator, basket drain, wall bracket.

Heavy gauge type 304 series stainless steel.

Offset galvanized wall mounting bracket.
Fittings are chrome plated brass.

Supplemental Information:

Furnish stainless steel mounting hardware of proper type for wall construction and to sustain weight while in use.

General contractor shall provide wall blocking as required for mounting.

Item No:4

Quantity:6

Description:Double Door Reach In Refrigerators

Mfg:Continental Refrigerator

Model No:2RE-SS

Options:

6 ea. Self-Contained refrigeration, 1/3 hp, standard

Standard warranty: 1 year parts and labor; 5 year compressor

Stainless steel case back including rear grill & concealed drain

Model 45249CP Thermometer Digital Reading, externally mounted

Model 45247CP Alarm, high/low battery backup (°F)

5" Casters, standard

6 Shelves, epoxy coated, plated steel w/clips.

Item No:5

Quantity:1

Mfg:Scotsman

Model No: C1448SA-3

Options:1 ea3 year parts & labor warranties

5 year parts & labor warranties on Evaporator

5 year parts on compressor and condenser

Model KVS Prodigy™ Vari-Smart™ Ice Level Control

Model KSBU Prodigy SmartBoard

Model B948S Ice Bin, w/top-hinged front-opening door

Model KLP8S Leg Kit, 6", stainless steel

Model KHOLDER Ice Scoop Holder

Supplemental Information:

Plumbing contractor shall install ice machine filter system in water supply line and furnish and install interconnecting piping between water filter and ice machine water inlet.

Item No:6

Quantity3

Description:Stainless steel service counter.

Mfg:Custom Fabricated

Supplemental Information:

Two curved, one straight (alternate), 16 gauge stainless steel countertop with 4" integral backsplash.

Fabricate as shown on drawings with galvanized steel angle support.

Extend counter under coiling counter OH doors at service windows.

END OF SECTION

SECTION 11 66 00
TENSION BALL SAFETY NETTING SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. This Section includes providing all materials and labor required to install the following exterior athletic equipment:
 - 1. Baseball / Softball Backstop Tension Ball Safety Netting System.

1.02 RELATED SECTIONS

- A. Division 3 - Cast-in-Place Concrete; installation of pole footings and/or support connection curbing.
- B. Division 31 - Earthwork
- C. Division 32 - Concrete Paving and Concrete Paving Joint Sealants

1.03 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. National Federation of State High School Associations (NFHS)
 - 2. National Collegiate Athletic Association (NCAA)
 - 3. International Amateur Athletic Association (IAAF)
 - 4. American Sports Builders Association (ASBA)
 - 5. Manufacturers Data and Recommended Installation Requirements

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, features, and finishes. Include details of anchors, hardware, and fastenings. If applicable, include assembly, disassembly, and storage instructions.
- B. Shop Drawings: Show location and extent of fully assembled athletic equipment. Include plans, elevations, sections, and details not shown in Product Data. Indicate color or place holder for color to be selected by owner. Show method of field assembly, connections, installation details, attachments to other Work.
- C. Samples for Verification: For the following products:
 - 1. Netting
- D. Product Certificates: For each type of athletic equipment, signed by product manufacturer.
- E. Manufacturer Certificates: Signed by manufacturers certifying that they comply with requirements. Include evidence of manufacturing experience.
- F. Qualification Data: For installer.
- G. Maintenance Data: For athletic equipment to include in maintenance manuals.
- H. Warranty: Manufacturer's warranty information

1.05 QUALITY ASSURANCE

- A. Manufacturers warranties shall pass to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements.

1.06 PRODUCT DELIVERY AND STORAGE

- A. Materials delivered to the site shall be examined for damage or defects in shipping. Any defects shall be noted and reported to the Owners representative. Replacements, if necessary, shall be immediately re-ordered, so as to minimize any conflict with the construction schedule. Sound materials shall be stored above ground under protective cover or indoors so as to provide proper protection.

PART 2 - PRODUCTS

2.01 TENSION BALL SAFETY NETTING SYSTEM

- A. Basis of Design: TFBSSTN - Tension Ball Safety Netting System as Manufactured and/or Supplied by: Sportsfield Specialties, Inc. P.O. Box 231, 41155 State Highway 10, Delhi, NY 13753 p. 888-975-3343, f. 607-746-8481, www.sportsfieldspecialties.com.
- B. COMPONENTS:
1. Tension Ball Safety Netting System Upright Support Posts and Tie-Back Structures - Fabricated, Sized and Configured as Required.
 - a. Height Above Finish Grade as Required
 - b. Powder Coated Finish
 - c. Ground Sleeve, Base Plate or Permanent Embedment Mount
 - d. Stainless Steel and/or Hot Dipped Galvanized Assembly Hardware - Quantities, Sizes and Configurations as Required
 2. Tension Ball Safety Netting System Dyneema® Rope Support Structure:
 - a. Length, Height and Configuration as Required
 - b. AmSteel®-Blue Dyneema® SK-75 Single Braid, 12-Strand Coated Black Rope - 1/2" Diameter Main Horizontal Support, 30,600 lb. Minimum Breaking Strength, 10,200 lb. Minimum Working Load Limit and Weighs 6.4 lbs. per 100' of Length.
 - c. AmSteel®-Blue Dyneema® SK-75 Single Braid, 12-Strand Coated Black Rope - 3/8" Diameter Tie-Back Support, 17,600 lb. Minimum Breaking Strength, 5,866 lb. Minimum Working Load Limit and Weighs 3.6 lbs. per 100' of Length.
 - d. Amsteel®-Blue Dyneema® SK-75 Single Braid, 12-Strand Coated Black Rope - 1/4" Diameter Vertical and Bottom Horizontal Supports, 7,700 lb. Minimum Breaking Strength, 2,566 lb. Minimum Working Load Limit and Weighs 1.6 lbs. per 100' of Length.
 - e. Splicing of AmSteel®-Blue Dyneema® Rope as Required per Manufacturer's Suggested Instructions and Guidelines
 - f. Stainless Steel and/or Hot Dipped Galvanized Assembly Hardware - Quantities, Sizes and Configurations as Required
 3. Tension Ball Safety Netting System Net and Rope Bound Border:
 - a. Length, Height and Configuration as Required
 - b. Ultra Cross Knotless Netting
 - c. Dyneema® Ultra-High Molecular Weight Polyethylene (UHMWPE) SK-75 Fiber Construction
 - d. 4 Ply, 1.2 mm (0.0472") Diameter Twine
 - e. 186 lb. (84 kg) Minimum Breaking Strength per Bar of Netting
 - f. 1-3/4" (44 mm) Square Mesh Size, 0.009 lbs. per Square Foot
 - g. 4-Strand, Braided, Continuous Monofilament Dyneema® Fiber
 - h. Amsteel®-Blue Dyneema® SK-75 Single Braid, 12-Strand Coated Black Rope Bound Border, Diameter : 1/8": Minimum Breaking Strength: 2,300 lb.:Weight: 0.5 lb. per 100' of Length
 - i. Urethane Black Bonded Finish
 - j. Strong Resistance to Ultraviolet (UV) Light Degradation

- k. Excellent Resistance to Chemicals and Water Absorption
- 4. Accessories:
 - a. Stainless Steel and/or Hot Dipped Galvanized Assembly Hardware - Quantities, Sizes and Configurations as Required
 - b. Amsteel®-Blue Dyneema® SK-75 Single Braid, 12-Strand Coated Black Rope for Net Binding Attachment to Support Structure - 1/8" Diameter, 2,300 lb. Minimum Breaking Strength and Weighs 0.5 lb. per 100' of Length - Quantities and Configurations as Required.
 - c. Stormguard™ Break-Away System.
 - d. Stamped and Sealed Drawings and Calculations by a Licensed Professional Engineer of Record in the State of Project Location.

PART 3 EXECUTION

3.01 INSTALLATION OF EQUIPMENT

- A. All athletic equipment shall be installed as recommended with manufacturer's written directions, and as indicated on the drawings.

END OF SECTION

SECTION 11 68 20
OUTDOOR ATHLETIC EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Provide all equipment and materials, and do all work necessary to furnish and install the Outdoor Athletic Equipment, as indicated on the drawings and as specified herein.

1.02 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this section. Other specification sections that directly relate to work of this Section include, but are not limited to:
 - 1. Division 31 00 00 - Earthwork; Excavation and Backfill and establishment of subgrade elevations.
 - 2. Section 32 12 16 - Asphalt Concrete Pavement
 - 3. Section 32 18 23 - Synthetic Track Surfacing
 - 4. Section 32 18 25 - Synthetic Field Surfacing
 - 5. Section 03 30 00 - Cast-in-Place Concrete; Concrete foundations and bases for goals.

1.03 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. U.S. Tennis Court and Track Builders Association
 - 2. National Federation of State High School Associations (NFSHSA)
 - 3. National Collegiate Athletic Association (NCAA)
 - 4. International Amateur Athletic Foundation (I.A.A.F.)
 - 5. Manufacturers Data and Recommended Installation Requirements.

1.04 SUBMITTALS

- A. Manufacturers Product Data
 - 1. Provide manufacturer's product literature, technical specifications and other data prior to actual field installation work for Architect or Owner's Representative review.
- B. Shop Drawings
 - 1. Provide drawings of manufacturers recommended installation and foundation requirements prior to actual field installation work for Architect or Owner's Representative review.

1.05 QUALITY ASSURANCE

- A. Manufacturers warranties shall pass to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Materials delivered to the site shall be examined for concealed damage or defects in shipping. Any defects shall be noted and reported to the Owner's Representative.
- B. Replacements, if necessary, shall be immediately re-ordered, so as to minimize any conflict with the construction schedule.
- C. Sound materials shall be stored above the ground under protective cover or indoors so as to provide proper protection.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. See drawings for sizes and locations.
- B. Provide mounting plates, brackets, and anchors of sufficient size and strength to securely attach equipment; comply with requirements of contract documents.
- C. Hardware: Heavy duty steel hardware, as recommended by manufacturer.
- D. Electrical Wiring and Components: Comply with NFPA 70; provide UL-listed equipment.
- E. Structural Steel Fabrications: Welded in accordance with AWS D1.1/D1.1M, using certified welders.

2.02 MANUFACTURERS

- A. Outdoor Athletic Equipment Manufacturers:
 - 1. ACO Polymer Products, Inc.
P.O. Box 245
Chardon, OH 44024; (800) 543-4764
 - 2. Aluminum Athletic Equipment Co. (AAE);
1000 Enterprise Drive,
Royersford, PA 19468; (800) 523-5471.
 - 3. Daktronics
201 Daktronics Dr.
Brookings, SD 57006-5128; (800) 325-8766
 - 4. Edwards Sports Products Ltd,
Units 8-9 Hounsell Building, North Mills,
Bridport, Dorset, DT6 3BE, Tel: 01308 424111; Email: sales@edsports.co.uk
 - 5. Nevco, Inc.
301 East Harris Avenue
Greenville, IL 62246-2151; (800) 851-4040.
 - 6. Sportsfield Specialties Inc.
P.O. Box 231, 41155 State Highway 10
Delhi, NY 13753; (888) 975-3343; www.sportsfieldspecialties.com
 - 7. Tomark Sports, Inc.
P.O. Box 1088
Corona, CA 92878
- B. Manufacturers and product selections named in the following articles are provided to establish the minimum standard. Subject to compliance with the stated attributes of the Basis of Design, products of manufacturers listed above, or other manufacturers, may be submitted as a request for substitution. Refer to Section 01 60 00 - Product Requirements.

2.03 COMBINATION FOOTBALL/SOCCER SYSTEM:

- A. BASE: SG4980HS GoalPak® as manufactured by Sportsfield Specialties Inc. (Basis of Design).
- B. COMPONENTS:
 - 1. Football Goal Post(s):
 - a. Gooseneck support fabricated of 6.0 inch Schedule 40 aluminum pipe (6.625 inch OD), 5.0 ft radius, 8.0 ft. offset.
 - b. Crossbar fabricated of 6.0 inch Schedule 40 aluminum pipe (6.625 inch OD).
 - 1) Length: 23 ft. 4 in.
 - 2) With internal rotating sleeve for upright adjustment.

- c. Uprights fabricated of extruded 6061 T6 aluminum tube (4.0 inch OD) with rigid wire loop at upper end
 - 1) Length: 20.0 ft.
 - d. Powder Coat Finish: Yellow or White
 - e. Installation package consisting of the following components:
 - 1) Ground sleeve: 8.0 inch hot-dipped galvanized Schedule 40 steel pipe, 5 ft. long.
 - 2) Access frame: SG2SGP fabricated of .125 inch aluminum, 22.25 inch square, 6.0 inch high, with eight anchor bolts.
 - 3) Filler plugs fabricated of 0.5 inch pressure treated plywood and .1875 inch (3/16") aluminum.
 - f. Accessories:
 - 1) Directional wind flags.
 - 2) Touch-up paint (powder coat specific).
 - 3) Stainless steel assembly bolts, and nuts.
2. Round Post Soccer Goal(s):
- a. Crossbar fabricated of 6061 T6 extruded aluminum tube, 4.375 in. square x 4.688 in., having the following attributes:
 - 1) Length: 24.0 ft.
 - 2) Round Face with Radiused Backside Corners
 - 3) 7 Ga. Steel Crossbar Attachment Brackets
 - 4) Powder Coated White
 - 5) End Frame fabricated of 6061 T6 extruded aluminum tube having the following attributes:
 - (a) Corner Upright Posts, 4.375 in. x 4.688 in.
 - (b) Rolled Side Frame, 2.0 inch x 3.0 inch x 0.125 inch, Tig Welded to Corner Upright Posts.
 - (c) Radiused Outside Corners
 - (d) Powder Coated White
 - 6) Ground Bar fabricated of 6061 T6 extruded aluminum tube, 2.0 inch square x 0.250 inch thick having the following attributes:
 - (a) Powder Coated White.
 - 7) Accessories:
 - (a) Welded Aluminum Net Clips; Guaranteed for life.
 - (b) Polypropylene Soccer Net: Color selected from standard net colors.
 - (c) Associated Stainless Steel Hardware
3. Soccer Goal Portable Wheel Mobility Kit:
- a. Soccer Goal Wheel Insert
 - 1) Welded 13 Ga. Stainless Steel Frame
 - 2) Ultra High Molecular Weight Plastic Wheel
 - 3) All Stainless Steel Hardware
 - b. Soccer Goal Mobility Handle:
 - 1) Aluminum Frame
 - 2) All Stainless Steel Hardware
 - 3) Powder Coat: White
4. Soccer Goal Back Bar Safety Clamp Kit:
- a. Safety Clamp on Turf Field:
 - 1) Fabricated of (0.187 inch) 3/16 inch Aluminum
 - 2) Powder Coated White
 - 3) Stainless Steel Hardware

- b. Anchor Pin System for natural grass practice field.

2.04 PRACTICE FOOTBALL GOAL POSTS

- A. Model # GP4300 Football Goal Post - Ground Sleeve Mounted as manufactured by Sportsfield Specialties, Inc. (Basis of Design).
- B. Gooseneck support: fabricated of 6" Schedule 40 aluminum pipe (6.625in OD), 5.0ft radius, 6.0ft offset.
- C. Crossbar: fabricated of 6" Schedule 40 aluminum pipe (6.625in OD).
 - 1. Length: 23ft 4in
 - 2. With internal rotating sleeve for upright adjustment that utilizes precision fit textured mating surfaces, for locking into the vertical position.
- D. Uprights: fabricated of extruded 6061 T6 aluminum tube (4.0in OD) with rigid wire loop at upper end
 - 1. Length: 20.0ft
- E. Powder Coat Finish: Yellow or White
- F. Installation package consisting of the following components:
 - 1. Ground sleeve: 8.0 inch Schedule 40 steel pipe, 5.0ft long
 - 2. Access frame: fabricated of 0.125 inch aluminum, 22.25 inch square, 6.0 inch high, with eight anchor bolts, filler plugs fabricated of 0.5in pressure treated plywood and 0.1875 inch (3/16") aluminum.
- G. Accessories:
 - 1. Directional wind flags.
 - 2. Touch-up paint (Powder Coat Specific).
 - 3. Assembly bolts, and nuts- Stainless Steel

2.05 SOCCER

- A. Model # SG4950 Soccer Goal as manufactured by Sportsfield Specialties, Inc. (Basis of Design).
- B. Round Post Soccer Goal, refer to 2.03, B.2, B.3 and B.4.
- C. Provide Anchor Pin system for natural grass installation.
- D. Provide turf covered safety system at artificial turf installation. Refer to 2.03, B.4.
 - 1. Product: Model # SG2S as manufactured by Sportsfield Specialties, Inc.

2.06 BASEBALL/SOFTBALL

- A. Baseball/Softball Aluminum Foul Pole:
 - 1. Foul Pole 4" o.d. x .226" wall reinforced 6061T6 extruded aluminum tube.
 - a. Baseball: 20'-0" high (24'-0" overall).
 - b. Softball: 15'-0" high (19'-0" overall).
 - 2. Frame 1.900" od. x .125" wall extruded aluminum tube, 2' x 10'-2 1/2" welded frame, 1-1/2" sq. x 3/16" thick aluminum lockcrimp mesh.
 - 3. Finish: Powder-coated yellow.
 - 4. Ground Sleeve 4.350" o.d. x .100" wall x 48" long aluminum tube,
 - 5. Hardware: Stainless steel.
 - 6. Product:
 - a. Baseball Model # LGFPW420 manufactured by Sportsfield Specialties Inc. (Basis of Design).
 - b. Softball Model # LGFPW415 manufactured by Sportsfield Specialties Inc. (Basis of Design).
- B. Home Plate With Anchor:

1. Professional homeplate with ground anchor
 2. Product: Model 310-shp manufactured by Bolco. (Basis of Design).
- C. Anchor Bases:
1. One-piece, all rubber construction with modular heavy-gauge non-collapsible textured white rubber.
 2. Universal aluminum hollow stanchion anchor adaptable with male stake and female ground receptacle.
 3. Set includes: 3 bases, 3 anchors & 3 plugs. 15" x 15" x 3"
 4. Products:
 - a. Model # TB-K13348, 100-ML Bases manufactured by Bolco. (Basis of Design).
- D. Pitcher's Rubber:
1. 24" Dual Stanchion Pitching Rubber with anchor system.
 2. Product: Model #02908 Import Double Stanchion Baseball Pitching Rubber provided by Sports Advantage. (Basis of Design).
 3. Alternate Product: Model LBMPR224 Baseball Pitching Rubber manufactured by Schutt Sports.
- E. Tension Netting:
1. Product: Model # TFBSS-TN manufactured by Sportsfield Specialties Inc. (Basis of Design).
 - a. Baseball: 40' high custom backstop.
 - b. Softball: 30' high custom backstop.
 - c. Protective netting at dugouts: 4'-8" by dugout length. Provide 1" by 1" square aluminum tube perimeter frame
- F. Batting tunnel:
1. Overhead style Long Gone™ batting tunnel manufactured by Sportsfield Specialties, Inc. (Basis of Design).
 - a. Baseball: Triple Batting Tunnel No. LGOBT-BT-P.
 - b. Softball: Double Batting Tunnel No. LGOBT-SD-P.
 2. Upright fabricated with 4" O.D. x 1/8" Wall Aluminum Tube:
 - a. Height above ground = 15'-11"
 - b. Powder Coat Option
 3. Crossbar fabricated with 4" O.D. x 1/8" Wall Aluminum Tube:
 - a. 199.750" Length
 - b. Powder Coat Option
 4. Arm-D fabricated with 2" X 2" X 1/8" Square Aluminum Tube and 4" Schedule 40 Aluminum Pipe:
 - a. Aluminum Mill Finish, with Powder Coat Option
 5. Ground sleeves fabricated with 4.30" O.D x 4.10" I.D. Aluminum Tube:
 - a. 30" Length
 - b. Aluminum Mill Finish
 - c. Ground Sleeve Caps included
 6. Baseball /Softball Batting Tunnel Net:
 - a. #36 Black Nylon 1-3/4" Mesh
 - 1) Baseball: Three nets 14' W x 13' H x 75'L.
 - 2) Softball: Two nets 14' W x 13' H x 55'L.
 7. Hardware Kit
 - a. Stainless Steel Assembly Hardware
 - b. Quick-Clips for Net Attachment
 - c. Tethers

1) Black Vinyl Coated Wire Rope

- G. Baseball Windscreen, Distance Banner, Batter's Eye:
 - 1. Windscreen: Diamond Weave Mesh, Black, Model # Wind 538 manufactured by Nylon Net Co.
 - 2. Distance Banner: Heavy duty 16 oz vinyl banner with 24" numbers on 38" x 56" banner.
 - a. Product: Model # TB-K13407 manufactured by Tomark Sports. (Basis of Design).
- H. Softball Windscreen with Distance Banner:
 - 1. Heavy-duty open-mesh, vinyl coated Mesh fabric windscreen
 - a. Product: Model 6' high, black FencePro TB-K15246 manufactured by Tomark Sports. (Basis of Design).
 - 2. Distance Banner: Heavy duty 16 oz vinyl banner with 14" numbers on 27" x 36" banner.
 - a. Product: Model # TB-K13456 manufactured by Tomark Sports. (Basis of Design).
- I. Fence Guards: Enduro Fence Topper, Blue, Model # TB-K35625 manufactured by Tomark Sports. (Basis of Design).
- J. Helmet & Bat Storage: Long Gone "Cubby", 90" x 60" x 36" manufactured by Sportsfield Specialties, Inc. (Basis of Design).
- K. Clay Bricks: 4" x 8" x 2-1/2" clay bricks:
 - 1. Product: Model # TB-K15228 manufactured by Diamond Master, Inc. (Basis of Design).
- L. Warning Track and Infield Surface:
 - 1. Warning Track: Model # DT Warning Track Mix, 6" thickness, manufactured by Diamond Tex.
 - 2. Infield and Bullpens: Model # DT Professional Mix, 6" thickness, manufactured by Diamond Tex.
 - 3. Infield Conditioner: Model # DP Red Infield Conditioner, 1/2" thickness, manufactured by Diamond Pro.

2.07 FIELD HOCKEY

- A. Goals: 12'-4" wide, 7'-2" high, 4'-0" depth.
 - 1. 2" square slotted structural aluminum extrusion with rounded outside corners.
 - 2. Continuous positive net attachment.
 - 3. Heli-arc welded one-piece construction goal mouth and rear frame.
 - 4. 18" high bottom boards bolted to welded, reinforced aluminum framework with all stainless steel hardware.
 - 5. Goal mouth features a white powder-coated finish.
 - 6. Product: Model #FHG01 Field Hockey Goal as manufactured by Sportsfield Specialties Inc. (Basis of Design).
- B. Accessories:
 - 1. Black Nylon Net
 - 2. Stainless Steel Assembly Hardware
 - 3. FHG-WK SG Field Hockey Goal Wheel Kit
 - 4. FHC-CLAMP SG2S Safety Ground Clamp System on Turf Field.

2.08 LACROSSE GOALS

- A. Provide Model # LCG01 Lacrosse Goal as manufactured by Sportsfield Specialties Inc. (Basis of Design).
- B. Frame:
 - 1. Uprights and Top Bar Fabricated of 1.50in Schedule 40 Steel Pipe, Tig Welded
 - 2. Powder Coat: Orange
- C. Ground Bar:

1. Fabricated of Steel Bar, Tig Welded
2. Powder Coat: Orange

D. Accessories:

1. Standard White Nylon Net
2. Stainless Steel Assembly Hardware
3. Anchoring pins.

2.09 TRACK AND FIELD

A. Pole Vault :

1. Landing Pad with Skirted Breather Cover
 - a. Product: Model # SPV-30XL manufactured by AAE. (Basis of Design).
2. Side Pads:
 - a. Product: Model # PVB-32XL manufactured by AAE. (Basis of Design).
3. Weather Cover
 - a. Product: Model # SWC-30XL manufactured by AAE. (Basis of Design).
4. High School Pole Vault Standards
 - a. Product: Model # PVS-HSX manufactured by AAE. (Basis of Design).
5. Pole Vault Crossbars
 - a. Product: Model # XG5 manufactured by AAE. (Basis of Design).
6. Vault Box Collar
 - a. Product: Model # VBC manufactured by AAE. (Basis of Design).
7. Mechanical Measuring Bars
 - a. Product: Model # AMB-6 manufactured by AAE. (Basis of Design).
8. Crossbar Lifters
 - a. Product: Model # ALT-20 manufactured by AAE. (Basis of Design).

B. Long Jump Pit Form:

1. Polymer concrete curbing with thermoplastic elastomer (TPE) rubber cap (white) and sand catcher.
2. Provide cover panels with recessed handles and top surface to accept synthetic track surfacing.
3. Provide jump pit assembly kit.
4. Product: Model # 7300 Modular Long Jump Pit with Flushend option manufactured by ACO Polymer Products, Inc. (Basis of Design).

C. High Jump:

1. Landing pad with Skirted Breather Cover.
 - a. Product: Model # IAP-26 manufactured by AAE.(Basis of Design).
 - b. Weather Cover
 - 1) Product: Model # IWC manufactured by AAE. (Basis of Design).
 - c. High Jump Standards
 - 1) Product: Model # MJS manufactured by AAE. (Basis of Design).
 - d. High Jump Crossbars
 - 1) Product: Model # XG4 manufactured by AAE. (Basis of Design).

D. Throwing Form Systems:

1. Nominal 10' x 10' x 6" welded aluminum concrete form.
2. 2" x 2" x 1/4" thick aluminum angle circles
3. Circle diameters:
 - a. Discus: 8' 2-1/2"
 - 1) Product: Model # DFS manufactured by AAE. (Basis of Design).
 - b. Shot Put: 7'-0"

- 1) Product: Model # SHFS manufactured by AAE. (Basis of Design).
 4. Discus Cage: Product: Model # HSDC manufactured by AAE. (Basis of Design).
 5. Shot Put Cage: Product: Model # SC-12 manufactured by AAE. (Basis of Design).
- E. High School Hurdle:
1. Aluminum Frame
 2. Push-button height adjustment modified to 24"/27"/30"/33"/36"
 3. Flat base, stabilizer bar and reinforced post welded into 3-way hurdle frame
 4. Powder-coated telescoping tubes
 5. Self-adjusting weights
 6. Double-web Lexan board - standard 41" width
 7. Product: Model # XLAH-CP manufactured by AAE. (Basis of Design).

2.10 TENNIS COURT EQUIPMENT

- A. Tennis Posts: Classic Round Post, (Green), manufactured by Edwards. (Basis of Design).
1. Product: Tomark Model # TB-K15415.
 2. Provide round, 3-inch-diameter steel tubing with an internal brass winder mechanism and removable handle, steel pulley and axle, and net lacing bars.
 3. Provide complete with galvanized ground sleeves Model # TB-K15418 and galvanized center anchor Tomark Model # TB-K15412.
- B. Tennis Net: Model #30LS manufactured by Edwards. (Basis of Design).
1. Product: Tomark Model # TB-K15428.
 2. Provide heavy duty 34 oz. headband sewn with four rows of Dacron thread.
 3. The net body 3.5mm braided polyethylene twine.
 4. The net is supported by a 5mm PVC-coated aircraft cable with an extra-heavy-duty bottom tape to resist court abrasion. Thick pockets allow side sticks to be inserted.
- C. Center Net Strap: manufactured by Edwards. (Basis of Design).
1. Product: Tomark Model # TB-K15409.
 2. Polyester tennis net strap with a snap for the center of the net.
- D. Windscreen: Premium grade windscreen with reinforcement and vents.
1. Product: Model # WSP7850 as manufactured by Nylon Net, Inc..

2.11 OUTDOOR SCOREBOARDS

- A. Baseball/Softball:
1. Baseball Field: (Basis of Design) Nevco, Model 1606 Scoreboard with decorative truss and two-color, 0.125 inch thick aluminum logo and sign cabinet Model ADO, as shown.
 2. Softball Field: (Basis of Design) Nevco, Model 1606 Scoreboard with decorative truss and two-color, 0.125 inch thick aluminum logo and sign cabinet Model ADO, as shown.
 3. Product: Similar Model manufactured by Daktronics.
- B. Football/Soccer/Lacrosse/Track/Field Hockey Stadium:
1. Football Main Stadium: (Basis of Design) Nevco - Model 7685 Scoreboard with Decorative Truss, two color 0.125 inch thick aluminum logo, sign cabinet Model ADO, as shown and Video Display - 20MM True Color - 6.75'x9.5' and Game Clock Model DGT-6.
 - a. Alternate Video Display: 10.94'x15.73'
 2. Aux. Stadium: (Basis of Design) Nevco - Model 3680 Scoreboard with Decorative Truss, two color 0.125 inch thick aluminum logo and sign cabinet Model ADO, as shown and Video Display - 20MM True Color - 6.75'x9.5'

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions where equipment and systems are to be installed and notify the contractor of conditions detrimental to the proper and timely installation and completion of the work.
- B. Do not proceed with the work until unsatisfactory conditions have been corrected by the contractor in a manner acceptable and to the satisfaction of the Architect/Engineer or Owner's Representative.

3.02 INSTALLATION

- A. All athletic equipment shall be installed as indicated on approved submittals as recommended and in strict accordance with manufacturer's written directions and as indicated on the drawings and specified herein.
- B. All concrete footings for athletic equipment shall be installed as indicated on the drawings and in accordance with Section 03 30 00, Cast-in-Place Concrete.
- C. All sleeves required for athletic equipment installation shall be set plumb and true to line and grade in concrete as indicated on the drawings and per manufacturer's recommendation.
- D. All athletic equipment shall be installed in strict accordance with the latest rules, regulations and specifications governing that sport or event for which it is being installed.

3.03 TESTING, ADJUSTMENT AND OPERATION

- A. All athletic equipment requiring testing, adjustments and operation shall be tested for proper operation and adjusted to conform to specified standards.
- B. Provide certifications as required, indicating that equipment has been tested and adjusted to conform to specified standards.
- C. Provide operating and maintenance instructions and manuals to Owner -designated personnel for the proper operation and care of equipment after equipment has been tested and adjusted to conform to specified standards.

3.04 CLEANING

- A. Upon completion of work in any given area, remove all trash and debris from the work area and leave in clean condition.

END OF SECTION

SECTION 12 34 00
LAMINATE CLAD CASEWORK

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Fixed modular laminate clad casework and components.

1.02 RELATED SECTIONS

- A. Section 06 10 00: Blocking within walls where indicated.
- B. Division 9: Base molding.
- C. Section 12 36 00: Countertops

1.03 DEFINITIONS

- A. Identification of casework components and related products by surface visibility.
 - 1. Open Interiors: Any open storage unit without solid door or drawer fronts, units with full glass insert doors and/or acrylic doors, and units with sliding solid doors.
 - 2. Closed Interiors: Any closed storage unit behind solid door or drawer fronts.
 - 3. Exposed Ends: Any storage unit exterior side surface that is visible after installation.
 - 4. Other Exposed Surfaces: Faces of doors and drawers when closed, and tops of cabinets less than 72 inches above furnished floor.
 - 5. Semi-Exposed Surfaces: Interior surfaces which are visible, bottoms of wall cabinets and tops of cabinets 72 inches or more above finished floor.
 - 6. Concealed Surfaces: Any surface not visible after installation.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Minimum of 5 years experience in providing manufactured casework systems for similar types of projects, produce evidence of financial stability, bonding capacity, and adequate facilities and personnel required to perform on this project.
- B. Manufacturer: Provide products certified as meeting or exceeding ANSI-A 161.1-2000 testing standards.

1.05 SUBMITTALS

- A. Comply with Section 01 30 00, unless otherwise indicated.
- B. Product Data: Manufacturer's catalog with specifications and construction details.
- C. Shop Drawings: Indicate dimensions, description of materials and finishes, general construction, specific modifications, component connections, anchorage methods, hardware, and installation procedures, plus the following specific requirements.
 - 1. Include section drawings of typical and special casework, work surfaces and accessories.
 - 2. Indicate locations of plumbing and electrical service field connection by others.
- D. Component samples: Two sets of samples for each of the following:
 - 1. Decorative laminate color charts.
 - 2. PVC edgings.

1.06 PRODUCT HANDLING

- A. Deliver completed laminate clad casework, countertops, and related products only after wet operations in building are completed, store in ventilated place, protected from the weather, with relative humidity range of 25 percent to 55 percent.

- B. Protect finished surfaces from soiling and damage during handling and installation with a protective covering.

1.07 JOB CONDITIONS

- A. Environmental Requirements: Do not install casework until permanent HVAC systems are operating and temperature and humidity have been stabilized for at least 1 week.
 - 1. Manufacturer/Supplier shall advise Contractor of temperature and humidity requirements for architectural casework installation areas.
 - 2. After installation, control temperature and humidity to maintain relative humidity between 25 percent and 55 percent.
- B. Conditions: Do not install casework until interior concrete work, masonry, plastering and other wet operations are complete.

1.08 WARRANTY

- A. All materials and workmanship covered by this section will carry a five (5) year warranty from date of acceptance.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Approved Manufacturers:
 - 1. Basis of specification: TMI Systems Design Corporation.
 - 2. LSI
 - 3. Case Systems
- B. Substitution: See Section 01 60 00 . Other manufacturers shall comply with the minimum levels of material and detailing indicated on the drawings or as specified.
 - 1. Subject to compliance with the specifications, the following manufacturers are approved:
 - a. Stevens Industries, Inc.
 - b. Mastercraft, Inc.

2.02 MATERIALS

- A. BASE BID : Core Materials:
 - 1. Certified Particleboard: SCS Certified 100% pre-consumer recycled wood fiber particleboard with no Urea Formaldehyde added during the manufacturing process.
 - a. Up to 7/8 inch thick: Industrial Grade average 47-pound density meeting ANSI A 208.1-1999, M-3 requirements.
 - b. 1 inch thick: Industrial Grade average 45-pound density meeting ANSI A 208.1-1999, M-2 requirements.
 - c. MR Moisture Resistant Particleboard: Average 47-pound density particleboard, ANSI A208.1 1-1999, M-3.
 - 2. Medium Density Fiberboard 1/4 inch thick: Average 54-pound density grade, ANSI A208.2.
- B. Decorative Laminates: GREENGAURD Indoor Air Quality Certified
 - 1. High-pressure decorative laminate VGS (.028), NEMA Test LD 3-2005.
 - 2. High-pressure decorative laminate HGS (.048), NEMA Test LD 3-2005.
 - 3. High-pressure decorative laminate HGP (.039), NEMA Test LD 3-2005.
 - 4. High-pressure cabinet liner CLS (.020), NEMA Test LD 3-2005.
 - 5. High-pressure backer BKH (.048), (.039), (.028), NEMA Test LD3-2005.
 - 6. Thermally fused melamine laminate, NEMA Test LD 3-2005, color matched with White.
- C. Laminate Color Selection: Maximum 1 color per unit face and 4 colors per project. (See Color Selection in section 3.06).

D. Edging Materials:

1. 3mm PVC banding, machine applied and machine profiled to 1/8 inch radius.

2.03 CABINET HARDWARE

A. Hinges:

1. Five knuckle, epoxy powder coated, institutional grade, 2-3/4 inch overlay type with hospital tip. 0.095 inch thick. ANSI-BHMA standard A156.9, Grade 1.
 - a. Doors 48 inches and over in height have 3 hinges per door.
 - b. Magnetic door catch with maximum 5 pound pull provided, attached with screws and slotted for adjustment.

B. Pulls:

1. Door and drawer front pulls are rectangular, semi-recessed, injection molded plastic, screw fastened. Pull design shall comply with the Americans with Disability Act (ADA).

C. Drawer Slides:

1. Full extension: 150-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop both directions with self-closing feature.

D. Adjustable Shelf Supports:

1. Injection molded transparent polycarbonate shelf supports friction fit into cabinet end panels and vertical dividers, adjustable. Shelf support have minimum 2 integral support pins to interface pre-drilled holes, and to prevent accidental rotation of support. The support shall adapt to 3/4 inch or 1 inch thick shelving and provides non-tip feature for shelving. Supports may be field fixed if desired. Structural load to 1200 pounds (300 pounds per support) without failure.

E. Locks:

1. Removable core, disc tumbler, cam style lock with strike. Lock for sliding 3/4 inch thick doors is a disc type plunger lock, sliding door type with strike.
2. Elbow catch or chain bolt used to secure inactive door on all locked cabinets.

2.04 FABRICATION:

A. Fabricate casework, countertops and related products to dimensions, profiles, and details shown.

B. All casework panel components sized/cured to be precisely finished in size and squareness to within 0.010 inches, ensuring strict dimensional quality and structural integrity in the final fabricated product.

C. Cabinet Body Construction:

1. Tops and bottoms shall be glued and doweled to cabinet sides and internal cabinet components such as fixed horizontals, rails and verticals.
 - a. Tops, bottoms and sides of all cabinets are particleboard core.
 - b. Tops, bottoms and sides of sink base units are moisture resistant particleboard core.
2. Cabinet backs: 1/4 inch thick medium density fiberboard panel fully captured by the cabinet top, bottom and side panels. Finish to match cabinet interior. 3/4 inch x 4 inch particleboard rails will be placed behind the back panel at the top and bottom, and doweled to the sides utilizing 10mm hardwood fluted dowels. A third intermediate rail will be included on all cabinets taller than 56 inches. Utilize hot melt glue to further secure back and increase overall strength.
3. Fixed base and tall cabinets shall have factory mounted bases of 3/4 inch thick exterior grade plywood. Base is nominal 4 inch high unless otherwise indicated on the drawings.
4. Base units, except sink base units: Full sub-top. Sink base units are provided with open top and a stretcher at the front, attached to the sides. Back to be split removable access panel.

5. Side panels and vertical dividers shall receive adjustable shelf hardware. Mount door hinges, drawer slides and pull-out shelves in the line boring for consistent alignment.
 6. Exposed and semi exposed edges.
 - a. Edging: 1mm PVC.
 7. Adjustable shelf core: 3/4 inch thick particleboard up to 36 inches wide, 1 inch thick particleboard over 36 inches wide.
 - a. Front edge: 1mm PVC.
 8. Interior finish, units with open Interiors:
 - a. Top, bottom, back, sides, horizontal and vertical members, and adjustable shelving faces with VGS high-pressure decorative laminate.
 9. Interior finish, units with closed Interiors:
 - a. Top, bottom, back, sides, horizontal and vertical members, and adjustable shelving faces with thermally fused melamine laminate.
 10. Exposed ends:
 - a. Faced with VGS high-pressure decorative laminate.
 11. Wall unit bottom:
 - a. Faced with thermally fused melamine laminate.
 12. Balanced construction of all laminated panels is mandatory. Unfinished core stock surfaces, even on concealed surfaces (excluding edges), are not permitted.
- D. Drawers:
1. Sides, back and sub front: Minimum 1/2 inch thick particleboard, laminated with thermally fused melamine doweled and glued into sides. Top edge banded with 3mm PVC.
 2. Drawer bottom: Minimum 1/2 inch thick particleboard laminated with thermally fused melamine, screwed directly to the bottom edges of drawer box.
 3. Paper storage drawers: Minimum 3/4 inch thick particleboard sides, back, and sub front laminated with thermally fused melamine. Minimum 1/2 inch thick particleboard drawer bottoms screwed directly to the bottom edges of the drawer box. Provide PVC angle retaining bar at the rear of the drawer.
- E. Door/Drawer Fronts:
1. Core: 3/4 inch thick particleboard except at sink units which is 3/4 inch thick moisture resistant particleboard.
 2. Provide double doors in opening in excess of 24 inches wide.
 3. Faces:
 - a. Exterior: VGS High-pressure decorative laminate.
 - b. Interior: High-pressure cabinet liner CLS.
 4. Door/drawer edges: 1mm PVC, external edges and outside corners machine profiled to 1/8 inch radius.
- F. Miscellaneous Shelving:
1. Core material: 3/4 inch or 1 inch thick particleboard.
 2. Exterior: VGS High-pressure decorative laminate.
 3. Edges: 3mm PVC, external edges and outside corners machine profiled to 1/8 inch radius.

PART 3- EXECUTION

3.01 INSPECTION:

- A. The casework contractor must examine the job site and the conditions under which the work under this section is to be performed, and notify the building owner in writing of unsatisfactory conditions. Do not proceed with work under this Section until satisfactory conditions have been corrected in a manner acceptable to the installer.

3.02 PREPARATION:

- A. Condition casework to average prevailing humidity conditions in installation areas prior to installing.

3.03 KEYING:

- A. Key alike by room, unless otherwise instructed.
- B. Provide locks for each cabinet.

3.04 INSTALLATION:

- A. Erect casework, plumb, level, true and straight with no distortions. Shim as required. Where laminate clad casework abuts other finished work, scribe and cut for accurate fit.
- B. Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind.
 - 1. Install drawer pulls horizontally.
 - 2. Install door pulls vertically.
- C. Repair minor damage per plastic laminate manufacturer's recommendations.
- D. Install countertop and backsplash.
 - 1. Scribe and cut for accurate fit to wall and under window stools.
 - 2. Coordinate openings with grilles supplied in Section 06200.
 - 3. Provide 1 inch overhang at countertop over lockers.

3.05 CLEANING:

- A. Remove and dispose of all packing materials and related construction debris.
- B. Clean cabinets inside and out. Wipe off fingerprints, pencil marks, and surface soil etc., in preparation for final cleaning by the building owner.

3.06 COLOR SELECTION:

- A. Laminate Color Selection: From Formica, Nevamar and Chem Metal stock colors.
- B. Hinge and Pull Color Selection: From manufacturer's standard
- C. Miscellaneous Hardware Color Selection (support brackets, table frames, rail): From manufacturer's standard.
- D. 1mm PVC Edge Banding Color Selection: From manufacturer's standard of colors matching decorative laminate.
- E. 3mm PVC Edge Banding Color Selection: Match decorative laminate color selection.

END OF SECTION

SECTION 12 36 00
COUNTERTOPS AND BACKSPLASHES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Countertops for manufactured casework.
- C. Wall-hung counters.

1.02 RELATED REQUIREMENTS

- A. Section 1140 00 - Foodservice Equipment: Stainless steel work counters and window stools.

1.03 REFERENCE STANDARDS

- A. ANSI A161.2 - Performance Standards for Fabricated High Pressure Decorative Laminate Countertops; 1998.
- B. ANSI A208.1 - American National Standard for Particleboard; 2009.
- C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2009.
- D. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- E. PS 1 - Structural Plywood; 2009.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- 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. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.
- F. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- G. LEED Report: Submit for wood products made from sustainably harvested wood, salvaged and reused wood, wood fabricated from recovered timber, and locally-sourced wood, as specified in Section 01 35 15.
- H. Installation Instructions: Manufacturer's installation instructions and recommendations.
- I. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Same fabricator as for cabinets on which tops are to be installed.
- B. Installer Qualifications: Fabricator.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.

- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 COUNTERTOP ASSEMBLIES

- A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI Architectural Woodwork Standards.
- B. Plastic Laminate Countertops: High pressure decorative laminate sheet bonded to substrate.
 - 1. Laminate Sheet, Unless Otherwise Indicated: NEMA LD 3 Grade HGS, 0.048 inch nominal thickness.
 - a. Finish: Matte or suede, gloss rating of 5 to 20.
 - b. Surface Color and Pattern: As scheduled.
 - c. Manufacturers:
 - 1) Formica Corporation : www.formica.com.
 - 2) Panolam Industries International, Inc\Nevamar : www.nevamar.com.
 - 3) Panolam Industries International, Inc\Pionite : www.pionitelaminates.com.
 - 4) Wilsonart International, Inc : www.wilsonart.com.
 - 5) Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Exposed Edge Treatment: Square, substrate built up to minimum 1-1/4 inch thick; covered with matching laminate.
 - 3. Back and End Splashes: Same material, same construction.

2.02 ACCESSORY MATERIALS

- A. Wood-Based Components:
 - 1. Wood fabricated from old growth timber is not permitted.
 - 2. Provide sustainably harvested wood, certified or labeled as specified in Section 01 60 00.
- B. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.
- C. Particleboard for Supporting Substrate: ANSI A208.1 Grade 2-M-2, 45 pcf minimum density; minimum 3/4 inch thick; join lengths using metal splines.
- D. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- E. Joint Sealant: Mildew-resistant silicone sealant, clear.

2.03 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
 - 1. Join lengths of tops using best method recommended by manufacturer.
 - 2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
 - 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
 - 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.

2. Height: 4 inches, unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.
- C. Seal joint between back/end splashes and vertical surfaces.

3.02 CLEANING

- A. Clean countertops surfaces thoroughly.

3.03 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 12 93 13
SITE FURNISHINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Bicycle racks.
- B. Benches
- C. Trash Receptacles

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- 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.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Outdoor Bicycle Racks:

2.02 BICYCLE RACKS

- A. Interior Bicycle Racks: Device designed for indoor storage of bicycles; allows user provided lock to simultaneously secure one wheel and part of the frame on each bicycle parked or racked.
 - 1. Capacity: __ bicycles.
- B. Materials:

2.03 MATERIALS

- A. Bicycle Racks: Tubular steel pipe formed to allow at least one bicycle to lock simultaneously on each bend and each end, securing one wheel and part of the frame.
 - 1. Capacity: 3 bicycles.
 - 2. Mounting: In-ground anchor.
 - 3. Accessories: In-ground grout cover.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install bicycle racks level, plumb, square, and correctly located as indicated on the drawings.
- C. In-Ground Anchor Installation:
 - 1. Prepare holes in size according to manufacturer's instructions.
 - 2. Place anchoring bolts through the holes in the pipe.
 - 3. Lower rack into holes, ensuring the bottom of lower bends are at least 1-1/2 inch from the ground.
 - 4. Pour concrete and level rack.
 - 5. Support until dry.

3.02 CLEANING

- A. Clean installed work to like-new condition. Do not use cleaning materials or methods that could damage finish.

3.03 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 13 34 16
GRANDSTANDS AND BLEACHERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Provide outdoor permanent grandstands as described and shown on drawings and detailed in these performance specifications.
 - 1. Grandstand decking may be continuous tongue and groove or welded.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete Foundations.
- B. Division 26 - Electrical: Main electrical feed and final hook-up to press box.
- C. Division 31 - Earthwork: Surveying and site preparation.
- D. Division 32 - Exterior Improvements: Landscape fabric and stone base under grandstands.

1.03 DESIGN REQUIREMENTS

- A. New bleacher designs have been developed per recommendations by the district and no design changes are allowed. Contractor must verify that listed manufacturers are bidding on an equal basis as no design alterations or changes will be allowed for the bleachers or press boxes.
- B. Bleachers include:
 - 1. Base Bid- Seats (Per Plans)
 - a. 2,681 seats with a 42' wide steel framed sloped front two-tier press box and permanent steel canopy cover.
 - b. 1,353 visitor side stand with filming platform
 - 2. Alternate Bid-
 - a. 3,417 seats with a 42' wide steel framed sloped front two-tier press box and permanent steel canopy cover.
 - b. 1,641 visitor side stand with filming platform
 - 3. Soccer bleachers approx 817 seats
 - 4. Mitered Baseball bleachers with press box approx. 618 seats
 - 5. Mitered Softball bleachers with filming platform approx 506 seats
- C. Provide necessary demolition, engineering, material, freight, concrete, installation, related site work and supervision to provide grandstand seating systems listed below in accordance with the following performance specifications.
- D. The minimum acceptable standards of design are:
 - 1. Grandstands are elevated per plans. Front Walkway to be 6'-2" deep. Center walkway on Baseball/Softball per plans. Overall length per plans, Total net seating capacity with Handicap seating per plans.
 - 2. The riser height tread depth and decking type is noted on each layout.
 - 3. Aisle layout is per plans. There shall be center aisle rails or end aisle rails per code.
 - 4. Handicap seating areas per plans with necessary closure panels.
 - 5. Finishes to be "hot dipped" galvanized on the steel understructure, clear anodized on the seat boards, High Performance Dur-Kyn paint on the aluminum aisle nosing strips at aisles and stairs, High Performance Dur-Kyn painted finish on aluminum stair risers and main grandstand risers. Perimeter Railing risers to be hot dipped galvanized, rails to be clear anodized and utilizes 6 ga. black vinyl chain link fencing.

6. Walking Surfaces - All walking surfaces shall be manufactured and extruded in a manner that provides for spectator safety in wet conditions. Walking surface traction (slip coefficient) shall be classified as High Traction as defined by ANSI B101.1. Surfaces shall be extruded with repetitive serrations of ridges and valleys. Walking surface shall be shop blasted to achieve the high traction certified rating. To prevent unwanted surface stains caused during the manufacturing, shipping and installation process, surface shall have a clear anodized finished. This entire process with the anodizing must meet the walking surface traction requirements of the ANSI and ADA codes. Mill finish products are not acceptable and do not meet this specification. Tribometer testing is no longer an approved testing method of ASTM and therefore not acceptable
7. The front and side closures where noted will be Dur-Kyn Ptd. Aluminum riser panels to provide closure from the walkway elevation to approx. 3" above grade. This closure is along the front of the bleacher and also around the front and sides of all front exits and side ramps per plans.
8. Signage
 - a. Properly label all handicap seating areas
 - b. Provide press box signage- All press boxes- Signage to be determined
9. Foundations have been designed for this project. Final approval drawings should provide a sealed set of documents inclusive of these designs
10. Football Press Box: 42' wide steel framed, sloped front two-tier press box with exterior rear stair to filming platform and steel roof mitered canopy.
11. Baseball Press Box: steel framed sloped front design per plans.
12. Seat Planks are anodized aluminum plank.
13. Inspections/ Certificates - Submit with Bid:
 - a. AISC plant certification of manufacturer required prior to bid. Submit with bid documents.
 - b. National floor safety institute or approved equal documentation for extra traffic coating as specified meeting high traction per ANSI B101.1
 - c. Press boxes shall include ICC certified inspections for construction of electrical work. Data plate, certified sticker and back up documentation required.

1.04 QUALITY ASSURANCE

A. Manufacturers Qualifications:

1. Manufacturers must have a minimum of ten years of experience in the manufacturing of grandstands and press boxes under current company name as a sole source provider.
2. Manufacturer must provide five references (if requested) of similar projects within a reasonable driving distance from the project site completed in the last three years for visual inspection. References shall include scope of work, contract amount, owner's name and phone numbers, contract completion date and actual completion date.
3. Manufacturer shall have local representation within a reasonable mile radius of the project. Representative is responsible to attend job site meetings, provide sequencing and scheduling information and make decisions on behalf of the manufacturer. Due to the coordination and timeframe of this project, it is imperative that this representative can immediately respond, in person, to evaluate questions, concerns and actions and resolve issues that immediately impact the fabrication and installation of the product or other contractors' abilities to proceed with their work. Resume of representatives needs to be submitted for review and approval.
4. List with submission the date that you visited the site and reviewed the existing conditions.
5. If approved bidder is a dealer or representative of the manufacturer in addition to the manufacturer the dealer must provide the same information required in this section.

6. Welders must be AWS certified; manufacturing capabilities in accordance with the governmental agencies having jurisdiction.
- B. Installers Qualifications:
 1. Factory-trained and experienced in the installation of grandstands.
 2. Project is a prevailing wage job. Certified payrolls are required on this project.
- C. Source Quality Control: Mill Test Certification.
- D. Single Source Responsibility: Obtain all of each distinct material required from a single manufacturer.
- E. Code Compliance: Provide aluminum bleachers to meet or exceed all State and Local applicable codes and in compliance with the IBC/ICC National Code and CABO/ANSI A117.1 Barrier Free Subcode, Current Editions.

1.05 SUBMITTALS

- A. Product Data: Submit technical data for each distinct type of material, component and accessory indicated.
 1. Include information which specifically details physical properties and performance characteristics.
- B. Shop Drawings: Manufacturer to submit shop drawings and structural design calculations signed and sealed by a Delaware licensed Professional engineer, and schedules for type, location, quantity and details of all aluminum components required for this project.
 1. Indicate on shop drawings that products are in compliance with IBC/ICC National Building Code and all other State and Local Codes and Regulations.
 2. Concrete designed per American Concrete Institute Guidelines
- C. Samples: Submit manufacturer's samples for aluminum components, and an 18 inch seat sample.
- D. Certificate: Submit manufacturer's certification that materials furnished comply with requirements indicated and also in compliance with the IBC/ICC code and all other applicable Federal, State and local codes, and that materials meet or exceed test requirements indicated.

1.06 WARRANTY

- A. Submit a written warranty signed by the manufacturer, installer, and the contractor, guaranteeing to correct failures for a period of two (2) years after substantial completion, without reducing or otherwise limiting any other rights to correction which owner may have under the contract documents. Failures are defined to include faulty workmanship or faulty materials. Correction may include repair or replacement.

1.07 BUILDING CODES

- A. Comply with all applicable codes, which include but are not limited to the following:
 1. IBC/ICC Building Code- Current Edition
 2. AISC Manual of Steel Construction, 9th Edition
 3. Aluminum Association of America Guidelines
 4. IBC barrier free sub-code and Guidelines
 5. U.S. Department of Justice ADA Standards
 6. American Concrete Institute
- B. The bleacher shall be designed to support, in addition to its own weight, a uniformly distributed live load of not less than 100 pounds per square foot of gross horizontal projection of the bleacher.
 1. Add 6 pounds per square foot of dead load on seats, footboards, risers and steel framing.
- C. All seat and footboard members shall be designed to support not less than 120 pounds per linear foot. The bleacher shall be designed to resist, with or without live load, horizontal wind

load appropriate for local conditions. It shall also be designed to resist, in addition to the live load, sway forces applied to the seats in a direction parallel to the length of the seat planks 24 pounds per linear foot; and, in a direction perpendicular, stresses in aluminum members and connections shall not exceed those specified for Building Type Structures by the Aluminum Association.

- D. General: The structure shall be properly braced for wind and construction loads until all structural elements are secured. Lateral and longitudinal bays shall be cross-braced as required. Guardrails shall be of adequate size, location, and height to meet specified codes and designed to carry required loads. Exit stairs and intermediate aisle stairs shall be completely closed, in the direction of travel and shall have a maximum rise of 7 inches and a minimum tread of 11 inches.
- E. Code Compliance: Submittals shall be based upon specifications and drawings contained in the bid documents. Architect will not review any design or product changes prior to the bid date. Design changes to reduce overall aisle egress calculations or number of stair and ramp exits will not be allowed. Design changes to seatboard bracket support and location is not allowed. All bidders must bid in accordance with these specifications.
 - 1. The Bleacher Contractor shall be responsible to meet the code interpretation provided in the bid documents and modify as required by state or local governmental review boards.
 - 2. Calculations that demonstrate code compliance with egress and exit of aisles, stairs, and ramps are a required submission with approved drawings.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design:
 - 1. Southern Bleacher Company, 801 Fifth St., P.O. Box One, Graham, Texas 76450, (800) 433-0912.
- B. Products specified herein have been selected because of their quality of construction, configuration, design, function, available finishes, components, accessories, dimensions, shape and style.
- C. Other manufacturers include:
 - 1. Dant Clayton Corporation, 1500 Bernheim Lane, Louisville, KY 40210 (502) 634-3626.
 - 2. Outdoor Aluminum Inc., P.O. Box 118, Geneva, AL 36340, (800) 225-4249.
 - 3. E & D Speciality Stands, Inc., 2081 Franklin Street, P. O. Box 700, North Collins, NY 14111, (800) 525-8515.
- D. All manufacturers shall submit the following information to verify compliance and financial responsibility for meeting the intent of these performance specifications.
 - 1. Provide a side by side comparison of all products specified including the press box per these performance specifications
 - 2. Provide documentation certifying that the all walking surfaces meet the criteria set forth in the specifications
 - 3. Provide proof of a minimum of 10 years manufacturing experience.
 - 4. Provide a reference list with contacts for a minimum of 5 projects within a reasonable driving distance from the project site over the last 3 years. This list should be of similar projects.
 - 5. Provide a sample drawing of press box to verify compliance with specified box.
 - 6. Provide proof of participation and certification listed in 1.1.13
- E. Sole source manufacturing: All products within this specification shall be manufactured by a sole source facility.

- F. Architect/Engineer/Owner reserves the right to accept or reject Grandstand manufacturers. All approvals will be in writing through addendum prior to the bid date.

2.02 PERMANENT STEEL GRANDSTAND

- A. Interlocking Deck- Home and Visitor Football Grandstands; Semi-Closed Aluminum Decking for Soccer Stand and Fully Closed Tongue and Groove Decking for Baseball and Softball Grandstands.
- B. All as shown and noted on plans.
1. The intent of the product design is to reduce deflection of aluminum deck and to eliminate fluid drainage below spectator seating.
 2. All individual deck members shall be locked together longitudinally at all treads, front walk and cross walk locations.
 3. This design, in ambient conditions, allows for expansion and contraction without damage or deformation of the aluminum deck.
 4. The locking design does not allow any fluids to pass to the ground under the spectator seating.
 5. Extrusion gutters are part of each decking member that will allow for the collection and control of fluids that occur on the deck surface.
 6. At all butt joint locations, internal gutters shall be mounted onto the structural members to direct fluids to determined locations.
 7. Vertical columns are to be placed 6 feet 0 inches on center laterally and front to back per plans.
 8. Traverse bays are free of cross bracing the total length of the grandstand.
 9. Stringers are wide flange with steel angle rise and depth fabrication and are placed 6 feet on center.
- C. Front Walkway:
1. All grandstands to be elevated per plans.
- D. Entry stairs:
1. Firmly anchored to uniformly poured concrete bases.
 2. Stair rise: 7 inches max. per IBC Building Code with aluminum closure.
 3. Stair tread depth: 11 inches min. per IBC Building Code.
 4. Guardrails on Stair to be 42 inches above leading edge of step with intermediate rails.
 5. Stairs to have handrail extension. The handgrip portion of handrails shall not be less than 1 1/2 inches or more than 2 inches in cross-sectional dimension or the shape shall provide an equivalent gripping surface. The handgrip portion of handrails shall have a smooth surface with no sharp corner. The top of handrails and handrail extensions shall be placed not less than 34 inches or more than 38 inches above the nosing of treads and landings. Handrails shall be continuous the full length of the stairs and shall extend in the direction of the stair run not less than 12 inches beyond the bottom riser. Ends shall be returned or shall terminate in newel posts or safety terminals.
- E. Aisles:
1. Aisles with seating on both sides to have 34-inch high handrail with intermediate rail at approximately 22 inches above tread.
 2. Anodized aluminum handrails with rounded ends (no fittings) are discontinuous to allow access to seating through a space 22 inches (min.) to 36 inches (max.).
 3. Intermediate steps shall provide equal rise and run throughout aisle. Each shall have aisle nosing with Dur-Kyn finish and riser closure with Dur-Kyn finish.
- F. Interlock Deck System-
1. Rise and depth at each row is per plans

2. Each seat 17 inches above its respective tread.
3. Decking Arrangement:
 - a. The seats shall be 2"x10" seat plank with two internal legs and extruded aluminum alloy, 6063-T6 with clear anodized 204R1, AA-M10C22A31, Class II finish. Mounting brackets to be "L" type riser mounted.
 - b. The tread system shall be comprised of uniform serrated, slip resistant aluminum extrusions which interlock together lengthwise and form a .922" x .60" V-shaped gutter running the length of the planks. The interlocking mechanism will minimize deflection and not separate due to loads being applied to individual planks. The locking mechanism by design shall allow for expansion and contraction of individual planks without effecting performance of the system.
 - c. The system shall cause the deck planks to react together at all treads and cross walks to live load and form the appearance of a single tread system. By design, this system forms a solid, overlapping tread and riser installation.
 - d. The nose extrusion shall allow for a 1" extruded aluminum contrasting nose piece to be flush mounted on the leading edge and shall capture the vertical riser plank in an extruded pocket. The heel extrusion shall have a .70" vertical lip at the rear of the plank to allow for placement of vertical riser plank and inhibit fluids from escaping at the rear of the tread.
 - e. These extrusions shall be such that the attachment of the seat brackets, step brackets, mid-aisle rails and all other components is accomplished without deck penetrations. No through-bolting or drilling of the aluminum tread / riser system shall be permitted.
 - f. The system shall allow for seat and aisle reconfiguration at any time without evidence of its previous configuration.
 - g. At all butt joint locations of the interlocking deck system, a secondary gutter shall be installed below the aluminum tread / riser system that allows fluids to be contained and gravity flow toward the first tread. This gutter will collect fluids and control them to specific areas.
 - h. The secondary gutter system shall be placed on to the structural steel support system of the grandstand such that the gutter is supported by stringers (raker beams) at each side. These stringers (raker beams) shall be a minimum 12" apart to allow for adequate gutter widths to properly collect fluids drainage.
 - i. These secondary gutters shall terminate at strategic locations dependent on the grandstand layout. At the termination points, a collection box will be provided such that the owner can make a connection to allow for desired fluid routing. The intention is to control a majority of the water from collection at the front or under the stand.
 - j. Entry stairs and ramps to be 2 x 12 mill finish aluminum.
 - k. Open ends of planks to be covered with aluminum end caps, securely fastened to the plank.
 - l. Joint sleeves: Dual joint sleeves to be inserted at each butt joint of each load bearing aluminum plank, and to penetrate 6 inches into each plank at the joint. Joint sleeves are not required at secondary gutter locations.

G. Guardrailing:

1. To be at sides and front of bleacher. Also provide railing along front and sides of accessible areas per plans.
2. Railing to be anodized aluminum with end plugs at ends of straight runs and/or elbows at corner.
3. All guardrails shall be secured to angle rail risers by galvanized fasteners.
4. Railing shall be 42" above walkways and entrances.

5. Railing shall be 42" above any adjacent seat.
 6. Guardrailing on sides, front and rear of stand to be 6 ga. black vinyl fence fabric closure design per plans and details providing a separate top rail.
- H. Ramps:
1. Slope: maximum 1:12 using aluminum tongue and groove deck planks
 2. Guardrail to be 42 inches above ramp with black vinyl coated chain link rail system and 2 x 6 toeboard.
 3. Handrail: Ramps to have handrail extension. The handgrip portion of handrails shall not be less than 1 1/2 inches or more than 2 inches in cross-sectional dimension or the shape shall provide an equivalent gripping surface. The handgrip portion of handrails shall have a smooth surface with no sharp corners. The top of handrails and handrail extensions shall be placed not less than 34 inches or more than 38 inches above the ramp surface. Handrails shall be continuous the full length of the ramp and shall extend in the direction of the ramp not less than 12 inches beyond the end of the ramp. Ends shall be returned or shall terminate in newel posts or safety terminals.
 4. All ramp footboards will run perpendicular to the direction of travel, to ensure proper function of anti-skid flutes. Running plank parallel is strictly prohibited.
- I. Handicap provision:
1. Quantity of wheelchair spaces: Per Plans.
 2. Sides and front of accessible forward pockets to be closed. Sides to have galvanized steel plate factory applied and front closure to be a series of Kynar painted riserboards. Adequate to provide complete closure.
 3. Floor mounted companion benches to be provided where necessary
- J. Materials/Finishes
1. Substructures:
 - a. Structural shapes meet one of the following ASTM specifications: A36, A36/A572 grade 50, A572, grade 50, A529-50, or A500 grade B.
 - b. Shop connections are seal welds.
 - c. After fabrication, all steel is hot-dipped galvanized to ASTM-A-123 specifications.
 2. Extruded Aluminum:
 - a. Seat Planks and Railing are extruded aluminum alloy, 6063-T6 with clear anodized 204R1 coating.
 - b. Riser board planks and closure planks are extruded aluminum alloy, 6063-T6, Dur-Kyn painted finish.
 - c. Tread planks are extruded aluminum alloy 6063-T6 mill finish
 - d. Joint Sleeve Assembly to be inserted in flat plank to maintain true alignment in joining together two plank pieces. Extruded aluminum alloy, 6063-T, mill finish. Splice cover is unacceptable between two flat plank pieces joined in a straight line.
- K. Accessories:
1. Channel End Caps: Aluminum alloy 6063-T6, clear anodized 204R1, AA-M10C22A31, Class II.
 2. Hardware:
 - a. Bolts, Nuts: Hot-dipped galvanized or mechanically galvanized.
 - b. Hold-down Clip Assembly: Aluminum alloy 6005A-T6, mill finish.
 - c. Structural Hardware: Equal to or greater than hot-dipped galvanized ASTM-A307. No connections utilizing high strength bolts are classed as slip critical.
 3. Aisle Nose and Stair Nose: Aluminum alloy, 6063-T6, non-skid painted finish. This extrusion shall be recessed into the front floor nosing plank in order to prevent a tripping hazard, no surface mounting will be acceptable.

L. Fabrication:

1. Design Load:
 - a. Live Load: 100 psf gross horizontal projection.
 - b. Lateral Sway Load: 24 plf seat plank.
 - c. Perpendicular Sway Load: 10 plf seat plank.
 - d. Live Load of Seat and Tread Planks: 120 plf.
 - e. Guardrail: Per IBC/ICC Building Code.
 - f. Windload: 30 psf.
2. All manufactured connections to be shop welded.
 - a. Manufactured by certified welders conforming to AWS Standards.

2.03 TWO-TIER PRESS BOX WITH STEEL FRAME STRUCTURE

A. Product Description:

1. Type II Construction Design; sloped front design with end viewing glass per plans.
 - a. Press Box Dimensions: Base Bid- Two-tier 10'-6" Base, 12'-0" overall depth x 42'-0" long, plus landings for football, with permanent steel framed canopy cover per plans.
 - b. Press box Dimensions- Baseball - 8'-0" wide x 18'-0" long, plus landings.
2. Press Box to be of open construction, allowing inspection of electrical wiring, switches and other components without destructive disassembly.
3. Pressbox to be constructed with rear exterior stair to filming platform where shown.

B. Materials/Finishes

1. Press Box Support Structure:
 - a. Structural shapes meet one of the following ASTM specifications: A36, A36/A572 grade 50, A572 grade 50, A529-50, or A500 grade B.
 - b. Shop connections are seal welds.
 - c. After fabrication, all steel is hot-dipped galvanized to ASTM-A-123 specifications.
2. Press Box: All materials shall be new and shall comply with ASTM specifications.
 - a. Floor
 - 1) Main support to be a galvanized steel floor frame sized to support structure and metal belly pan for support of insulation.
 - 2) Floor to be INTERLOCK Aluminum Decking System, extruded aluminum alloy 6063-T6. Attach Decking System to steel floor frame with mechanical fasteners at end of plank and at intermediate supports.
 - 3) Walking surface traction (slip coefficient) shall be classified as "High Traction" as defined by ANSI B101.1 to match grandstand walkway finish.
 - 4) Insulation: Kraft faced fiberglass building insulation R-11, 3 1/2 inches thick. Batt or roll as manufactured by Owens-Corning Fiberglass Corp., or equal.
 - b. Wall Structure Steel Framing
 - 1) 4 inch x 4 inch x 11 gauge square tubing with maximum span of 14 feet on front wall and maximum span of 6 feet on back wall and 4 inch x 2 1/2 inch x 14 gauge steel "cees" with maximum spacing of 5 feet for all walls with siding. Spans greater than these require engineered calculations for design.
 - 2) Insulation: Kraft faced fiberglass building insulation R-11, 3 1/2 inches thick. Batt or roll as manufactured by Owens-Corning Fiberglass Corp., or equal.
 - 3) Interior Finish
 - (a) 1/2 inch vinyl coated gypsum panels, Gold Bond vinyl-surfaced Durasan-Santa Fe porcelain.
 - (1) Cove Base: Vinyl 4 inches x .080 color to be medium gray.
 - 4) Exterior Finish

- (a) 26 gauge prefinished R-Panel paneling as manufactured by MBCI, Signature 200 color series, color to be determined.
 - (b) Wall panels are attached with #12 TEK screws - 6" O.C. at the top and bottom of the panels. Lap screws are placed at each end of the panels, at the intermediate supports, and at the mid point between supports (TEK #14). All fasteners to be painted same color as exterior paneling.
- c. Roof Structure
- 1) 4 inch x 4 inch x 11 gauge square tubing with maximum spacing of 6 feet on center and 4 inches x 2 1/2 inches x 14 gauge steel "cees" with maximum spacing of 2 feet on center.
 - 2) Roof: 1/8 inch fourway steel plate roof, continuous welded seams coated with acrylic metal primer as manufactured by Coronado and 36 mils of acrylink roof coating as manufactured by Isothermal Protective Coatings, or equal. Plate is welded on both sides of rafters with 1-1/2 inch long 1/8 inch fillet welds on 12 inch centers.
 - 3) Insulation: Kraft faced fiberglass building insulation, R-19 (minimum) 6 inches thick. Batt or roll as manufactured by Owens-Corning Fiberglas Corp., or equal.
 - 4) Cornice: 26 gauge steel prefinished- color to be determined.
 - 5) Ceiling: 24 inch x 24 inch x 5/8 inch acoustical ceiling tile architectural revealed edge style wind clips and other components as manufactured by USG, or equal.
 - 6) Roof to have a steel framed canopy cover at football press box only.
- d. Exterior Doors
- 1) Full flush steel construction with honeycomb core. 18 gauge skin sheets. Dimensions: 3 feet 0 inches x 6 feet 8 inches. Color: White.
 - 2) Steel door frame (16 gauge) complete with 1/2 inch threshold and weather-stripping.
 - 3) Exterior Hardware: Yale 546F Exterior Trim, or equal. Handles shall be lever type that allows operation without tight grasping or twisting of the wrist. All exterior hardware must accommodate District standard Best core keyed lock system.
 - 4) Interior Hardware: Yale 2100 Exit Device, or equal. Handle shall be panic bar that allows for opening without any grasping, twisting or turning.
- e. Interior Walls
- 1) Framing to be steel galvanized studs (25 gauge) 1 1/4 inch x 3 5/8 inch at maximum 2 feet on center.
 - 2) Finishes to be consistent with all other interior finishes.
- f. Windows
- 1) Provide 24" x 56" interior window in each wall.
 - 2) Frame: Extruded aluminum single hung, vertical sliding unit, thermal break.
 - 3) Sash: Tilt toward inside for easy cleaning.
 - 4) Glazing: Clear tempered panes.
 - 5) Dimensions of each unit: Dependent on compartment size. At interior wall locations or structural support locations the dimension between windows shall be no greater than 6 inches.
 - 6) Finish: Electrostatically applied acrylic enamel.
- g. Work Bench
- 1) 18 inch deep clear anodized aluminum countertop with a radius front edge.
 - 2) Support using 4" x 2" x 14 ga. Steel "cee" on 4" x 4" x 11 ga. Sq. tubing welded to steel.

- h. Painting: Materials equal to. Coronado or equal.
 - 1) Surfaces: Exterior Door(s), Door Frame(s)
 - (a) Primer: Applied by Door Manufacturer.
 - (b) Finish: 2 coats acrylic latex semi-gloss enamel applied by press box manufacturer.
 - 2) Surfaces, Exterior Siding
 - (a) Primer: Applied by Siding Manufacturer.
 - (b) Finish: Applied by Siding Manufacturer.
 - (c) Touchup: If applicable
 - 3) Surfaces: Wall and Roof Structure
 - (a) Primer: Coronado DTM Industrial 180-11 acrylic metal primer applied after welding, or equal.
- i. Caulking: Sonneborn NP1 - Polyurethane sealant, All temperature, UV resistant, or equal.
- j. Electrical Work:
 - 1) Submittal drawing shall indicate devices and circuitry.
 - 2) Fixtures: Recessed 2'x4' static T8 Troffer fluorescent light fixture for use in grid ceiling systems.
 - 3) Wiring to be in nonmetallic Panduit, or equal. N.E.C. breaker box to be 100 amp service mounted on wall with 2 inch rigid conduit to be stubbed out at back wall of press box ready for service line to be connected.
 - 4) Service line to Press Box
 - 5) Electrical outlet(s) installed per NEC shall be standard duty.
 - 6) Sound, Telephone, Clock, Field Communication: Empty double outlet boxes per N.E.C. with 3/4 inch conduit stubbed out bottom of Press Box for use of Owner.
 - 7) Outlet boxes to be flush mounted into wall. Any wiring completed on-site will be responsibility of such contractor for inspections. Quantity per plans.
 - 8) Filming Area/Observation Deck: Weathertight outlet box for cameras. Quantity: Two. Owner shall indicate additional outlets needed.
 - 9) Provide Electric Baseboard heat in each room. Quantity per plans.
 - 10) Provide in each of the four rooms an emergency combination exit/flood light with battery back-up. Also provide two exterior emergency lights with remote heads.
 - 11) Provide (2) wall mount exterior lights with photocell
 - 12) Provide fire extinguishers rated for proper use alongside each exit door.
- 3. Filming Area/Observation Deck
 - a. Access
 - 1) Exterior rear stair entrance (Football)
 - 2) Roof hatch (Baseball)
 - b. Roof guardrailing: 42" above walking surface around perimeter of deck attached to 5/8 inch galvanized studs welded to roof support structure.
 - 1) Guardrailing: black vinyl coated 6 gauge fencing.
 - c. Steel framed canopy cover at football press box per plans.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All work performed by technicians experienced in bleacher seating. Project references may be required to verify the quality of finished projects.

1. Installation with proven experience in the Mid-Atlantic region. Requirement for a minimum of (3) installer references in DE for this project of similar size and scope.

B. Project is only to be installed as per approved shop drawings.

3.02 FIELD QUALITY CONTROL

- A. Foundation: Footings for the grandstand shall provide sufficient bearing area at bottom to support all loads of the grandstand. Depth and design of footings have been designed for this project and shall be bid in accordance with the plans and specifications. Hot-dipped galvanized anchor bolts shall be secured in the concrete footings.

1. Concrete shall attain working strength of 3,500 psi.

3.03 CLEAN-UP

- A. Clean up all debris caused by work of this section removed from site.
- B. Upon completion of the work and final inspections, bleacher manufacturer shall broom clean the stand removing all loose debris.
- C. If broom cleaning does not properly remove dirt and debris from the surface, pressure washing will be required.

END OF SECTION

SECTION 13 34 19
METAL BUILDING SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Metal Building System:
 - 1. Structural steel framing system.
 - 2. Metal roof system.
 - 3. Metal wall system.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-In-Place Concrete.
- B. Section 07 90 05 - Joint Sealers.
- C. Section 08 11 13 - Hollow Metal Doors and Frames.
- D. Section 08 33 23 - Overhead Coiling Doors.

1.03 REFERENCE STANDARDS

- A. American Institute of Steel Construction (AISC):
 - 1. AISC Specification for Structural Steel Buildings.
 - 2. AISC Serviceability Design Considerations for Low-Rise Buildings.
- B. American Iron and Steel Institute (AISI):
 - 1. AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
- C. American Welding Society (AWS):
 - 1. AWS D1.1 / D1.1M - Structural Welding Code - Steel.
 - 2. AWS D1.3 / D1.3M - Structural Welding Code - Sheet Steel.
- D. Association for Iron & Steel Technology (AISE):
 - 1. AISE 13 - Specifications for Design and Construction of Mill Buildings.
- E. ASTM International (ASTM):
 - 1. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - 2. ASTM A 653 / A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 3. ASTM A 792 / A 792M - Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - 4. ASTM B 117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
 - 5. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 6. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus.
 - 7. ASTM D 522 - Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.
 - 8. ASTM D 523 - Standard Test Method for Specular Gloss.
 - 9. ASTM D 968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.

10. ASTM D 1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
 11. ASTM D 2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
 12. ASTM D 2247 - Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
 13. ASTM D 2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
 14. ASTM D 3361 - Standard Practice for Unfiltered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
 15. ASTM D 4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
 16. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 17. ASTM E 96 / E 96M - Standard Test Methods for Water Vapor Transmission of Materials.
 18. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
 19. ASTM G 87 - Standard Practice for Conducting Moist SO₂ Tests.
- F. Metal Building Manufacturers Association (MBMA):
1. MBMA Metal Building Systems Manual.
- G. North American Insulation Manufacturers Association (NAIMA):
1. NAIMA 202 - Standard For Flexible Fiber Glass Insulation to be Laminated for Use in Metal Buildings.
- H. The Society for Protective Coatings (SSPC):
1. SSPC-Paint 25 - Primer for Use Over Hand Cleaned Steel performs to SSPC-Paint 25 standards.
 2. SSPC-SP2 - Hand Tool Cleaning.
- I. Underwriters Laboratories (UL):
1. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies.
 2. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.
- J. US Army Corps of Engineers (COE):
1. COE Unified Facilities Guide Specification Section 07 61 13.

1.04 PREINSTALLATION MEETINGS

- A. Convene preinstallation meeting 2 weeks before start of installation of metal building system.
- B. Require attendance of parties directly affecting work of this section, including Contractor, Architect, Engineer, installer, and metal building system manufacturer's representative.
- C. Review materials, installation, protection, and coordination with other work.

1.05 SUBMITTALS

- A. Comply with Section 01 33 00 - Submittal Procedures.
- B. Product Data: Submit metal building system manufacturer's product information, specifications, and installation instructions for building components and accessories.
- C. Erection Drawings: Submit metal building system manufacturer's erection drawings, including plans, elevations, sections, and details, indicating roof framing, transverse cross-sections, covering and trim details, and accessory installation details to clearly indicate proper assembly of building components.

- D. Certification: Submit written "Certificate of design and manufacturing conformance" prepared and signed by a Professional Engineer, registered to practice in the State of Delaware verifying that the metal building system design and metal roof system design (including panels, clips, and support system components) meet indicated loading requirements and codes of authorities having jurisdiction.
 - 1. Certification shall reference specific dead loads, live loads, snow loads, wind loads/speeds, tributary area load reductions (if applicable), concentrated loads, collateral loads, seismic loads, end-use categories, governing code bodies, including year, and load applications.
 - 2. Submit certification 1 week before bid date on the metal building system manufacturer's letterhead.
- E. Submit certification verifying that the metal roof system has been tested and approved by Underwriter's Laboratory as Class 90.
- F. Submit certification verifying that the metal standing seam roof system has been tested in accordance with ASTM E 1592 test protocols.
- G. Dealer Certification: Submit certification 1 week before bid date that the metal building system supplier or metal roof system supplier is a manufacturer's authorized and franchised dealer of the system to be furnished.
 - 1. Certification shall state date on which authorization was granted.
- H. Installer Certification: Submit certification 1 week before bid date that the metal building system or roof system installer has been regularly engaged in the installation of building systems of the same or equal construction to the system specified.
- I. Warranty Documentation: Submit manufacturer's standard warranty.

1.06 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
 - 1. Manufacturer regularly engaged, for past 10 years, in manufacture of metal building systems of similar type to that specified.
 - 2. Accredited based on IAS Accreditation Criteria AC472 and requirements in International Building Code (IBC), Chapter 17.
- B. Installer's Qualifications:
 - 1. Installer regularly engaged, for past 5 years, in installation of metal building systems of similar type to that specified.
 - 2. Employ persons trained for installation of metal building systems.
- C. Certificate of design and manufacturing conformance:
 - 1. Metal building system manufacturer shall submit written certification prepared and signed by a Professional Engineer, registered to practice in the State of Delaware verifying that building system design and metal roof system design (including panels, clips, and support system components) meet indicated loading requirements and codes of authorities having jurisdiction.
 - 2. Certification shall reference specific dead loads, live loads, snow loads, wind loads/speeds, tributary area load reductions (if applicable), concentrated loads, collateral loads, seismic loads, end-use categories, governing code bodies, including year, and load applications.
 - 3. Certificate shall be on metal building system manufacturer's letterhead.
 - 4. Refer to Submittals article of this specification section.
- D. Material Testing:

1. In addition to material certifications of structural steel, metal building system manufacturer shall provide, upon request at time of order, evidence of compliance with specifications through testing.
2. This quality assurance testing shall include testing of structural bolts, nuts, screw fasteners, mastics, and metal coatings (primers, metallic coated products, and painted coil products).

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage and Handling Requirements:
 1. Store and handle materials in accordance with manufacturer's instructions.
 2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
 3. Do not store materials directly on ground.
 4. Store materials on flat, level surface, raised above ground, with adequate support to prevent sagging.
 5. Protect materials and finish during storage, handling, and installation to prevent damage.

1.08 WARRANTY

- A. Metal building system manufacturer shall provide a written weathertightness warranty for a maximum of 10 years against leaks in roof panels, arising out of or caused by ordinary wear and tear under normal weather and atmospheric conditions.
 1. Warranty shall be signed by both the metal roof system manufacturer and the metal roof system installer.
 2. Maximum liability of warranty shall be no less than \$0.20 per square foot of roof area.
- B. Metal building system manufacturer shall provide a written warranty for 10 years against perforation of metal roof panels due to corrosion under normal weather and atmospheric conditions.
 1. Warranty shall be signed by metal roof system manufacturer.
- C. Metal building system manufacturer shall provide a paint film written warranty for 25 years against cracking, peeling, chalking, and fading of exterior coating on painted roof and wall panels.
 1. Warranty shall be signed by metal building system or roof system manufacturer and state that the coating contains 70 percent "Kynar 500" or "Hylar 5000" resin.
 2. Metal building system manufacturer shall warrant that the coating shall not peel, crack, or chip for 25 years.
 3. For a period of 25 years, chalking shall not exceed ASTM D 4214, #8 rating and shall not fade more than 5 color difference units in accordance with ASTM D 2244.
- D. Metal Building System Manufacturer's Certification: Metal building system manufacturer shall submit a signed written Certification 1 week before bid date, stating that the metal roof system manufacturer or approved representative will provide warranties and Inspection and Report Service specified in this specification section.
 1. Warranty terms shall be submitted with bid.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Metal Building System Manufacturer:
 1. Butler Manufacturing.
 2. Metallic Building Company.

3. Star Building Company.
4. Varco Pruden Buildings.
5. American Buildings.

2.02 BUILDING DESCRIPTION

- A. Building Dimensions: Indicated on the Drawings.
 1. Horizontal Dimensions: Measure to inside face of wall sheets.
 2. Eave Height: Measure from top of finished floor to intersection of insides of roof and sidewall sheets.
 3. Clear Height Between Finished Floor and Bottom of Roof Steel: Indicated on the Drawings.
- B. Primary Structural Members:
 1. Primary Framing System: Butler Manufacturing framing system as specified in this specification section.
 2. Frames: Welded-up plate section columns and roof beams, complete with necessary splice plates for bolted field assembly as specified in this specification section.
 3. Bolts for Field Assembly of Primary Steel: High-strength bolts as indicated on erection drawings of metal building system manufacturer.
 4. Beam and Post Endwall Frames: Endwall corner posts, endwall roof beams, and endwall posts as required by design criteria.
 5. Exterior Columns: Welded-up "H" sections or cold-formed "C" sections.
 6. Interior Columns: "H" sections or tube columns.
 7. Connection of Primary Structural Members: ASTM A 325 bolts through factory-punched holes.
 8. Primary Structural Members: Paint with metal building system manufacturer's standard primer with surface preparation as specified in this specification section.
- C. Secondary Structural Members:
 1. Secondary Framing System: Butler Manufacturing framing system as specified in this specification section.
 2. C/Z Purlins and Girts: Acrylic-coated G30 galvanized finish.
- D. Metal Roof System: as specified in this specification section.
- E. Metal Wall System: as specified in this specification section.
- F. Where metal panels are required to be painted, use coating system as specified in this specification section.

2.03 DESIGN LOADS

- A. Governing Design Code:
 1. Structural design for the building structural system shall be provided by the metal building system manufacturer for the following design criteria:
 - a. Governing Building Code: IBC.
 - b. Year/Version: 2009.
 - c. Occupancy Category: General Use.
- B. Roof Live Load:
 1. Roof live loads are loads produced during the life of the structure by moveable objects.
 2. Wind, snow, seismic, or dead loads are not live loads.
 3. Minimum roof live loads: 20 psf (unreduced).
- C. Roof Snow Load:
 1. Roof snow load used for designing the structure shall not be reduced and shall be the product of the following criteria:

- a. Snow Importance Factor (I): 1.00.
 - b. Ground Snow Load (Pg): 25 psf.
 - c. Roof Snow Load (Pf): 17.5 psf.
 - d. Design snow load shall include the effects of minimum flat roof load limits, rain on snow, drifting snow, and unbalanced snow load as defined in the governing building code specified above.
- D. Wind Load:
1. Wind load used for designing the structure shall be the product of the following criteria:
 - a. Wind Velocity (V), miles per hour: 96.0 mph.
 - b. Wind Importance Factor (Iw): 1.0.
 - c. Exposure Category: C.
 - d. Wind Pressure Coefficients and the design pressures shall be applied in accordance with the governing code.
- E. Seismic Load:
1. Seismic load used for designing the structure shall be based on the following criteria:
 - a. Spectral response acceleration for short periods (Ss): 18% g.
 - b. Spectral response acceleration for 1-sec. period (S1): 5 % g.
 - c. Site Class: E.
 - d. Seismic Importance Factor (I): 1.00.
 - e. Seismic loads shall be applied in accordance with the governing code.
- F. Dead Load: Dead load shall consist of the weight of building system construction, such as roof, framing, and covering members.
- G. Collateral Load:
1. Collateral load of 5 psf shall be applied to the entire structure to account for the weight of additional permanent materials other than the building system, such as sprinklers, mechanical systems, electrical systems, hung partitions, and ceilings.
 2. This allowance does not include the weight of hung equipment weighing 50 pounds or more.
 3. Equipment loads of 50 pounds or more shall be indicated on the Drawings and the structure shall be strengthened as required.
 4. Architect will provide the metal building system manufacturer with the magnitude and approximate location of concentrated loads greater than 50 pounds before design of the building starts.
- H. Load Combinations: Load combinations used to design primary and secondary structural members shall be in accordance with the governing code.

2.04 DEFLECTIONS

- A. Structural Members:
1. Maximum deflection of main framing members shall not exceed 1/180 of their respective spans.
 2. Maximum deflection due to snow load in roof panels and purlins shall not exceed 1/180 of their respective spans.
 3. Maximum deflection due to wind load in wall panels and girts shall not exceed 1/180 of their respective spans.
- B. Lateral deflections, or drift, at the roof level of the structure in relation to the floor or slab on grade, caused by deflection of horizontal force resisting elements, shall not exceed H/240.
- C. Calculations for deflections shall be done using only the bare frame method.
1. Reductions based on engineering judgment using the assumed composite stiffness of the building envelope shall not be allowed.

2. Drift shall be in accordance with AISC Serviceability Design Considerations for Low-Rise Buildings.
3. Use of composite stiffness for deflection calculations is permitted only when actual calculations for the stiffness are included with the design for the specific project.
4. When maximum deflections are specified, calculations shall be included in the design data.

2.05 STRUCTURAL STEEL FRAMING SYSTEM

A. General:

1. Design of Structural System: Clear or multi-span rigid frame with tapered or straight columns and roof beams, with gable or single-slope roof.
2. Actual Building Length:
 - a. Structural line to structural line.
 - b. Same as nominal; i.e., number of bays times length of bays.
 - c. Structural Line: Defined as inside face of wall sheets.
 - d. Actual Building Width:
 - 1) Structural line to structural line.
 - 2) Nominal building width.
 - e. Minimum Roof Slope: 1/2 inch in 12 inches.
 - f. Components and Parts of Structural System:
 - 1) Indicated on the Drawings or the Specifications.
 - 2) Clearly marked.
 - 3) Erection Drawings: Supply for identification and assembly of parts.
 - 4) Drawings: Carry stamp of a registered professional engineer.
 - g. Foundations:
 - 1) Foundations, Including Anchor Bolt Embedment Length: Properly designed by qualified engineer, retained by other than metal building system manufacturer, in accordance with specific soil conditions for building site.
 - 2) Reactions for Proper Design of Foundations: Supplied by metal building system manufacturer.
 - 3) Anchor Bolts:
 - (a) Anchor Bolt Diameter: Indicated on anchor bolt layout drawings furnished by metal building system manufacturer.
 - (b) Anchor Bolts: Supplied by Contractor, not metal building system manufacturer.
 - (c) Anchor Bolts on Moment-Resisting Column Bases: Nuts above and below base plates.

B. Structural Steel Design:

1. Structural Mill Sections or Welded-up Plate Sections: Design in accordance with AISC Specification for Structural Steel Buildings.
2. Cold-Formed Steel Structural Members: Design in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
3. Structural System: Design in accordance with specified building code (Refer to Design Loads and Building Codes).

C. Primary Framing:

1. Rigid Frames:
 - a. Frames: Welded-up plate section columns and roof beams, complete with necessary splice plates for bolted field assembly.
 - 1) Base Plates, Cap Plates, Compression Splice Plates, and Stiffener Plates: Factory welded into place and connection holes factory fabricated.

- 2) Columns and Roof Beams: Fabricated complete with holes in webs and flanges for attachment of secondary structural members and bracing, except for fieldwork as noted on erection drawings furnished by metal building system manufacturer.
 - 3) Bolts for Field Assembly of Frame Members: ASTM A 325 high-strength bolts as indicated on erection drawings furnished by metal building system manufacturer.
 - b. Endwall Structural Members: Cold-formed channel members designed in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members or welded-up plate sections designed in accordance with AISC Specification for Structural Steel Buildings.
 - 1) Endwall Frames: Endwall corner posts, endwall roof beams, and endwall posts as required by design criteria.
 - (a) Splice Plates and Base Clips: Shop fabricated complete with bolt connection holes.
 - (b) Base Plates, Cap Plates, Compression Splice Plates, and Stiffener Plates: Factory welded into place and connection holes shop fabricated.
 - (c) Beams and Posts: Factory fabricated complete with holes for attachment of secondary structural members, except for field work as noted on erection drawings furnished by metal building system manufacturer.
 - 2) Intermediate Frames: Substituted for end-wall roof beams, when specified.
 - (a) Factory fabricate necessary endwall posts and holes for connection to intermediate frame used in endwall.
- D. Secondary Structural Members:
1. Purlins:
 - a. Purlins:
 - 1) "Z"-shaped, precision-roll-formed, acrylic-coated G30 galvanized steel in different gauges to meet specified loading conditions.
 - 2) 7-inch, 8-1/2-inch, 10-inch, or 11-1/2-inch-deep "Z" sections.
 - 3) Outer Flange of Purlins: Factory-punched holes for panel connections.
 - 4) Attach purlins to main frames indicated on erection drawings furnished by metal building system manufacturer and endwalls with 1/2-inch-diameter bolts.
 - 5) Brace purlins at intervals
 - 6) Concentrated Loads: Hung at purlin panel points.
 - b. Eave Members:
 - 1) Eave Struts: Factory punched 7-inch, 8-1/2-inch, 10-inch, or 11-1/2-inch-deep "C" sections, precision-roll-formed, acrylic-coated G30 galvanized steel in different gauges to meet specified loading conditions.
 - c. Girts:
 - 1) "Z" or "C"-shaped, precision-roll-formed, acrylic-coated G30 galvanized steel in different gauges to meet specified loading conditions.
 - 2) 7-inch, 8-1/2-inch, 10-inch, or 11-1/2-inch-deep "Z" or "C" sections.
 - 3) Outer Flange of Girts: Factory-punched holes for panel connections.
 - d. Bracing:
 - 1) Locate bracing as indicated on the Drawings.
 - 2) Diagonal Bracing:
 - (a) Hot-rolled rods of sizes indicated on the Drawings.
 - (b) Attach to columns and roof beams as indicated on the Drawings.
 - 3) Optional fixed-base wind posts or pinned-base portal frames may be substituted for wall rod bracing on buildings as required.

- 4) Flange Braces and Purlin Braces: Cold formed and installed as indicated on the Drawings.

E. Welding:

1. Welding Procedures, Operator Qualifications, and Welding Quality Standards: AWS D1.1 - Structural Welding Code - Steel and AWS D1.3 - Structural Welding Code - Sheet Steel.
2. Welding inspection, other than visual inspection as defined by AWS D1.1, paragraph 6.9, shall be identified and negotiated before bidding.
3. Certification of Welder Qualification: Supply when requested.

2.06 METAL ROOF SYSTEM

A. Metal Roof System: Basis of Design: Butler Manufacturing "Butlerib®II" roof system.

B. Roof System Design:

1. Design roof panels in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
2. Design roof panels to support a 200-pound load distributed evenly over a 2-foot square area centered between purlins, without exceeding a panel deflection-to-span ratio of 1/180 in a 2-span condition.
3. Design roof paneling system for a minimum roof slope of 1/2 inch in 12 inches.
4. Design roof paneling system to support design live, snow, and wind loads.

C. Roof System Performance Testing:

1. UL Wind Uplift Classification Rating, UL 580: Class 90.
2. Structural Performance Under Uniform Static Air Pressure Difference: Test roof system in accordance with ASTM E 1592.

D. Roof Panels:

1. General:

- a. Factory roll-formed to provide width coverage of 3 feet.
- b. Four major corrugations spaced 12 inches on center.
- c. Each Major Corrugation: 1-1/2 inches high, 2-7/8 inches wide, tapering 1-9/32 inches wide at top, with no intermediate minor corrugations.
- d. In Panel Flat: Two additional minor corrugations, 1 inch wide, 1/8 inch high, spaced 4 inches on center, between major corrugations.
- e. Roof Panel Side Laps:
 - 1) Overlap 1 major corrugation.
 - 2) One of the Outboard Corrugations: Formed as overlapping corrugation.
 - 3) Other Outboard Corrugation: Formed as underneath corrugation.
 - (a) Full corrugation to provide bearing support to side lap.
 - (b) Formed with continuous-length sealant groove.
- f. Roof Panel End Laps:
 - 1) 6 inches.
 - 2) Supply maximum possible panel lengths, up to 38'-9", to minimize panel end laps.
 - 3) Factory punch roof panel end laps (top panel with a round hole and bottom panel with a slotted hole) to provide for expansion and contraction and panel alignment.
 - 4) Design end laps to occur over and be fastened to secondary structural members.
- g. Ridge Panels:
 - 1) One-piece, factory formed to match roof slope.
 - 2) Ridge Panel Cross Section: Match roof panels.
 - 3) Ridge Panel Splices: Occur over first purlin on either side of building center.

- h. Eave Panels: Extend beyond building structural line.
 - i. Factory punch roof panels at panel ends to match factory-punched or field-drilled holes in structural members to ensure proper alignment.
 - 1) Upper End of Eave and Splice Panels: 3/4-inch-long slots to provide for expansion and contraction of panels.
 - j. Panel Material and Finish:
 - 1) 26-gauge or 24-gauge painted Galvalume aluminum-zinc alloy (approximately 55 percent aluminum, 45 percent zinc), ASTM A 792.
 - 2) Paint with exterior colors of “Butler-Cote™” finish system, full-strength, 70 percent “Kynar 500” or “Hylar 5000” fluoropolymer (PVDF) coating.
 - 3) PVDF Coating Warranty: Metal building system manufacturer shall warrant coating for 25 years for the following.
 - (a) Not to peel, crack, or chip.
 - (b) Chalking: Not to exceed ASTM D 4214, #8 rating.
 - (c) Fading: Not more than 5 color-difference units, ASTM D 2244.
 - k. Panel Material and Finish: Special materials, gauges, or colors as applicable for custom designs.
- E. Provision for Expansion and Contraction:
- 1. Optional Factory-Punched Roof Panels: 5/16-inch by 3/4-inch-slotted holes at upper end and 5/16-inch-diameter holes at lower end.
 - 2. Slotted Holes: Permit thermal movement of panels without detrimental effect on roof panels.
- F. Fasteners:
- 1. Fastener Locations and Quantities: Indicated on erection drawings furnished by metal building system manufacturer.
 - 2. Panel-to-Structural Connections: Type 410 stainless steel “Scrubolt™” fasteners, 3/8-inch hex head, with 3/4-inch OD aluminum-backed EPDM washers.
 - 3. Panel-to-Panel Connections: Self-clinching aluminum “Lock-Rivet™” fasteners, with 3/4-inch diameter low-profile-head EPDM washers.
- G. Accessories:
- 1. Accessories (i.e. eave and gable trim, gutters): Standard with metal building system manufacturer, unless otherwise noted and furnished as specified.
 - 2. Metal Coating on Gutters, Downspouts, Gable Trim, and Eave Trim: full-strength, 70 percent “Kynar 500” or “Hylar 5000” fluoropolymer (PVDF) coating.
 - 3. Location of Standard Accessories: Indicated on erection drawings furnished by metal building system manufacturer.

2.07 METAL WALL SYSTEM

- A. Exterior Metal Wall System: Basis of Design: Butler Manufacturing™ “Butlerib® II” wall system.
- B. Wall System Design: Design wall panels in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
- C. Wall Panels:
 - 1. Roll-formed panels, 3 feet wide with 4 major corrugations, 1-1/2 inches high, 12 inches on center, with 2 minor corrugations between each of the major corrugations entire length of panel.
 - 2. One piece from base to building eave.
 - 3. Upper End of Panels: Fabricate with mitered cut to match corrugations of roof panels of 1/2 inch to 12 inches.

4. Factory punch or field drill wall panels at panel ends and match factory-punched or field-drilled holes in structural members for proper alignment.
5. Panel Material and Finish:
 - a. 26-gauge or 24-gauge painted Galvalume aluminum-zinc alloy (approximately 55 percent aluminum, 45 percent zinc), ASTM A 792.
 - b. Paint with exterior colors of “Butler-Cote™” finish system, full-strength, 70 percent “Kynar 500” or “Hylar 5000” fluoropolymer (PVDF) coating.
 - c. PVDF Coating Warranty: Metal building system manufacturer shall warrant coating for 25 years for the following.
 - 1) Not to peel, crack, or chip.
 - 2) Chalking: Not to exceed ASTM D 4214, #8 rating.
 - 3) Fading: Not more than 5 color-difference units, ASTM D 2244.
- D. Fasteners:
 1. Wall Panel-to-Structural Connections: Torx-head “Scrubolt™” fasteners.
 2. Wall Panel-to-Panel Connections: Torx-head self-drilling screws.
 3. Fastener Locations: Indicated on erection drawings furnished by metal building system manufacturer.
 4. Exposed Fasteners: Factory painted to match wall color.
- E. Accessories:
 1. Accessories (i.e., doors, windows, louvers): Standard with metal building system manufacturer, unless otherwise noted and furnished as specified.
 2. Location of Standard Accessories: Indicated on erection drawings furnished by metal building system manufacturer.

2.08 METAL COATING SYSTEM

- A. Metal Coating System: Basis of Design: Butler Manufacturing™ “Butler-Cote™” finish system a factory-applied, exterior metal coating system
- B. Substrate Preparation:
 1. G90 Hot-Dipped Galvanized Steel or AZ50 Galvalume: Factory-controlled chemical-conversion treatment.
- C. Coating:
 1. Material: “Fluropon”. Full-strength, 70 percent, “Kynar 500” or “Hylar 5000” fluoropolymer (PVDF) color coating.
 2. After steel preparation, coat exterior exposed surface with primer and “Fluropon”.
 - a. Nominal Total Dry Film Thickness: 1.0 mil.
 - b. Interior Exposed Surfaces: Coat with polyester color coat.
 - c. Apply coatings to entire material dimensions of steel sheets before forming of panels.
- D. Physical Characteristics of Exterior Coating:
 1. Resistance to failure through cracking, checking, peeling, and loss of adhesion.
 2. Measure by the following laboratory weather-simulating tests to obtain test results justifying metal building system manufacturer's 25-year warranty:
 - a. Humidity resistance at 100 degrees F and 100 percent relative humidity, ASTM D 2247.
 - b. Salt-spray resistance at 5 percent salt fog, ASTM B 117.
 - c. Reverse impact resistance, ASTM D 2794.
 - d. Resistance to accelerated weathering, Atlas Model XW-R Dew Cycle Weather-O-Meter, ASTM D 3361.
 - e. Resistance to dry heat.
 - f. Abrasion resistance, ASTM D 968.

- g. Chemical/acid/pollution resistance, ASTM D 1308 and G 87.
- h. Maintain gloss of finish evenly over entire surface, ASTM D 523

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine area to receive metal building system.
- B. Notify Architect of conditions that would adversely affect installation or subsequent use.
- C. Do not begin installation until unacceptable conditions are corrected.

3.02 ERECTION - STRUCTURAL STEEL FRAMING SYSTEM

- A. Erect structural steel framing system in accordance with the Drawings and metal building system manufacturer's erection drawings.
- B. Field Modifications:
 - 1. Require approval of metal building system manufacturer.
 - 2. Responsibility of building erector.
- C. Fixed Column Bases: Grout flush with floor line after structural steel erection is complete.

3.03 INSTALLATION - METAL ROOF SYSTEM

- A. Metal Roof System Installation: Butler Manufacturing™ Butlerib® II roof system.
 - 1. Install roof system in accordance with metal building system manufacturer's instructions at locations indicated on the Drawings.
 - 2. Install roof system weathertight.
 - 3. Factory cut-to-length roof panels in accordance with erection drawings furnished by metal building system manufacturer.
 - 4. Position and align roof panels to hold 3-foot module throughout building length.
 - a. Position and align optional factory-punched roof panels by matching factory-punched holes in panels with factory-punched holes in roof structural members.
 - b. Install side laps with minimum of 1 full corrugation.
 - c. End Laps:
 - 1) Minimum of 6 inches.
 - 2) Fasten together over and to structural members.
 - d. Panel Side and End Laps: Seal with "Panlastic" sealant to prevent entry of capillary moisture.

3.04 INSTALLATION - METAL WALL SYSTEM

- A. Metal Wall System Installation: Butler Manufacturing™ "Butlerib® II" wall system.
 - 1. Install wall system in accordance with metal building system manufacturer's instructions at locations indicated on the Drawings.
 - 2. Install wall system weathertight.
 - 3. Verify structural system is plumb before wall panels are attached.
 - 4. Align and attach wall panels in accordance with erection drawings furnished by metal building system manufacturer.
 - 5. Install side laps with minimum of 1 full corrugation.
 - 6. Seal wall panels at base with metal trim and foam or rubber closures.
 - 7. Exterior Trim: Apply same finish as exterior color of wall panels, except the following:
 - a. Gutters, Downspouts, Eave Trim, Gable Trim, Door-Side Flashings, and Header Flashings: Paint with exterior colors of "Butler-Cote™" finish system, full-strength, 70 percent "Kynar 500" or "Hylar 5000" fluoropolymer (PVDF) coating in standard color of metal building system manufacturer.
 - b. Windows: Factory paint aluminum extrusions (thermally broken).

- c. Flashings, Trim, Closures, and Similar Items: Install as indicated on erection drawings furnished by metal building system manufacturer.

3.05 INSTALLATION - INSULATION

- A. Insulation Installation: Install insulation in accordance with metal building system manufacturer's instructions at locations indicated on the Drawings.

3.06 INSTALLATION - INSULATION SUPPORT SYSTEM

- A. Insulation Support System Installation: Butler Manufacturing™ “Sky-Web® II” insulation support system.
 1. Install insulation support system in accordance with metal building system manufacturer's instructions at locations indicated on the Drawings.
 2. Verify roof structural system is in place before installation of insulation support system.
 3. Keep insulation support system in place after metal roof system is installed.
 4. Fasten insulation support system to structural framing at perimeter of building.
 5. Make mesh-to-mesh connections above interior frames.
 6. Verify installed system conforms to geometry of fiberglass blanket insulation to maintain designed insulation value of roof system.

3.07 PROTECTION

- A. Protect installed metal building system to ensure that, except for normal weathering, metal building system will be without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 27 41 01

EXTERIOR ATHLETIC SOUND SYSTEMS

PART 1 -GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Complete Sound Systems for the following:
 - 1. Football Stadium,
 - 2. Soccer Stadium,
 - 3. Baseball Stadium, and
 - 4. Softball Stadium.
- C. Sound Distribution including cabling, terminations and equipment.
- D. This section and associated drawings define auxiliary sound systems for the gymnasium and cafeteria spaces. The contractor shall provide all equipment, cables and components necessary for complete systems.

1.02 DEFINITIONS

- A. Auxiliary Sound System refers to a stand alone sound system which includes speakers, speaker wire, pathways, equipment racks, mixers, processors, amplifiers, microphones, wireless components, audio sources, assistive listening equipment and associated equipment.

1.03 SYSTEM DESCRIPTION

- A. Design Requirements
 - 1. Audio distribution from wired and wireless microphones, analog and digital audio sources.
 - 2. Amplifier/Mixer/Processors must have multiple audio inputs allow transmitting of sound to exterior speakers from the microphone and input equipment located in the equipment cabinet.
 - 3. A multi-loudspeaker system shall be provided. Loudspeakers shall be provided and placed as shown on the drawings.
 - 4. Hearing Assistance System - Provide a reinforcement system for the hearing impaired. The hearing assistance system shall be an FM radio system that shall not limit operation to certain seats or areas of the room(s). Provide approximately 20-40 milliseconds of high-quality digital signal delay to help in the localization of the sound source.
- B. Performance Requirements
 - 1. Comply with applicable requirements in Local, State and Federal Codes, TIA/EIA Standards, and BICSI methodology.
 - 2. Specified cabling system derived from recommendations in approved telecommunications industry codes, standards and methods, including the following documents:
 - a. Articles 250, 725, 760, 770, 800,810 and 820 of the current National Electrical Code.
 - b. ANSI/TIA/EIA-568-B.1: Commercial Building Telecommunications Cabling Standard Part 1 - General Requirements
 - c. ANSI/TIA/EIA-569-A: Commercial Building Standard for Telecommunications Pathways and Spaces
 - d. ANSI/TIA/EIA-606: Administration Standard for Telecommunications Infrastructure of Commercial Buildings
 - e. BICSI Telecommunications Distribution Methods Manual (TDMM), Twelfth Edition
 - f. National Fire Protection Agency (NFPA-70): National Electrical Code (NEC)

1.04 SUBMITTALS

- A. Comply with requirements of Division 0 and Division 1 - Submittals and as modified below.
- B. Product Data: Submit manufacturer's product literature, technical specifications and similar information for the following items demonstrating compliance with the specified requirements.
 - 1. Amplifiers,
 - 2. Speakers,
 - 3. Mixers,
 - 4. Processors,
 - 5. Microphones,
 - 6. Assistive Listening,
 - 7. Equipment Cabinets,
 - 8. Cabling and wiring, and
 - 9. Audio connectors.
- C. Samples: Provide samples of equipment, cables, microphones and assemblies as described below, prior to installation, for approval by designer.
 - 1. Submit samples of equipment including the following components and characteristics:
- D. Shop Drawings
 - 1. The Contractor shall submit line drawings of all systems showing major components of the systems. Submit wiring diagrams showing typical connections for all systems and equipment as part of the shop drawings and as-built drawings.
- E. Quality Control Submittal
 - 1. Test Reports: Submit complete sample test data and reports with exact labels used on cables and faceplates.
 - 2. Certificates
 - a. Manufacturer Certification: Submit certification from manufacturer of products to be installed under this contract certifying that Installer is authorized by manufacturer to install specified products.
 - b. Installer Experience Listing: Submit list of at least 5 completed projects as specified below in "Quality Assurance - Qualifications - Installer."
- F. Contract Closeout Submittal: Comply with requirements of Division 0, including submission of operating and maintenance instructions as item in "Operation and Maintenance Data" manual described in that Section.

1.05 QUALITY ASSURANCE

- A. All Work shall be installed in a first class, neat and professional manner by skilled Technicians. The quality of the workmanship shall be subject to inspection and approval by authorized school district personnel. Any work found to be of inferior quality and/or workmanship shall be replaced and/or reworked until the approval of the school district is obtained.
- B. Installer Qualifications: Qualified to cable, terminate and test cabling system specified in this Section, certified by manufacturer of products to be installed, and completed at least 5 installations of similar size, nature and complexity as specified for this project.
- C. Conditions for Consideration of "Or Equal" Products: Where products are specified by name and accompanied by the term "or equal", the proposed "or equal" product will be considered when the following conditions are satisfied. If all the following conditions are not satisfied, Design Consultant will return requests without action, except to record noncompliance with these requirements:
 - 1. Proposed product does not require extensive revisions to the Contract Documents.

2. With the exception of the product name or number and manufacturer's name, proposed product conforms with requirements indicated on the Drawings and in the Specifications in every respect and will produce indicated results.
3. Proposed product is fully documented and properly submitted.
4. Proposed product has received necessary approvals of authorities having jurisdiction.
5. Proposed product is compatible with AND has been coordinated with other portions of the Work.
6. Proposed product provides specified warranty.
7. If proposed product involves more than one contractor, proposed product has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
8. Submission is accompanied with detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
9. Submission is accompanied with a list of similar installations for completed projects with project names and addresses and names and addresses of design consultants and authorities, if requested.
10. Submission is accompanied with proposed product's Manufacturer signed written statement on Manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents.

1.06 WARRANTY

- A. Installer's Warranty: Provide manufacturer's system warranty against electrical or mechanical defects for 1 year from date of final acceptance.
 1. System Certification: Upon successful completion of the installation and subsequent inspection, the Authority shall be provided with a numbered certificate, from the manufacturing company, registering the installation.

PART 2 -PRODUCTS

2.01 MATERIALS - ALL MATERIALS SHALL BE NEW AND UNUSED EXCEPT AS NOTED IN T-SERIES DRAWINGS.

- A. Basis of Design
 1. Speakers - Community
 2. Mixers - Shure
 3. Processors - Rane
 4. Wireless Mic System - Shure
 5. Assistive Listening - Listen Technologies
 6. Equipment Cabinets - Atlas Sound
 - a. Any equipment substitution must be approved by the designer and school district prior to being allowed on the project.
 - b. Equipment substitutions must be submitted in writing to the design team for review and approval.
 - c. Any equipment not meeting the design criteria will be rejected at the contractor's expense.

2.02 FOOTBALL STADIUM

- A. Speakers
 1. Community R2-474Z
 2. Community R2-52Z
 3. Community R.25-94Z

- B. Amplifiers
 - 1. QSC CMX 800V
- C. Processor
 - 1. Rane Hal 3
- D. Mixer
 - 1. Shure SCM 262
- E. Wireless Mics
 - 1. Shure ULSD124/150/C
- F. Assistive Listening
 - 1. Listen Technologies LS-03
- G. Ipod Input
 - 1. Chief IRDS
- H. CD Player
 - 1. Tascam CD-200i
- I. Power Conditioner
 - 1. Atlas ECS-3
- J. Equipment Drawer
 - 1. Atlas
- K. Equipment Cabinet
 - 1. Atlas 221-30
- L. Speaker Mounts
 - 1. PoleStar Community Multi-speaker unit
 - 2. Adjustable U-Bracket
- M. Wiring
 - 1. West Penn 14/2 AWG (or as required for proper signal strength)
 - 2. West Penn Mic wiring
 - 3. As required for system operation.

2.03 SOCCER STADIUM

- A. Speakers
 - 1. Community R2-474Z
 - 2. Community R.25-94Z
- B. Amplifiers
 - 1. QSC CMX 800V
- C. Processor
 - 1. Rane Hal 3
- D. Mixer
 - 1. Shure SCM 262
- E. Wireless Mics
 - 1. Shure ULSD124/150/C
- F. Assistive Listening
 - 1. Listen Technologies LS-03
- G. Ipod Input
 - 1. Chief IRDS
- H. CD Player

1. Tascam CD-200i
- I. Power Conditioner
 1. Atlas ECS-3
- J. Equipment Drawer
 1. Atlas
- K. Equipment Cabinet
 1. Atlas 221-30
- L. Speaker Mounts
 1. PoleStar Community Multi-speaker unit
 2. Adjustable U-Bracket
- M. Wiring
 1. West Penn 14/2 AWG (or as required for proper signal strength)
 2. West Penn Mic wiring
 3. As required for system operation.

2.04 BASEBALL STADIUM

- A. Speakers
 1. Community R2-94Z
 2. Community R2-52Z
 3. Community R.5HP
- B. Amplifiers
 1. QSC CMX 800V
- C. Processor
 1. Rane Hal 3
- D. Mixer
 1. Shure SCM 262
- E. Wireless Mics
 1. Shure ULSD124/150/C
- F. Assistive Listening
 1. Listen Technologies LS-03
- G. Ipod Input
 1. Chief IRDS
- H. CD Player
 1. Tascam CD-200i
- I. Power Conditioner
 1. Atlas ECS-3
- J. Equipment Drawer
 1. Atlas
- K. Equipment Cabinet
 1. Atlas 221-30
- L. Speaker Mounts
 1. PoleStar Community Multi-speaker unit
 2. Adjustable U-Bracket
- M. Wiring
 1. West Penn 14/2 AWG (or as required for proper signal strength)
 2. West Penn Mic wiring

3. As required for system operation.

2.05 SOFTBALL STADIUM

- A. Speakers
 1. Community R2-94Z
 2. Community R2-52Z
 3. Community R.5HP
- B. Amplifiers
 1. QSC CMX 800V
- C. Processor
 1. Rane Hal 3
- D. Mixer
 1. Shure SCM 262
- E. Wireless Mics
 1. Shure ULSD124/150/C
- F. Assistive Listening
 1. Listen Technologies LS-03
- G. Ipod Input
 1. Chief IRDS
- H. CD Player
 1. Tascam CD-200i
- I. Power Conditioner
 1. Atlas ECS-3
- J. Equipment Drawer
 1. Atlas
- K. Equipment Cabinet
 1. Atlas 221-30
- L. Speaker Mounts
 1. PoleStar Community Multi-speaker unit
 2. Adjustable U-Bracket
- M. Wiring
 1. West Penn 14/2 AWG (or as required for proper signal strength)
 2. West Penn Mic wiring
 3. As required for system operation.

PART 3 -EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine conditions under which cabling and sound equipment and related components are to be installed in coordination with Installer of materials and components specified in this Section and notify affected Prime Contractors and Design consultant in writing of any conditions detrimental to proper and timely installation. Do not proceed with installation until unsatisfactory conditions have been corrected to ensure a safe and timely installation.
 1. When Installer confirms conditions as acceptable to ensure proper and timely installation and to ensure requirements for applicable warranty or guarantee can be satisfied, submit to Design consultant written confirmation from applicable Installer. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to Installer.

2. Visit Site to identify and become familiar with existing field conditions and specific requirements of each Site.
3. Verify all dimensions in field and confirm condition of existing hardware to be utilized.
4. Confirm space requirements and physical confines of all work areas to ensure that all materials can be installed in indicated spaces.
5. Confirm all outlet locations and cable pathways and advise Design consultant in writing of any discrepancies or issues in Design described in Contract Documents.

3.02 PREPARATION

- A. Protection: Provide adequate protection of equipment and hardware before and after installation.
- B. Existing Communications Services: Ensure all telecommunications systems (voice, video and data) remain operational throughout the project.
 1. Identify any additional outlets, circuits, and wiring at the site not shown on T-Drawings and interfering with installation of specified equipment.
 2. Remove all accessible portions of abandoned communications cabling per NEC 800.52. Tag all communications cabling not terminated at both ends but retained for future use.

3.03 INSTALLATION

- A. Provide and install all components necessary to install complete sound systems equipment including (but is not limited to) connectors, electronics, terminators, pass-thrus, cables etc...
 1. Cable runs shall be properly terminated.
 2. Secure all pathways and cables to structure.
 3. Secure speaker equipment with mounts and safety chains and wires.
 4. Antennas shall be positioned for proper coverage in the field and attached to structural elements.
 5. Do not violate manufacturer's recommended loadings. Leave capacity for future use of pathway.
 6. Verify all horizontal cable run lengths prior to installation. Ensure cables do not exceed distances that would degrade the signal transmission requirements
 7. Install cables in EMT in all unfinished or exposed areas
 8. Do not secure cables with permanent cable ties. Do not tighten cable bundles in such a way as to cause jacket deformation or damage.
 9. Place cables in compliance with TIA/EIA-568.B standards and BICSI recommended methods.
 10. Tight 90-degree bends are unacceptable, and use of plastic "cinch-type" tie-wraps are not permitted, in order to prevent damage to cable jacket and compromise the cable's electrical or optical characteristics.
 11. Sound Equipment shall be located to be no more than 6 feet from an electrical outlet.
- B. Determine allowable cable proximity to other electrical power sources of 480 Volts or less using TIA/EIA-569A "Cabling Pathway Standard" for UTP cable separations from sources of EMI
- C. Install all cable in accordance with National, state and local codes and TIA/EIA Standards, and BICSI methods.
 1. Follow manufacturer's guidelines and requirements for all cable termination.
- D. Permanently identify all system components following TIA/EIA-606A "Administration Standard for Commercial Telecommunications Infrastructure" with identification format:
 1. Identification: Provide permanent identification labels for outlets, faceplates and cables.
 2. Each individual cable shall be labeled on both ends of cable terminations regardless of cable intended use. Labels must be machine printed with permanent black ink on

laminated white label material. The intended format and labeling material must be approved by the school district Technology Department before labeling begins.

3.04 AS-BUILTS

- A. As-built drawings shall be provided in multiple hardcopy and electronic AutoCAD 2010 (or later) format.
- B. As-builts shall include all equipment locations, signal levels and wiring diagrams for each system.

3.05 TESTING

- A. Sound System
 - 1. The contractor shall test all aspects of the sound system operation once it is installed and demonstrate these functions to the owner of owner's representative.
 - a. Speaker levels shall be verified
 - b. Microphones shall be demonstrated to work as intended by the manufacturer.
 - c. System inputs shall function as intended.
 - d. Sound Levels shall be verified.

3.06 ACCEPTANCE

- A. Contractors work shall be considered complete after the following conditions have been met:
 - 1. Cable installation is complete and all cable runs have been tested and documented to be installed according to specifications and drawings.
 - 2. Sound Pressure Levels have been verified and documented.
 - 3. Equipment installation is complete and all functions have been tested and documented to function as designed and per the manufacturer's recommendations.
 - 4. All punch list items have been reconciled.
 - 5. All disturbed panels, fire stopping materials, covers, etc. have been properly reinstalled.
 - 6. All materials and trash have been removed from the site.
 - 7. A 1-Year Installers warranty has been given to a school district Technology representative.
 - 8. Submit Manufacturers Extended Warranty Application.

END OF SECTION

SECTION 32 18 16.16
ARTIFICIAL TURF

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Provide all materials, labor, equipment and services required to accomplish related work in accordance with the drawings and specifications. The extent of artificial turf work is shown on the Drawings.
- C. Artificial turf work includes, but is not limited to, the following:
 - 1. A complete synthetic turf system.
 - a. Vertical draining gravel blanket.
 - b. Polyethylene fiber, tufted into a primary backing with a secondary backing.
 - c. Resilient infill system, consisting of a mixture of rubber granules and silica sand.
 - d. Tufted-in game lines and perimeter lines per drawings.
 - e. Edge details.
- D. Maintenance manual.
- E. Written company warranty: 8-year warranty supported by a 3rd party insured 8-year warranty policy from an A-Rated domestic insurance carrier. Letters of credit are not permissible. Actual and current policy must be submitted for verification.
- F. The artificial turf shall be specifically designed, manufactured and installed for the intended sports and events. Typically sports include, but are not limited to, football, soccer, lacrosse, field hockey, baseball and softball.
 - 1. At the time of substantial completion, the system's shock attenuation shall have an average G-max value less than 135 for a non-padded system, based on ASTM-F355A.
 - 2. At no time shall the G-max value exceed 170 for a non-padded system throughout the life of the warranty.

1.02 REFERENCE STANDARDS

- A. Provide copies of independent laboratory test reports on system or components:
 - 1. ASTM D 792 Specific Gravity
 - 2. ASTM D 1335 Tuft Bind
 - 3. ASTM D 5034 Grab Breaking Strength
 - 4. ASTM D 418 Pile Height, Tuft Spacing, Face Weight and Total Weight
 - 5. ASTM D 2859 Flammability (Pill test)
 - 6. ASTM F 1551 Water Permeability

1.03 SUBMITTALS

- A. Submit the following with bid:
 - 1. Three (3) copies of most recent installation/reference list for all projects of similar scope to this project completed in the last three years.
 - 2. Three (3) copies of most recent independently audited financial statements.
 - 3. Three (3) copies of required 3rd party insurance policy, demonstrating that all of the requirements outlined in this Section are met. Actual policy must be submitted.
- B. One (1) 12" x 12" sample of proposed synthetic turf carpet and one (1) 12" x 12" boxed turf sample including infill representative of finished synthetic turf system.

- C. Product data and testing documents demonstrating that proposed system meets or exceeds all specified requirements.
- D. Material Certificates and Samples: Provide for each material from material producer that will be used for this project.
 - 1. Each material certificate must be stamped and checked as approved by the Field Builder before submittal to the Architect.
- E. Materials samples of the following:
 - 1. Two (2) 12" x 12" samples of synthetic turf carpet and color yarn samples.
 - 2. Two (2) bagged samples each of rubber and sand infill material.
- F. Sample warranty.
- G. Shop Drawings showing seam layout plan, striping plan and any details of construction that deviate from the plans and specifications.
 - 1. Provide a colored striping plan detailing lines, numbers and letters.
- H. Three (3) copies of Field Builder's recommended maintenance equipment cut sheets.
- I. Prior to Final Acceptance: Three (3) copies of maintenance manuals that include all necessary instructions for the proper care and maintenance of the newly installed synthetic turf system.

1.04 QUALITY ASSURANCE

- A. Provide a qualified installation foreman to coordinate and review the component parts of the artificial turf system.
 - 1. Submit a resume of experience for Architect's approval prior to starting work.
- B. Rubber & Sand Filled Artificial Turf:
 - 1. Factory-trained technicians skilled in the installation of athletic-caliber infilled synthetic turf systems will undertake the placement of the turf. Special brushing equipment and techniques will be used in the installation.
 - 2. The designated installation crew shall have installed a minimum of ten high quality, stadium grade rubber/sand filled synthetic turf systems of 65,000 square feet or greater in the past three years.
 - 3. A notarized letter from the Field Builder that the installation crew and foreman are factory certified must be submitted prior to the start of turf installation.
- C. The Field Builder shall meet the following criteria:
 - 1. The Turf Manufacturer and the Field Builder must be experienced in the manufacturing and installation of this type of artificial turf system and provide project references of the synthetic grass system being installed at 100 similar exterior sites in the United States over the last 5 years, a minimum of 65,000 square feet each.
 - 2. The Field Builder must have actively been in business - under its current name and ownership - for at least the past five years; and must have a minimum of 25 athletic fields still in use in the United States for a minimum of the past 5 years.
 - 3. The Field Builder must provide competent workmen skilled in this type of artificial turf installation. The designated Supervisory personnel on the project must be certified, in writing, by the Field Builder as competent in the installation of this material, including gluing or sewing seams and proper installation of the infill mixture. The Field Builder shall have a qualified job foreman on site to certify the installation and warranty compliance.

1.05 WARRANTY

- A. The warranty coverage shall not be prorated nor place limits on the amount of the field's usage.

- B. Submit written 8-year warranty, which warrants the usability and playability of the artificial turf system for its intended uses. A 3rd party insured 8-year warranty from an A-Rated domestic insurance carrier is required in addition to the Field Builder's warranty.
 - 1. Letters of credit in lieu of an insurance policy are not acceptable.
 - 2. The value of the policy shall be \$5,000,000 for each insured warranty and \$15,000,000 annual aggregate.
 - 3. Only true 3rd party policies will be accepted.
- C. The Field Builder's warranty must have the following characteristics:
 - 1. Provide full coverage for a minimum of eight (8) years from the date of Substantial Completion.
 - 2. Warrant materials and workmanship.
 - 3. Warrant that the materials installed meet or exceed the system specifications.
 - 4. Repair or replace such portions of the installed materials that are no longer serviceable to maintain a serviceable and playable surface.
 - 5. Be from a single source covering workmanship and all materials.
 - 6. Assure the availability of exact or substantially the same replacement materials for the artificial turf system installed for the full warranty period.
 - 7. Include general wear and damage caused from UV degradation. The warranty shall specifically exclude vandalism and acts of God beyond the control of the Turf Manufacturer or Field Builder.
 - 8. Cover defects in the installation and workmanship. Assure the installation was done in accordance with both the Field Builder's recommendations and any written directives of the Field Builder's on-site representative.
 - 9. Shall be limited to repair or replacement of the affected areas at the option of the Field Builder, and shall include all necessary materials, labor, transportation costs, etc. to complete said repairs.
 - 10. The Field Builder may be required, upon the request of the Owner, to provide a list of ten (10) clients for which they have completed after-the-sale warranty work.
 - 11. All designs, game markings and layouts shall conform to all currently applicable National Federation State High School Association or NCAA rules and regulations, or league specific requirements, depending on what applies.
 - 12. All components and Field Builder's installation method shall be designed and manufactured for use on outdoor athletic fields. The materials as hereinafter specified, shall withstand full climatic exposure in the location of the field, be resistant to insect infestation, rot, fungus and mildew; it shall also withstand ultra-violet rays and extreme heat, it shall allow the free flow of water horizontally to perimeter areas and vertically to the gravel blanket and into the field drainage system below the surface.
 - 13. The adhesive bonded or sewn seams of all system components shall provide a permanent, tight, secure and hazard-free athletic playing surface. All inlaid markings (game lines, logos, etc.) shall remain in place throughout the duration of the warranty period.
 - 14. The installed artificial turf system's drainage capability shall allow water flow through the system (turf & infill) at a rate of 10 inches +/- per hour.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Approved manufacturers are as follows:
 - 1. Basis of Design: FieldTurf USA.
 - a. Products: FieldTurf XM65P (Main Stadium)
 - b. FieldTurf XM50P (Auxiliary Field)
 - 2. Shaw Sports Turf:

- a. Powerblade SD 36 (Main Stadium).
- b. Powerblade HP+SR (Auxiliary Field).
3. A-Turf: Mono.
4. ProGrass: Game Turf.

2.02 SYNTHETIC GRASS SYSTEM

A. Synthetic Grass - Mono

1. Pile Weight: 35-40 oz/sy
2. Total Product Weight: 55-70 oz/sy
3. Face Yarn Type: 100% polyethylene spined monofilament fiber
4. Yarn Size: 10,000 denier minimum.
5. Yarn Thickness: 310 microns
6. Pile Height (Finished): 2.50" at Main Stadium, 2.00" at Auxiliary Field.
7. Colors: Field Green / Olive Green / Blue / White
 - a. Main Stadium: dual green colors as alternating panels as shown.
 - b. Auxiliary Field: blended fibers.
 - c. Provide two additional turf colors, as shown.
8. Construction: Broadloom tufted
9. Tufting Gauge: 3/4" maximum
10. Primary Backing: Double-layered polypropylene with UV inhibitors.
11. Secondary Backing: 13+ oz/sy urethane
12. Total Product Weight: 75 oz/sy.
13. Finished Roll Width: 15'
14. Finished Roll Length: Up to 220'
15. Perforation: 3/16" holes on staggered 4" (approximate) centers
16. Turf Permeability: > 20" +/- per hour
17. Infill Composition: Ambiently ground SBR crumb rubber mixture and rounded or sub-angular, uniformly sized silica sand, cryogenically processed.
18. Infill Material Height:
 - a. Main Stadium: 1.75 inches
 - b. Auxiliary Field: 1.25 inches
19. The carpet shall be delivered in 15-foot wide rolls with the four (4") inch white, football 5-yard lines tufted into each roll, when applicable. The perimeter white line shall also be tufted into the individual sideline rolls, when applicable. The rolls shall be of sufficient length to go from sideline to sideline. Head seams, between the sidelines, will not be acceptable.
20. Provide game markings as follows: Hash marks, numbers, individual yard marks, and soccer, boys lacrosse, school logo and related markings shall be cut in and glued in accordance with Field Builder's recommendations. Provide markings as shown on Drawings.
21. Provide a school logo as shown on Drawings.

- ### B. Resilient Infill: A resilient infill system, consisting of a specially formulated mixture of approximately 3 lbs. per square foot of rubber and 3 lbs. per square foot of sand engineered to provide the look, feel, footing and shock absorption of a natural grass field in ideal conditions.
1. Ambiently ground SBR Crumb Rubber. Granules shall contain minimal dust or contaminants and shall be derived from the ambient processing form of recycled tires.
 2. Color shall be substantially black and shall meet the 10 - 20 or 8 - 16 mesh size designation.
 3. The clean, uniformly sized particles shall be consistent in shape and particle size distribution.

4. The particles shall resist abrasion in high traffic and excessive wear applications and provide stability to artificial sports turf applications.
5. The particles shall be processed and sized under rigid specifications and Manufacturers' statistical and quality control assurance program.
6. Particles shall be structurally pure and consistently uniform in size distribution for predictable performance.
7. Sand Particulate. The sand provided as a component of the infill mixture shall be rounded or sub-angular so as to minimize abrasion to the athlete and synthetic grass fibers.

2.03 VERTICAL DRAINAGE BASE MATERIALS

- A. Excavation: Existing natural grass field shall be excavated to the depth established by the Architect and as shown on the excavation plan. The sub grade shall be shaped to achieve a .5% (one half of one percent) slope from the center of the field to each sideline in order to mirror the grade of the finished synthetic turf surface. The subgrade shall be compacted and proof rolled to a minimum of a 95% compaction rate.
- B. Geotextile Filter Fabric: Non-woven polypropylene geotextile fabric shall be chemically and biologically inert and shall be Mirafi 140N, Mirafi Inc., Pendergrass, GA (888) 795-0808, or approved equal.
- C. Drainage Pipe: A network of perforated HDPE highway grade drainage pipe (1" x 12" flat panel pipe) shall be installed under a 6" layer of free draining base aggregate. The drainage pipe will be installed in a herringbone pattern every 20 feet on center and will be connected to 12" perimeter collector lines as shown on drawings.
 1. ADS AdvanEdge, 800-821-6710 or approved equal.
 - a. 1 inch by 12-inch flat drain.
 - b. 12-inch diameter perforated collector drainpipe.
 - c. Architect approved equal.
- D. Stone Base Courses:
 1. The free-draining base aggregate base layer shall consist of a consistent depth of open graded material. Base drainage aggregate used must achieve a 95% minimum overall compaction rate. Material shall conform to the AASHTO #57 limestone classification. The open graded aggregate material shall conform to the following criteria:

Base Aggregate: Open Graded Stone (OGS)	Weight Passing	Approximate Percentage Passing
2" Sieve	36.99	100.0%
3/4" Sieve	34.04	92.0%
3/8" Sieve	21.5	58.0%
#4 Sieve	9.34	25.0%
#16 Sieve	203.3 grams	9.2%

2. The choker material shall be AASHTO #8. Material must be clean.
 - a. Subject to architectural approval, local or regional stone specifications that meet compaction and porosity requirements are permitted.

Choker Material:	Weight Passing	Approximate Percentage Passing
1/2" Sieve	10.99 lbs.	100.0%
3/8" Sieve	10.23 lbs.	93.1%
#4 Sieve	2.13 lbs.	19.4%
#8 Sieve	0.18 lbs.	1.6%
#16 Sieve	0.12 lbs.	1.1%

2.04 MISCELLANEOUS MATERIALS

- A. Adhesives for bonding tufted synthetic turf shall be one-part moisture-cured polyurethane obtained from a single manufacturer and be equivalent to 34-G as manufactured by Synthetic Surfaces, Inc., Scotch Plains, NJ (908) 233-6803, or approved equal as designated by the Field Builder.
 - 1. Seaming Tape: Tape for securing seams in the tufted synthetic turf and inlaid lines shall be high quality tape made with a minimum roll width of 12 inches.
- B. Sewn seams: If seams are to be sewn, they must be sewn with high quality cord/thread as recommended by Field Builder.
- C. Line Painting: Line paint for game lines and field markings, where applicable, shall be as directed and approved by Field Builder. Acceptable synthetic turf paint manufacturers:
 - 1. Pioneer Paints: 800-877-1500
 - 2. World Class Paints: 800-748-9649
 - 3. Approved Equivalent

2.05 NEW GROOMING EQUIPMENT

- A. Provide one (1) Field Groomer with towing attachment compatible with a field utility vehicle.
 - 1. Product: FieldTurf GroomRight manufactured by FieldTurf.
 - 2. Product: GreensGroomer drag brush as manufactured by WorldWide, Inc., 888-298-8852. Must be electrical unit, model number 720SDE.
- B. Provide one (1) Field Sweeper with towing attachment compatible with a field utility vehicle.
 - 1. Product: FieldTurf SweepRight manufactured by FieldTurf.

PART 3 - EXECUTION

3.01 VERTICALLY DRAINING BASE

- A. The synthetic turf Base Contractor shall strictly adhere to the installation procedures outlined under this section. Any variance from these requirements must be accepted in writing, by the Field Builder's on-site representative, and submitted to the Architect/Owner, verifying that the changes do not in any way affect the warranty.
- B. Install geotextile fabric over excavated and prepared sub-grade in accordance Field Builder's recommendations. Provide a 36" minimum overlap at all seams. Fabric shall first be installed in the drainage trenches prior to installation of perimeter collector lines. After backfilling of all trenches is complete, the entire field shall be covered with fabric prior to the base aggregate application.
- C. Trenching, Drainage Pipe Installation and Backfilling: All piping shall be as specified and connected by Field Builder's couplers, plugs etc.
 - 1. The base grade shall be shaped to mirror the finished grade and approved by the Architect and/or Owner's Representative.
 - 2. Collector lines shall be installed before lateral lines and shall begin with the deepest elevations.
 - 3. Collector lines shall be connected to discharge outlet at the onset of operations.
 - 4. Trenching progress shall work upward in elevation to allow for immediate discharge of water from the entire field in the event of a rainfall.
 - 5. No trenches, with or without pipe, shall be permitted, to remain unfilled overnight and/or while crews are not progressively working on site.
 - 6. All perimeter trenches must be dug in accordance with the field drainage plan details.
 - 7. After all collector and lateral lines have been installed, repair any sub grade undulations prior to installing geotextile fabric.

- D. Concrete Header Curb and Pressure Treated Wood Turf Nailer: The synthetic turf perimeter fastening structure shall be installed before the drainage aggregate.
1. The 6" x 16" concrete header curb shall be installed in accordance with the Drawings and/or Shop Drawings and these Specifications.
 - a. The foundation of the concrete header curb shall be a compacted free draining aggregate.
 - b. Water entering the foundation shall have a free draining path directly to the perimeter collector pipe.
 2. Install a pressure treated wood 2" x 4" nailer.
 - a. Pressure treated wood nailer shall be set 1.5 inches below top of the curb by means of a Tapcon or ramset every 18 inches. See Drawings for synthetic turf surface connection detail.
- E. Base Drainage Aggregate: The installation of the base drainage aggregate shall only begin after the drainage pipe installation has been inspected and approved by Owner's Representative. Installation of the Free Draining Base Aggregate shall follow procedures that protect the base grade soils and drainage pipe. The drainage pipe network and its existing elevations shall not be disrupted through ground pressures from trucks, dozers or by any other means.
1. The base grade subsoil shall be dry before undertaking the placement of base aggregate.
 2. Delivery trucks shall enter the field only from the designated entrance point. Base course stone shall be dumped closest to the entrance first and continuously worked towards the furthest point of the field. Extreme care must be taken not to disturb sub grade or drainage network.
 3. Track-type dozers shall push out the stone from behind the pile onto and toward the field center. Dozers shall only traffic the aggregate they are spreading.
 4. Bulldozer blades shall be equipped with a laser-guided hydraulic system. Care shall be taken not to disturb or contact the base grade soils with the dozer blades or tracks. All equipment trafficking over the drainage aggregate shall insure there is a minimum depth of 4" of aggregate between the geotextile fabric and the dozer track ground contact position.
 5. When the aggregate spreading is completed, the surface shall be further-firmed by a 5-ton roller. Static vibration shall not be part of this process.
 6. The stone shall be left firm, but not over-compacted as to protect the porosity and drainage capabilities of the aggregate profile.
 7. After the drainage stone has been uniformly spread throughout the surface, the surface shall receive a final laser finished grade. This process shall be accomplished using a turf-type tractor, or lightweight grader, equipped with high flotation tires and a hydraulically controlled laser blade.
 8. The free-draining base course must be installed to a depth of 4.5 inches and shall be independently tested for an overall compaction rate of 95% proctor.
- F. Choker Levels: The base drainage stone final elevations shall mirror the proposed choker layer final grade material. Care shall be taken not to allow the coarser aggregate to surface into the profile or finished grade of the choker layer.
1. The choker layer shall be applied using high flotation grading equipment. The choker material shall be evenly spread throughout the proposed field surface to the final pre-pad or pre-turf elevations.
 2. After the choker material has been uniformly spread throughout the surface by the described method, the surface shall receive a final laser finish grade. This process shall be accomplished using a turf-type tractor, or lightweight grader, equipped with high flotation tires and a hydraulically controlled laser blade.

3. Care shall be taken throughout the installation not to force the choker material into the porosity of the base aggregate below.
 4. Final choke layer must be graded by means of a laser within 0 to 1/2 inch from design grade. The finished surface tolerance must not exceed ¼ inch over 10 feet in all directions. Provide a topographical survey with a minimum of 200 shots demonstrating finished grade meets all written requirements.
 5. Final layer of stone must be installed at a depth of 1.5 inches. Finished aggregate base must be proof-rolled by means of 2- to 5-ton roller. The finished aggregate base must achieve an overall compaction rate of 95% proctor in accordance with ASTM D1557. It shall also be flush with top of pressure treated wood nailer.
 6. Stringline the entire field every five feet to identify high and low spots. And identified high and low spots must be eliminated prior to installation of the synthetic turf.
- G. Base Acceptance: The Architect and/or Owner's Representative must jointly approve the base before turf installation can begin.
- H. Synthetic Turf and Infill Materials
1. After a final inspection of the base by the Field Builder and the Owner's Representative, the synthetic turf installation shall begin. The first roll shall begin with the longest perpendicular cross-field distance. No head seams shall be permitted in the inbound playing surface.
 2. The rolls of turf shall be rolled out a minimum of four hours prior to starting seaming procedures and allowed to relax/expand.
 3. All visible wrinkles shall be stretched out before seaming.
 4. Seams shall be flat, tight and permanent with no separation or fraying.
 5. Synthetic turf yarn fabric that is trapped or glued between seams shall be freed from the seams by hand or other approved method to an upright position prior to the commencement of brushing and top dressing procedures.
 6. All synthetic turf seams shall be assembled as follows: The full width rolls shall be laid out across the field. Utilizing standard state of the art sewing procedures, each roll shall be attached to the next.
 7. When all of the rolls of the playing surface have been installed, the sideline areas shall be installed perpendicular to the playing field. The yard lines, game markings, sidelines, etc. of all applicable sports shall be tufted into carpet by the manufacturer wherever possible.
 8. After all seaming is completed and inlaid lines, logos and lettering have been installed; the infill materials shall be spread evenly, using a drop spreader or top dresser.
 - a. Crumb rubber and sand shall be applied in a uniform rate of multiple applications until the specified infill depth is achieved.
 - b. Infill material shall be brushed between infill applications with a motorized rotary broom and pull-type groomer brush simultaneously.
 - c. A minimum infill rate of 3 lbs. of rubber and 3 lbs. of sand per square foot is required.
- I. Tufted and Inlaid Lines
1. Layout and descriptions of tufted, inlaid and/or painted lines shall be as indicated on final shop drawings.
 2. Inlaid lines and field markings shall be cut in using seaming methods recommended by the Field Builder.
- J. Synthetic Turf Perimeter Attachment:
1. After final trimming of the turf, the turf shall be screwed, nailed or stapled to the pressure treated wood nailer system.

3.02 FIELD LAYOUT

- A. Field layout shall be as shown on the record drawings.
 - 1. Mark approved changes that took place during the installation in red and resubmitted.

3.03 CLOSEOUT

- A. Verify that a qualified representative has inspected the installation and that the finished field surface conforms to the manufacturer's requirements.
- B. Provide the pull behind maintenance brush grooming equipment.
- C. Provide a warranty that covers defects in materials and workmanship of the turf for a period of 8 years from the date of Substantial Completion.
- D. Submit three (3) copies of its standard maintenance manual to the Owner.
- E. Train Owner's designated field personnel in proper grooming and care procedures. This includes training field personnel how to properly use grooming equipment as well as make minor repairs.
- F. Extra materials: Field Builder must leave 500 lbs. of rubber granules and the equivalent of 15' x 10' (all pieces combined) of turf with Owner before leaving job site.
 - 1. Leave all salvageable pieces of colored turf remaining after installation.

3.04 CLEAN UP

- A. Provide the labor, supplies and equipment as necessary for final cleaning of surface and installed items.
- B. All usable remnants of new material shall be neatly rolled up and turned over to the Owner at a place and area designated by the Owner.
- C. During the contract and at intervals as directed by the Construction Manager and as synthetic turf installation is completed, clear the site of all extraneous materials, rubbish, or debris and leave the site in a clean, safe, well draining, neat condition.
- D. Surface, recesses, enclosures, etc. shall be cleaned as necessary to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner.

END OF SECTION

SECTION 32 18 17
SYNTHETIC TRACK SURFACING SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. This Section includes the following:
 - 1. All weather resilient synthetic track surface over asphalt base, with striping.

1.02 SCOPE

- A. The synthetic surfacing contractor shall furnish all labor, materials, equipment, supervision and services necessary for the proper completion of the synthetic track surfacing system and related work indicated on the drawings and specified herein.
- B. The synthetic surfacing contractor shall refer to the drawings for the required locations of synthetic track surfacing to be installed. All quantities and dimensions shall be field verified by the synthetic surfacing contractor.

1.03 SPECIFIC SCOPE OF WORK

- A. Install an IAAF approved, impermeable polyurethane synthetic track system consisting of SBR Rubber and a single component polyurethane binder and a poured in place, two component U.V. stabilized elastomeric polyurethane wearing layer with an embedded textured finish.
- B. Layout and paint all lines and event markings as required and specified by current NFSHSA, IAAF, and NCAA rules.

1.04 COORDINATION

- A. The synthetic surfacing contractor shall coordinate the work specified with an authorized and appointed representative of the owner so as to perform the work during a period and in a manner acceptable to the owner.

1.05 APPLICABLE PUBLICATIONS

- A. Codes and standards follow the current guidelines set forth by the International Amateur Athletic Federation (IAAF) and the National Collegiate Athletic Association (NCAA), along with the current material testing guidelines as published by the American Society of Testing and Materials (ASTM).

1.06 SUBMITTALS

- A. Product Data: For material indicated.
- B. Samples for Verification: For each type and color of material required.
- C. Product Certificates: Signed by manufacturers of track surface certifying that products furnished comply with requirements and are suitable for the use indicated.
- D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- E. Test results from an IAAF Testing Laboratory confirming compliance to the performance of athletic tracks test according to the IAAF.

1.07 PERFORMANCE STANDARDS

- A. The synthetic track surfacing system shall exhibit the following minimum performance standards as required by IAAF:

- | | |
|----------------------------------|---------------------------|
| 1. Thickness | > 13mm |
| 2. Force Reduction | 35 to 50% |
| 3. Modified Vertical Deformation | 0.6 to 1.8mm |
| 4. Friction | > 47 TRRL Skid Resistance |
| 5. Tensile Strength | > 0.5 MPa |
| 6. Elongation at Break | > 40% |

1.08 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced factory trained installer who has specialized in installing similar in material, design, and extent to those indicated for this Project and whose work has resulted with a record of successful in-service performance.
- B. The uniformity of both grade and planarity is intended to meet governing body specifications. Slopes shall meet those set forth in the rules for track and field for the intended use of the facility (NFSHSA). Complete rules and regulations are available from the National Federation of State High School Associations (NFSHSA) at 816-464-5400. Slopes shall not be less than .75%. Finished slopes shall match those shown on the grading plans.
- C. The finished surface of the leveling course shall not vary more than 3/16" in any direction when measured with a 10' straight-edge. Elevations shall be taken every twenty-five feet in the running direction at the inside edge, centerline and outside edge of track. Elevations on the high jump shall be taken on a 10' grid. Any area that does not have the correct cross slope shall be documented and reported to the owner prior to construction start up and staging of materials.
- D. Track surfacing contractor shall check the asphalt for compliance, and reject, for correction, any base which is not within specifications.
- E. Certification - Upon the completion of the stone and asphalt base, the construction shall be checked by a licensed professional engineer or land surveyor for compliance with the lines and grades set forth in the plans and specifications. Upon completion of the survey, the licensed professional engineer or land surveyor shall certify that the track and field events are constructed in accordance with the plans and specifications.
- F. Line striping and event markings shall be laid out in accordance with current IAAF and NCAA rules.
 - 1. Upon Completion of the installation, the owner shall be supplied with all necessary computations and drawings as well as a letter of certification attesting to the accuracy of the markings.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation.
- B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.10 PROJECT CONDITIONS

- A. Asphalt Substrate: The asphalt upon which the TRACK SURFACE is installed shall be clean, free- draining, and shall exhibit the planarity and tolerances set forth in Court and Field Diagram Guide as published by the National Federation of State High School Associations (NFSHSA).
- B. Weather Conditions: The quality of the installation is dependent upon proper weather conditions. No installation shall be made when rain is imminent or when ambient temperatures are below 50 degrees F. It is best to install the system in sunny weather with day-time

temperatures of at least 60 degrees F. When night-time temperatures fall below 45 degrees F, the system should not be installed.

- C. Installation shall not take place if adjacent or concurrent construction generates excessive dust, abrasives or any other by-product that, in the opinion of the installer, would be harmful to the track material, until completion of such works.

1.11 WARRANTY

- A. All synthetic track surfaces shall be fully warranted against defects in workmanship and materials. The specific length of the warranty shall be five (5) years. The contractor shall repair or replace defective surface at no cost to the owner. Excluded from the warranty are defects caused by faulty design, acts of God, improper maintenance, abuse, and uses other than those set forth above. The owner is required to maintain the facility in accordance with the maintenance instructions which are provided with the warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Beynon Sports Surfaces, Inc.
16 Alt Road
Hunt Valley, MD 21030
Phone: 410-771-9473
Fax: 410-771-9479
Email: dbeynon@beynonsports.com
- B. Advanced Polymer Technology Headquarters
109 Conica Lane, P. O. Box 160
Harmony, PA 16037
Phone: 724-452-1330
Fax: 724-452-1703
Email: info@advpolytech.com, www.recortanspurtan.com

2.02 MATERIALS, GENERAL

- A. Elastomeric Polyurethane
 - 1. Two component U.V. stabilized elastomeric polyurethane compounded from polyol and isocyanate components, based on one hundred percent (100%) Methylene Diphenyl Isocyanate (MDI). No Toluene Diisocyanate Isocyanate (TDI) will be allowed.
 - 2. The elastomeric polyurethane color shall be verified with owner/architect.
- B. EPDM Granulate
 - 1. The EPDM granulates shall be 1 to 3mm in size and peroxide cured.
 - 2. The EPDM granulates and the U.V. stabilized elastomeric polyurethane shall be color matched.
- C. Rubber Granulate of the Base Course
 - 1. Styrene Butadiene Rubber (SBR) processed ground to a graded size of 1 to 3mm.
 - 2. A maximum of 82%, by weight of the paved-in-place base layer, of SBR will be allowed.
- D. Single Component Polyurethane Binder
 - 1. Shall be a single-component polyurethane binder with a long cure time for use in paved mat specifications. A minimum of 18%, by weight of the paved-in-place base layer.
- E. Seal Coat
 - 1. Shall be a two-component polyurethane pore sealer used with paved rubber granule mats. The granular SBR and binder layer shall be sealed with the two-component polyurethane pore sealer. The application of EPDM dust is not allowed.

- F. Line Marking Paint
 - 1. Single-component, moisture cured, aliphatic polyurethane paint.
- G. Colors:
 - 1. Provide standard "Brick" color for track and other areas shown.
 - 2. Provide custom color for "D" areas inside track as shown.

2.03 REPRESENTATIVE PRODUCT

- A. Basis of Design:
 - 1. Product: BSS 300 Embedded Synthetic Track Surfacing System manufacturer by Beynon Sports Surfaces, Inc.
- B. Acceptable Products:
 - 1. Product: Spurtan BV manufactured by Rekortan/Advanced Polymer Technology.
 - 2. epiQ TRACKS x 1000
 - a. Certified installer:
 - 1) Hellas Construction Inc. (800) 233-5714
12710 Research Blvd. Suite 240
Austin, Texas 78759
Phone: 512-250-2910
Fax: 512-250-1960
Email: www.hellasconstruction.com

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine existing track surface for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting track surface performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Sub-base
 - 1. The Synthetic Track Surfacing System shall be laid on an approved sub-base. The General Contractor shall provide compaction test results of 95% or greater for the installed sub-base and asphalt surface.
 - 2. For NCAA certification the following criteria must be followed. The track surface, i.e. asphalt substrate, shall not vary from planned cross slope by more than + .2%, with a maximum lateral slope outside to inside of 1%, and a maximum slope of 0.1% in any running direction. The finished asphalt shall not vary under a 10' straight edge more than 1/8".
 - 3. It should be the responsibility of the asphalt-paving contractor to flood the surface immediately after the asphalt is capable of handling traffic, but within 24 hours. If, after 20 minutes of drying time, there are birdbaths evident, it shall be the responsibility of the architect, in conjunction with the surfacing contractor to determine the method of correction. No cold tar patching, skin patching or sand mix patching will be acceptable.
 - 4. Any oil spills (hydraulic, diesel, motor oil, etc.) must be completely removed, either by chipping out or removing and replacing with new, keyed in asphalt. The minimum depth of any asphalt replacement shall be one inch. The curing time for the asphalt base is 28 days. It shall be the responsibility of the surfacing contractor to determine if the asphalt substrate has cured sufficiently prior to the application of polyurethane surfacing system.
 - 5. It shall be the responsibility of the track surface contractor to determine if the asphalt substrate meets all design specifications, i.e. cross slopes, planarity and specific project

criteria. After all the above conditions are met, the synthetic surfacing contractor must, in writing, accept the planarity of the asphalt receiving base, before work can commence.

B. Thickness

1. The thickness of the Synthetic Track Surfacing System shall be 13mm.

C. Equipment

1. The Synthetic Track Surfacing System components shall be processed and installed by specially designed machinery and equipment. A mechanically operated paver with variable regulated speed and thermostatically controlled screed shall be used in the installation of the base mat. The wearing course shall be installed using automatic electronic portioning, which provides continuous mixing and feeding for an accurate, quality controlled installation.

D. Installation

1. Base Course - The SBR granules and single compound polyurethane binder shall be mixed together on site to regulate the ratio/quantity of SBR, not to exceed 82% in the base mat portion of the system. The single compound polyurethane binder shall be mixed with the SBR rubber so that a minimum of 20%, by weight, exists in the final mixture. This mixture is then mechanically installed using the paver.
2. Seal Coat - The two component polyurethane pore sealer shall be mixed at the prescribed ratio homogeneously with a suitable mixing device. The coating is squeegee applied to the base mat, making it impermeable. EPMD dusting in not allowed.
3. Wearing Course - The 1 to 3mm EPDM granules shall be integrated into the two-component U.V. stabilized elastomeric polyurethane to achieve the full depth of the 5 mm wearing course. The resilient embedded textured finish shall be a dense matrix of exposed EPDM granules. The homogeneous wearing course shall be applied in situ with the base course.

3.03 POST-INSTALLATION INSPECTION

- A. Mat Construction: The track and field event surface shall be constructed in accordance with methods approved by the manufacturer of the system.
- B. The finished surface shall be uniform in appearance, depth and density.
- C. Provide track markings in accordance with NFSHSA, IAAF, and NCAA rules and regulations.

3.04 CERTIFICATION

- A. Upon completion of the installation, the owner shall be supplied with all necessary computations and drawings as well as a letter of certification attesting to the accuracy of the markings.

3.05 CLEANING

- A. Clean off excess material as the Work progresses by methods and with cleaning materials approved by product manufacturers.

3.06 PROTECTIO

- A. Protect track surface during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so track surfaces are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated track surface immediately so installations with repaired areas are indistinguishable from the original work.

3.07 GUARANTEE

- A. The Synthetic Track Surfacing System shall be fully guaranteed against faulty workmanship and material failure for a period of five (5) years from the date of acceptance.

- B. Synthetic surfacing material found to be defective as a result of faulty workmanship and/or material failure shall be replaced or repaired at no charge, upon written notification within the guarantee period.

END OF SECTION

SECTION 32 18 18
TENNIS COURT PAVEMENT SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. All weather resilient acrylic-bound tennis courts over asphalt base, with striping.

1.02 RELATED SECTIONS

- A. Division 321216 "Asphalt Paving" for constructing asphalt concrete paving base platform for tennis court upon which surface mix is to be placed.
- B. Section 116820 "Outdoor Athletic Equipment" for Tennis Nets and equipment.
- C. Section 323113 "Chain Link Fences" for surrounding fencing.

1.03 SUBMITTALS

- A. Product Data: For material indicated, along with test data from an independent testing lab. Test results for weatherometer test, flexibility test and water resistance test.
- B. Samples for Verification: For each type and color of material required.
- C. Product Certificates: Signed by manufacturers of tennis surface certifying that products furnished comply with requirements and are suitable for the use indicated.
- D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.04 QUALITY ASSURANCE

- A. General Contractor / Bidder Qualifications:
 - 1. The bidder shall be engaged in the construction of Tennis Court Construction as a primary business enterprise and shall demonstrate the construction of six (6) complete tennis court projects within the last 3 years. Financial statements for the previous three (3) years will be made available upon request. Asphalt paving contractor and colorcoating surfacing contractor must be listed on the list of subcontractor form with the bid proposal.
- B. Asphalt Paving Contractor Qualifications:
 - 1. The contractor/sub-contractor, shall to the satisfaction of the design professional for this project, demonstrate a proven capability, specifically, in the construction of asphalt pavements for tennis court surfaces and have been in business, under the present name a minimum of five (5) years from the date of this bid. Upon request, financial statements for the previous five (5) years will be made available upon request.
 - 2. All asphalt leveling and asphalt layers are to meet the tolerances of the American Sports Builders Association (ASBA) guidelines and the National Federation of State High School Association (NFSHSA) requirements. It shall be the contractor's responsibility to demonstrate his/her ability to achieve all requirements concerning cross slope, longitudinal slope, planarity and compaction as outlined in these association's manuals.
 - 3. The contractor/sub-contractor shall construct all hot mix asphalt layers utilizing an asphalt paver that is equipped with a laser controlled screed board and automatic slope control. The laser level that is used to control this work shall be recently calibrated and certified as to the accuracy of the instrument.

4. The contractor/sub-contractor shall demonstrate that he has, satisfactorily, completed at least six (6) tennis court projects in the past three years, utilizing the laser and slope controls, including certifications for this work. Upon request, the contractor/sub-contractor shall be required to furnish a report, from an independent Professional Engineer or Licensed Surveyor certifying that the installed asphalt meets or exceeds the related guidelines and requirements for asphalt pavements relating to tennis courts.
- C. Colorcoating Surfacing Contractor Qualifications:
1. The contractor/sub-contractor, shall to the satisfaction of the design professional for this project, demonstrate a proven capability, specifically, in the installation of Colorcoat Systems of the scope and type proposed for this project and demonstrate that they have been in business, under the present name, a minimum of five (5) years from the date of this bid. Upon request, financial statements for the five previous years shall be required.
 2. Upon request and for evaluation of previous installations, the surfacing contractor/sub-contractor shall furnish the name, owner and contact person for every tennis court surface that they have installed in the three previous years.
- D. Acceptance Test: Prior to application of a color finish system, the court surface shall be flooded with water and allowed to drain for one hour at 70 degrees. There shall be no ponding or bird bath areas on the tennis courts deeper than a U.S. nickel laid flat. Any ponding or bird bath areas not meeting this requirement shall be patched and leveled by the Contractor. Reflood and patch until "birdbaths" are eliminated.
- E. Quality Assurance: Comply with Delaware Department of Transportation Standard Specifications, latest edition.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation.
- B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.06 PROJECT CONDITIONS

- A. Weather Limitations: Do not apply prime and tack coats when temperature is below 50 deg F (10 deg C) or when base is wet. Apply hot-mixed asphalt paving only when temperature is above 40 deg F (4 deg C) and when base is dry
- B. Drainage: The areas adjacent to the tennis courts shall be graded to drain surface water away from the stone and asphalt base. Subsurface drainage shall provide for a free flow of subsurface moisture away from the stone base.

1.07 WARRANTY

- A. The TENNIS COURTS shall be warranted against defects in workmanship and materials and structural cracking. The specific length of the warranty shall be five (5) years. The contractor shall repair or replace defective surface at no cost to the owner. Excluded from the warranty are defects caused by faulty design, acts of God, improper maintenance, abuse, and uses other than those set forth above. The owner is required to maintain the facility in accordance with the maintenance instructions which are provided with the warranty. Warranty shall be in the form of a Performance Bond.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

- A. Tennis Court Surfacing Materials shall be:

1. Novacrylic® , as manufactured by Nova Sports U.S.A., 6 Industrial Rd., Bldg. #2., Milford, MA 01757. 800- USA-NOVA or approved equal. All coatings shall be pure acrylic, containing no asphaltic or tar emulsions, nor any vinyl, alkyd or non-acrylic resins. The color system shall be factory-mixed compounds requiring only the addition of water at the jobsite except for the addition of sand to Novasurface® . All materials shall be delivered to the jobsite in sealed containers with the manufacturer's label affixed.
- B. Line paint shall be factory-compound product compatible with asphalt. White line paint shall be American Tennis Courts or approved equal Latexite Acrylic Line Paint. Use undiluted for painting of playing lines.
- C. Tennis nets and posts shall be furnished by other trades and installed by the contractor.
- D. Ground sleeves shall be Schedule 40 P.V.C. for tennis net posts. Note: Provide sleeves with a special cannon plug "air tight" seal, to prevent anchor slippage from concrete footing when tennis net s are set too tight. Length and method as recommended by tennis post manufacturer.
- E. Center tie-down anchors shall be American Tennis Courts or approved equal "Sure Grip" metal center tie-down anchors. Anchors shall contain an industrial grade steel collar, welded in place to prevent anchor slippage from concrete footing when tennis nets are set too tight.
- F. Surface Course: Type D, meeting the requirements of DOT Specifications, Section 401.
- G. Leveling Course: Type C, meeting the requirements of DOT Specifications, Section 401.
- H. Graded Aggregate Base Course: DOT Specifications Section 302 and Section 821, (Type B crusher run)
- I. Concrete: "Class B" (3,000 psi) meeting the requirements of DOT Specifications, Section 602.
- J. Stonedust: DOT Specifications, Section 307 and Section 813, (gradation requirements Del No. 10).
- K. Herbicide Treatment: Commercial chemical for weed control, registered by Environmental Protection Agency and approved by the State of Delaware. Provide granular, liquid, or wettable powder form.
- L. Manufacturers: Subject to compliance with requirements, provide products of one of the following:
 1. Allied Chemical Corp.
 2. Achem Products, Inc.
 3. Ciba-Geigy Corp.
 4. Dow Chemical U.S.A.
 5. E.I. Dupont De Nemours & Co., Inc.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine base course with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting tennis court surface performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 CONSTRUCTION PREPARATION

- A. Proof roll the subgrade and do all necessary rolling and compaction to obtain a firm, even subgrade surface conforming to the lines and grades set forth on the plans and consolidate depressed areas. Remove all unsuitable materials, replace with clean fill, and compact to 100% of the maximum dry density in accordance with ASTM D-1557 Modified Proctor Method.

3.03 INSTALLATION: STONE BASE

- A. Herbicide Treatment: Apply chemical weed control agent in strict compliance with manufacturer's recommended dosages and application instructions. Apply to compacted, dry subbase prior to application of prime coat.
- B. Filter Fabric: Install filter fabric over area to receive base.
- C. Spreading: The stone base material shall be spread by methods, and in a manner proposed by the contractor to produce a uniform density and thickness and the grades and dimensions shown on the drawings.
- D. Compaction: The stone base shall be compacted by rolling with a powered steel wheel tandem roller weighing not less than eight tons. The compacted surface of the stone base shall not vary more than 1/2" from the required elevations.
- E. Furnish and install stone dust to fill all cracks and construct minimum one inch (1") compacted thickness layer over the stone base surface. The stone dust shall be dampened and placed into all surface cracks and compacted with a vibrator plate compactor so that the compacted stone is level with the adjacent tennis court surface. The Contractor shall continue to place and dampen the stone dust to achieve maximum compaction with a three to five ton (3-5 ton) roller(s) placing thin layers of stone dust, until there is a minimum of one inch (1") thick compacted layer of stone dust. The average in-place density shall be at least 95% of the lab density when tested in accordance with the appropriate AASHTO requirements. The finished surface of the stone dust base course shall not vary more than one-quarter inch (1/4") in ten feet (10') when measure in any direction. Coordinate installation of ground sleeves.

3.04 INSTALLATION: LEVELING COURSE

- A. Paving joints in the Leveling Course and Surface Course shall be constructed so as to prohibit joints being placed directly upon one another. The contractor may criss-cross paving operations of the Leveling and Surface Courses (but the surface asphalt course must be laid perpendicular to the net line) on the Stone Dust Sub-Base, or by varying the width of the paving passes, if courts are to be paved in the same directions. Compaction shall be performed in accordance with the requirements contained elsewhere in the Contract Documents.
- B. Construct a Bituminous Stabilized Leveling Course Mix Type C, two and one half inches (2-1/2") Compacted Thickness, over the Stone Dust Sub-Base followed by the construction of a Bituminous Concrete Surface course Mix Type D.
- C. Spreading: The asphalt mixture shall be spread using a mechanical asphalt spreader, the condition of which shall be suitable for achieving the tolerances specified hereinafter. The minimum compacted thickness shall be 2" as indicated on the drawings.
- D. Compaction: The asphalt mixture shall be thoroughly compacted with a steel wheel tandem roller weighing not less than four tons. The finished surface of the leveling course shall not vary more than 1/4" from the required elevations.

3.05 INSTALLATION: SURFACE COURSE

- A. Following the construction of the Bituminous Concrete Surface Course Mix Type D, check the entire newly constructed surface for depressions over one-eighth inch (1/8"). The Contractor shall check the finished surface with a ten foot (10') straight edge; projections and/or depressions of more than one-eighth inch (1/8") in ten feet (10') shall be corrected before proceeding. The contractor shall asphalt patch any and all depressions one-half inch (1/2") and over.
- B. Spreading: The asphalt mixture shall be spread using a mechanical asphalt spreader, the condition of which shall be suitable for achieving the tolerances specified hereinafter. The minimum compacted thickness shall be 1.5" as indicated on the drawings.

- C. Compaction: The asphalt mixture shall be thoroughly compacted with a steel wheel tandem roller weighing not less than four tons. The finished surface of the surface source shall not vary more than 1/8" from the required elevations, nor shall it vary more than 1/8" in any direction when measured with a ten- foot straightedge.
- D. Allow fourteen (14) days curing time for the Asphalt Surface Course before proceeding with the scraping and cleaning of loose material(s) from the entire surface area.

3.06 POST-INSTALLATION INSPECTION

- A. Inspection of Completed Asphalt Paving: Upon completion, the asphalt pavement shall be inspected by a licensed professional engineer or land surveyor. The inspection shall verify that the dimensions, slopes and elevations of the asphalt paving meet the tolerances set forth herein. Areas of the asphalt paving which do not meet the tolerances shall be corrected by the paving contractor. High spots shall be milled to the proper elevations, or may be cut out and replaced. Low areas shall be corrected by removing the 1.5" surface course of asphalt and replacing with hot surface course plant mix.

3.07 ACRYLIC FINISH INSTALLATION

- A. New asphalt pavement shall cure for 14 days prior to application of any surfacing materials.
- B. Contractors must notify the Landscape Architect of all applications, 48 hours prior to installation. The surface to be coated shall be inspected and made sure to be free of grease, oil, dust, dirt and other foreign matter before starting work.
- C. The surface shall be flooded. Any ponding water remaining that is deep enough to cover the thickness of a five-cent piece shall be corrected using a patch mix consisting of Novabond® , 50-mesh sand and Portland cement, as per manufacturers directions. Depressions must be primed with a 50% dilution of Novabond® and water prior to patching.
- D. Application shall proceed only if the surface is dry and clean and the temperature is at least fifty degrees (50°F) and rising, and the surface temperature is not in excess of one hundred forty degrees (140°F). Do not apply coatings when rain is imminent.
- E. Each coat in this system must dry completely before next application. Between each coat, inspect entire surface. Any defects should be repaired. Scrape surface to remove any lumps, and broom or blow off all loose matter.
- F. Using a neoprene rubber squeegee, apply one (1) coat of Novasurface® acrylic resurfacer, diluted with one (1) part clean water to two (2) parts Novasurface® . Clean, bagged sand shall be incorporated into the diluted Novasurface® at the rate of five (5) to ten (10) Lbs. per gallon. Sand gradation shall be 50 to 60- mesh. Allow application to dry thoroughly.
- G. Using a neoprene rubber squeegee, apply two (2) coats of Novafil® , diluted two (2) parts concentrated material to one (1) part clean water (colors to be designated by owner). Allow each application to dry thoroughly. The quantity of water used in diluting these coatings may exceed the quantity specified by only a small amount and only if coatings are drying too rapidly. Permission of the owner shall be obtained before adding additional water.
- H. Using a neoprene rubber squeegee, apply one (1) coat of Novacoat® , diluted one (1) part concentrated material to one (1) part clean water (colors to be designated by owner). Allow application to dry thoroughly. The quantity of water used in diluting these coatings may exceed the quantity specified by only a small amount and only if coatings are drying too rapidly. Permission of the owner shall be obtained before adding additional water.

3.08 ACRYLIC FINISH INSTALLATION LINE MARKINGS

- A. Upon completion and acceptance of the tennis surface, this Contractor shall prepare and paint lines for tennis.

- B. All lines are to be applied by painting between masking tape with a paintbrush or roller, according to U.S.T.A specifications.
- C. Prime masked lines with Seal-A-Line® . Allow application to dry.
- D. Paint lines with Novatex® textured line paint. Allow application to dry. E. Remove masking tape immediately after lines are dry.
- E. Protect adjacent areas and structures (fences, posts, sidewalks, buildings, etc.), which are not to be coated.
- F. In the event that coatings are applied to above, remove immediately before drying is complete.

3.09 COMPLETION

- A. Upon completion, the contractor shall insure proper removal of all construction debris, surplus materials, empty containers and wash water, and shall leave the site in a condition acceptable to the owner. The court is to be left secure so as to prevent vandalism.

3.10 CLEANING

- A. Clean off excess material as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur. Upon completion remove all containers, debris, etc. and leave the site in acceptable condition.3.9

3.11 PROTECTION

- A. Protect tennis court surface during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so track surfaces are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated tennis court surface immediately so installations with repaired areas are indistinguishable from the original work.

END OF SECTION

SECTION 32 31 13
CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Galvanized-steel chain link fabric.
 - 2. Galvanized-steel framework.

1.02 RELATED SECTIONS

- A. Division 31 Section "Earth Moving" for filling and grading work.
- B. Division 03 Section "Cast-in-Place Concrete" for concrete for post footings.

1.03 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data in the form of manufacturer's technical data, specifications, and installation instructions for fence and gate posts, fabric, gates, gate operators, and accessories.
- C. Shop drawings showing location of fence, gates, each post, and details of post installation, extension arms, gate swing, hardware, and accessories.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has at least three years' experience and has completed at least five chain link fence projects with same material and of similar scope to that indicated for this Project with a successful construction record of in-service performance.
- B. Single-Source Responsibility: Obtain chain link fences and gates, including accessories, fittings, and fastenings, from a single source.

1.05 PROJECT CONDITIONS

- A. Field Measurements: Verify layout information for fences and gates shown on the Drawings in relation to the property survey and existing structures. Verify dimensions by field measurements.

1.06 MISCELLANEOUS REQUIREMENTS

- A. Deliver, store, uncrate, handle and install in manner to prevent damage to equipment.
- B. Remove promptly from site all debris resulting from installation of materials and equipment specified herein.
- C. Finish of all materials and equipment shall be appropriate for exterior locations.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Dimensions shown for pipe, roll-formed, and H-sections are outside dimensions.
- B. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 - 1. Allied Tube and Conduit Corp.
 - 2. Anchor Fence, Inc.
 - 3. Wheatland Tube
 - 4. Davis Walker Corp.
 - 5. Dominion Fence and Wire Prod.
 - 6. United States Steel

2.02 FABRIC - FENCING

- A. Selvage: Knuckled at both selvages for heights 72 inches and below. Heights above 72" shall be twisted (barbed) at one end and knuckled at the other.
- B. Steel Chain-Link Fence Fabric: Fabricated in one-piece widths for fencing 12 feet and less in height to comply with Chain Link Fence Manufacturers Institute (CLFMI) "Product Manual" and with requirements indicated below:
 - 1. Mesh and Wire Size:
 - a. Standard Fence - 2-inch mesh, 0.148-inch diameter (9 gauge).
 - b. Backstops - 2 -inch mesh, 0.192 diameter (6 gauge) lower panels, 2- inch mesh, 0.148 inch diameter (9 gauge) upper panels.
 - 2. Coating: ASTM A 817, Type 2, Class 2, zinc-coated, hot dipped galvanized after weaving (GAW).
- C. All baseball/softball , backstops, auxiliary stadium, football stadium and tennis fencing shall be PVC coated as follows:
 - 1. Coating: ASTM F 668, Class 2A, PVC.
 - 2. PVC Coating Color: Black

2.03 FRAMING

- A. Round member sizes are given in actual outside diameter (OD) to the nearest thousandth of inches. Round fence posts and rails are often referred to in ASTM standard specifications by nominal pipe sizes (NPS) or the equivalent trade sizes in inches. The following indicates these equivalents all measured in inches:

Actual OD	NPS Size	Trade Size
1.315	1	1-3/8
1.660	1-1/4	1-5/8
1.900	1-1/2	2
2.375	2	2-1/2
2.875	2-1/2	3
3.500	3	3-1/2
4.000	3-1/2	4
6.625	6	6-5/8
8.625	8	8-5/8

- B. Type I Round Posts: Standard weight (schedule 40) galvanized-steel pipe conforming to ASTM F 1083, according to heavy industrial requirements of ASTM F 669, Group IA, with minimum yield strength of 25,000 psi, not less than 1.8 oz. of zinc per sq. ft. Type A coating inside and outside according to ASTM F 1234, as determined by ASTM A 90, and weights per foot as follows:

Actual OD	Weight (lb/ft)	NPS Size
1.315	1.68	1
1.660	2.27	1-1/4
1.900	2.72	1-1/2
2.375	3.65	2
2.875	5.79	2-1/2
3.500	7.58	3
4.000	9.11	3-1/2
6.625	8.97	6
8.625	28.55	8

- C. Top Rail: Manufacturer's longest lengths (17 to 21 feet) with swaged-end or expansion-type coupling, approximately 6 inches long for joining. Provide rail ends or other means for attaching top rail securely to each gate corner, pull, and end post.
 - 1. Round Steel: 1.660-inch OD Type I or II steel pipe.
- D. Framing
 - 1. Steel posts for fabric heights under 6 feet:
 - a. Round Line or Intermediate Posts: 1.900-inch OD Type I or II steel pipe.
 - b. Round End, Corner, and Pull Posts: 2.375-inch OD Type I or II steel pipe.
 - c. Top Rail: Manufacturer's longest lengths, with expansion type couplings, approximately 6" long, for each joint. Provide means for attaching top rail securely to each gate, corner, pull and end post.
 - 1) 1.66O OD pipe, 2.27 lbs. per ft.
 - d. All baseball/softball, auxiliary stadium and football stadium fence frames, posts and fittings shall be PVC coated according to the following:
 - 1) Coating: ASTM F 668, Class 2A, PVC.
 - 2) PVC Coating Color: Black.
 - 2. Steel posts for fabric heights of 6 feet:
 - a. Round Line or Intermediate Posts: 2.375-inch OD Type I or II steel pipe.
 - b. Round End, Corner, and Pull Posts: 2.875-inch OD Type I or II steel pipe.
 - c. Top Rail: Manufacturer's longest lengths, with expansion type couplings, approximately 6" long, for each joint. Provide means for attaching top rail securely to each gate, corner, pull and end post.
 - d. All baseball/softball including backstops, auxiliary stadium and football stadium fence frames, posts and fittings shall be PVC coated according to the following:
 - 1) Coating ASTM F 668, Class 2A, PVC.
 - 2) PVC Coating Color: Black.
 - 3. Steel posts for fabric heights of 8 feet:
 - a. Round Line or Intermediate Posts: 2.875-inch OD Type I or II steel pipe.
 - b. Round End, Corner, and Pull Posts: 3.500-inch OD Type I or II steel pipe.
 - c. Top & Center rail: Manufacturer's longest lengths, with expansion type couplings, approximately 6" long, for each joint. Provide means for attaching top rail securely to each gate, corner, pull and end post.
 - d. All baseball/softball including backstops, auxiliary stadium and football stadium fence frames, posts and fittings shall be PVC coated according to the following:
 - 1) Coating ASTM F 668, Class 2A, PVC.
 - 2) PVC Coating Color: Black.
 - 4. Backstops:
 - a. Round Line or Intermediate Posts: 4.000-inch OD Type I or II steel pipe.
 - b. Round End, Corner, and Pull Posts: 4.000-inch OD Type I or II steel pipe.
 - c. Top Rail, center rail & bottom rail: Manufacturer's longest lengths, with expansion type couplings, approximately 6" long, for each joint. Provide means for attaching top rail securely to each gate, corner, pull and end post.
 - 1) 1.66O OD pipe, 2.27 lbs. per ft.
 - d. All baseball/softball fence and backstop frames, posts and fittings shall be PVC coated according to the following:
 - 1) Coating: ASTM F 668, Class 2A, PVC.
 - 2) PVC Coating Color: Black.
 - 5. Tennis courts:
 - a. Round Line or Intermediate Posts: 3.500-inch OD High strength, HS 83K, Type I or II steel pipe.

- b. Round End, Corner, and Pull Posts: 4.000-inch OD High strength, HS 83K, Type I or II steel pipe.
- c. Top Rail, center rail & bottom rail: Manufacturer's longest lengths, with expansion type couplings, approximately 6" long, for each joint. Provide means for attaching top rail securely to each gate, corner, pull and end post.
 - 1) 1.660 OD pipe, 2.27 lbs. per ft.
- d. All tennis court frames and fittings shall be PVC coated according to the following:
 - 1) Coating: ASTM F 668, Class 2A, PVC.
 - 2) PVC Coating Color: Black.

2.04 FITTINGS AND ACCESSORIES

- A. Material: Comply with ASTM F 626. Mill-finished aluminum or galvanized iron or steel to suit manufacturer's standards.
 - 1. Steel and Iron: Unless specified otherwise, hot-dip galvanize pressed steel or cast-iron fence fittings and accessories with at least 1.2 oz. zinc per sq. ft. as determined by ASTM A 90.
 - 2. Supplemental Color Coating: In addition to above metallic coatings, where specified, provide a 10-mil minimum polyvinyl chloride (PVC) plastic resin finish applied to exterior surfaces and, except inside cap shapes, to exposed interior surfaces. Color to match chain link fabric.
- B. Post and Line Caps: Provide weathertight closure cap for each post. Provide line post caps with loop to receive tension wire or top rail.
- C. Bottom and Center Rail: If shown on detail, same material as top rail. Provide manufacturer's standard galvanized-steel, cast-iron or cast-aluminum cap for each end. Provide bottom rail at baseball/softballbackstop only. Provide center rail at 8N high fences or over.
- D. Tension or Stretcher Bars: Hot-dip galvanized steel with a minimum length 2 inches less than the full height of fabric, a minimum cross section of 3/16 inch by 3/4 inch, and a minimum of 1.2 oz. of zinc coating per sq. ft. Provide one bar for each gate and end post, and two for each corner and pull post, except where fabric is integrally woven into the post.
- E. Tension and Brace Bands: 3/4-inch-wide minimum hot-dip galvanized steel with a minimum of 1.2 oz. of zinc coating per sq. ft.
 - 1. Tension Bands: 0.074 inch thick (14 gage) minimum.
 - 2. Brace Bands: 0.105 inch thick (12 gage) minimum.
- F. Tension Wire: 0.177-inch-diameter metallic-coated steel marcelled tension wire conforming to ASTM A 824 with finish to match fabric. Provide at all fencing except baseball/softball backstop.
 - 1. Coating Type II zinc in the following class as determined by ASTM A 90.
 - 2. Class 2, with a minimum coating weight of 1.20 oz. per sq. ft. of uncoated wire surface.
- G. Tie Wires: 0.106-inch-diameter (12-gage) galvanized steel with a minimum of 0.80 oz. per sq. ft. of zinc coating according to ASTM A 641, Class 3 or 0.148-inch-diameter (9-gage) aluminum wire alloy 1350-H19 or equal, to match fabric wire.

2.05 CONCRETE

- A. Concrete: Provide truck poured concrete consisting of portland cement per ASTM C 150, aggregates per ASTM C 33, and potable water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 2500 psi. Use at least four sacks of cement per cu. yd., 1-inch maximum size aggregate, 3-inch maximum slump.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Install fence to comply with ASTM F 567. Do not begin installation and erection before final grading is completed, unless otherwise permitted.
 - 1. Apply fabric to outside of framework. Install perimeter fencing inside of property line established by survey as required by Division 1
- B. Excavation: Drill or hand-excavate (using post-hole digger) holes for posts to diameters and spacings indicated, in firm, undisturbed or compacted soil.
 - 1. If not indicated on Drawings, excavate holes for each post to minimum diameter recommended fence manufacturer, but not less than four times the largest cross section of post.
 - 2. Unless otherwise indicated, excavate hole depths approximately 3 inches lower than post bottom with bottom of posts set not less than 36 inches below finish grade surface
- C. Setting Posts: Center and align posts in holes 3 inches above bottom of excavation. Space a maximum of 10 feet o.c., unless otherwise indicated
 - 1. Protect portion of posts above ground from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations.
 - a. Unless otherwise indicated, extend concrete footings 2 inches above grade and trowel to a crown to shed water.
- D. Top Rails: Run rail continuously through line post caps, bending to radius for curved runs and at other posts terminating into rail end attached to posts or post caps fabricated to receive rail. Provide expansion couplings as recommended by fencing manufacturer.
- E. Center Rails: Install center rails in one piece between posts and flush with post on fabric side, using rail ends and special offset fittings where necessary.
- F. Brace Assemblies: Install braces at end and gate posts and at both sides of corner and pull posts. Locate horizontal braces at midheight of fabric on fences with top rail and at two thirds fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
- G. Bottom tension wire: install tension wire within 6 inches of bottom of fabric before stretching fabric and tie to each post with not less than same gage and type of wire. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch-diameter (11-gage) hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c.
- H. Fabric: Leave approximately 2 inches between finish grade and bottom selvage unless otherwise indicated.
 - 1. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on security side of fence, and anchor to framework so that fabric remains under tension after pulling force is released.
- I. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not over 15 inches o.c.
- J. Tie Wires: Use wire of proper length to secure fabric firmly to posts and rails. Bend ends of wire to minimize hazard to persons or clothing.
 - 1. Maximum Spacing: Tie fabric to line posts 12 inches o.c. and to rails and braces 24 inches o.c.
 - 2. Fasteners: install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side.

- K. Fasteners: install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side.
 - 1. Peen ends of bolts or score threads to prevent removal of nuts for added security.

END OF SECTION

SECTION 32 31 15
ORNAMENTAL STEEL FENCING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. Ornamental welded steel fencing panels fabricated with galvanized flat bars and round rods welded into, modular, open grille fencing panels including steel fence posts and gates.
- C. Gate Operators.

1.02 RELATED SECTIONS

- A. Section 03 30 00, Cast-In-Place Concrete, installation of anchorages and pit liners, and perimeter angles.
- B. DIVISION 26, ELECTRICAL; electrical wiring and connections

1.03 PRODUCT SUBMITTALS

- A. Product data for components and accessories.
- B. Shop drawings showing layout, dimensions, spacing of components, interface with electric gate operator, and anchorage and installation details.
- C. Sample: 8 by 10 inches (203 by 254 mm) minimum size sample of fence panel illustrating design, fabrication workmanship, and selected color coating

1.04 WARRANTY

- A. 20 years warranty for factory finish against cracking, peeling, and blistering under normal use.

PART 2 PRODUCTS

2.01 GATES

- A. Manufacturers:
 - 1. Ametco® Manufacturing Corporation
 - 2. Approved Equal
- B. Cantilevered horizontal sliding gate.
- C. Construction: Welded frame fabricated steel tubing with open grille steel panels. Frame configuration shall be as indicated on Drawings and approved shop drawings.
- D. Nominal Size:
 - 1. Gate Opening: As Indicated on the Drawings
 - 2. Gate: As Indicated on the Drawings
 - 3. Overhang Distance: As Indicated on the Drawings
- E. Coordinate provision of gate with electric operator specified to ensure size, weight, and design of gate is compatible with operator.
- F. Accessories:
 - 1. Infill panel to be selected by architect from manufactures full line.

2.02 FINISHES

- A. Steel fence panels and posts shall be hot-dip galvanized to 1.25 ounces per square foot minimum zinc coating in accordance with ASTM A123. Standard size components shall receive polyester powder coating. Large gate panels shall be coated with 2-part polyurethane coating

1. Polyester powder coating: Electrostatically applied colored polyester powder coating heat cured to chemically bond finish to metal substrate.
2. Minimum hardness measured in accordance with ASTM D3363
3. Direct impact resistance tested in accordance with ASTM D2794: Withstand 160 inch-pounds.
4. Salt spray resistance tested in accordance with ASTM B117: No undercutting, rusting, or blistering after 500 hours in 5 percent salt spray at 95 degrees F and 95 percent relative humidity and after 1000 hours less than 3/16 inch (5 mm) undercutting.
5. Weatherability tested in accordance with ASTM D822: No film failure and 88 percent gloss retention after 1 year exposure in South Florida with test panels tilted at 45 degrees.

2.03 SLIDE GATE OPERATORS

- A. Manufacturer: Linear Corporation (www.linearcorp.com)
 1. Model Number: SLC-1-V-P
 - a. 1 Horse Power
 - b. 208V 1p
 - c. Maximum Gate Weight: 2000LBS
 - d. Maximum Gate Length: 45FT

PART 3 EXECUTION

3.01 PREPARATION

- A. Prior to fabrication, field verify required dimensions.
- B. Coordinate gate installation with provision of gate operator to ensure proper power supply and that conduit and wiring are concealed.
- C. Cast concrete footings in accordance with Section 03 30 00 - Cast-in-Place Concrete
- D. Minimum footing diameter:
 1. Terminal and gate posts: 12 inches
 2. Intermediate line posts: 10 inches

3.02 INSTALLATION

- A. Install fencing in accordance with manufacturer's installation instructions and approved shop drawings.
- B. Install fence posts plumb and temporarily brace fence posts with 2 by 4 wood supports until concrete is set.
- C. Do not install bent, bowed, or otherwise damaged panels. Remove damaged components from site and replace.
- D. Secure fence panels with standard stainless steel bolts to fence posts after posts have been set in footings.

END OF SECTION

SECTION 32 92 23

LAWNS

PART 1 GENERAL

1.01 SUMMARY

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. The work of this Section consists of all labor, materials, equipment, and services necessary for and incidental to the establishment of lawn areas as indicated on the Contract Plans and specified herein. The work includes:
 - 1. Weed removal
 - 2. Soil amendments
 - 3. Grass planting (from seed)
 - 4. Grass planting (sod)
 - 5. Maintenance
- C. Related Sections
 - 1. Division 32 Section "Planting"
 - 2. Division 32 Section "Meadow Planting"

1.02 INFORMATIONAL SUBMITTALS

- A. Certification of Grass Seed: From seed vendor for each grass-seed mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed, in accordance with the Federal Seed Act, and stating certification by the Delaware State Board of Agriculture Seed Certification Program. Include the year of production and date of packaging.
- B. Mulching materials: The Contractor shall provide submittals of manufacturer's / suppliers specifications for all mulching material.
- C. Qualification Data: For qualified landscape Installer.
- D. Soil Test Reports: For subgrade, stockpiled onsite topsoil and imported topsoil.
- E. Schedule and methodology for weed removal: provide information on method of weed removal and number of herbicide applications required based on site conditions prior to planting.
- F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of lawns during a calendar year. Submit before expiration of required maintenance periods.

1.03 QUALITY ASSURANCE

- A. Installer shall have not less than 5 years documented successful experience in lawn and seeding installations and be a member of the Landscape Contractors Association. Installer shall submit evidence of qualifications including photographs, locations and references of owners for review by the Landscape Architect and the Owners Representative. Installer must exhibit previous successful installations of Bermuda grass turf athletic fields.
- B. Quality Control of Seed: Seed lots must be State Certified and blended under the supervision of the Delaware Department of Agriculture, Seed Certification Program Seed. Seed shall be packed 50 lbs. net weight and packed in new, clean, poly woven bags, tightly woven to prevent leaking and contamination. Each container must have permanently affixed to it an accurate analysis tag, a certification tag, and a project name tag.

- 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: see requirements of Section 329300

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Seed and other packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, and name and address of manufacturer. Protect seed and other materials from damage and deterioration during delivery and while stored at the project site.

1.05 PROJECT CONDITIONS

- A. Site conditions: All areas shall be inspected by the Contractor before starting any work and any defects in planting areas shall be reported to the Landscape Architect prior to beginning this work. The commencement of work by the Contractor shall indicate his acceptance of the areas to be maintained or planted and he shall assume full responsibility for the work of this Section.
- B. 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. No seeding shall be done during windy weather or when the ground is wet or otherwise unsuitable.
- C. The Contractor is responsible for the protection of existing structures, utilities, existing plant material and other landscape features during lawn installation.

1.06 MAINTENANCE SERVICE

- A. Initial Lawn 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 lawn is established, and at least until completion of building construction.
- 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.

1.07 ACCEPTANCE AND WARRANTY

- A. At the end of the maintenance period, an inspection of work completed shall be conducted by the Landscape Architect and Owner's Representative for the purpose of initial acceptance. Any outstanding items revealed on inspection and identified on the punch list shall be corrected within two weeks. Initial acceptance shall be withheld until those items are completed. Acceptance can be on partially completed work. Warranty, for a period of one year, shall begin after landscape inspection and initial acceptance.
- B. Warrant in writing that all plant material placed on this Project will remain alive and be in healthy vigorous condition for a period of 1 year after completion and initial acceptance of entire project.
- C. During the warranty period replace, in accordance with the drawings and specifications, all lawn areas that are in an unhealthy or unsightly condition, or more than 25% dead.
- D. Final Inspection and Acceptance: An inspection will be conducted with the Landscape Contractor, Landscape Architect and Owner at the end of the one year warranty period for purposes of Final Acceptance.

- E. Warranty shall not include damage or loss of plants due to vandalism, fire, severe winds, extreme cold, or negligence on the Owner's part.
- F. Owners Maintenance will begin at the end of the required contractor maintenance period.

PART 2 PRODUCTS

2.01 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
- B. Lawn seed species for general lawn areas: State certified seed of grass species as follows:
 - 1. Provide "Rebel IV" Fescue or equal
 - a. 95% tall fescue
 - b. 5% Kentucky bluegrass
- C. Lawn seed species for multi-use practice athletic fields and practice baseball/softball outfields (BASE BID):
 - 1. Provide "Rebel IV" Fescue or equal
 - a. 95% tall fescue
 - b. 5% Kentucky bluegrass
- D. Lawn seed species for multi-use practice athletic fields and practice baseball/softball outfields (ALTERNATE): State certified seed of grass species as follows:
 - 1. Provide "Riviera" Bermuda grass
- E. Lawn seed species for competition baseball/softball outfields (BASE BID): State certified seed of grass species as follows:
 - 1. Provide "Riviera" Bermuda grass
- F. Lawn sod species for competition baseball/softball infields (BASE BID): State certified sod of grass species as follows :
 - 1. Provide "Riviera" Bermuda grass
- G. Turf seed mix for bioswales: State certified seed as follows:
 - 1. Provide Wet Tolerant Seed Mix #14 per DNREC handbook.
- H. Mulch:
 - 1. Mulch shall be clean threshed, straw of oats, wheat barley or rye is acceptable. Mulch shall be free of noxious weeds and seeds. Mulch shall be visually inspected to ensure that it is free from mold, foreign substances, weeds and that it is an air-dry condition suitable for placing with mulch blower equipment.
 - 2. Tackifier shall be Terra Tack Binders or equal as is manufactured by Grass Growers of Plainfield, New Jersey.

2.02 CHEMICAL AMENDMENTS

- A. Rates of all chemical amendment shall be based on soil test and recommendations.
- B. Lime: ASTM C 602, Class T, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 sieve and a minimum 75 percent passing a No. 60 sieve.
 - 1. Provide lime in the form of dolomitic limestone.
- C. Aluminum Sulfate: Commercial grade, unadulterated.
- D. Iron Sulfate (Ferris or Ferrous): Shall contain 30-35 percent iron, 35-50 percent sulfur and be supplied by a commercial fertilizer supplier.
- E. Sulfate of Potash: Agricultural grade containing 50-53 percent of water soluble potash.

2.03 FERTILIZER

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea-form, phosphorous, and potassium in the following composition:
 - 1. Composition: 1 lb. per 1,000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
- B. Slow-Release Fertilizer: Granular fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition: 10 percent nitrogen, 5 percent phosphorous, and 5 percent potassium, by weight.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas to receive Lawn for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 LAWN PREPARATION

- A. Weed removal: All weeds must be removed prior to planting of lawns. Mow closely two weeks before herbicide application. Apply glyphosate (Roundup) per manufacturers recommendation, only when plants are actively growing. Application must be done by a licensed spray technician. Based on the extent of weed growth, multiple applications of glyphosate may be required, at least two weeks apart.
- B. Till subgrade to a minimum depth of 3 inches. Remove stones larger than 1-1/2 inches.
- C. Spread planting soil to a depth as shown on drawings but not less than required to meet finish grades after light rolling and natural settlement. Mix into subgrade. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
- D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.
- E. Rake in required lime, fertilizer and soil amendments to a depth of 3" to 4" and rake smooth
- F. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil. Restore areas if eroded or otherwise disturbed after finish grading and before planting.

3.03 SEEDING

- A. Do not use wet seed or seed which is moldy or otherwise damaged in transit or storage.
- B. Sow seed using a spreader or seeding machine. Do not seed when wind velocity exceeds 5 mile per hour. Distribute seed evenly over entire area by sowing equal quantity in 2 directions at right angles to each other.
- C. Sow not less than the quantity of seed specified or scheduled.
 - 1. Fescue Sowing Rate: Sow grass seed at the following rates: Sow mixture at 9lbs. per 1000 sq. ft.
 - 2. Bermuda grass Sowing Rate: Sow grass seed at the following rates: Sow mixture at 2-3 lbs. per 1000 sq. ft.
- D. Rake seed lightly into top 1/8' of soil, roll lightly, and water with a fine spray.

- E. Protect seeded areas against erosion by spreading specified lawn mulch after completion of seeding operations. Spread uniformly to form a continuous blanket not less than 1-1/2" loose measurement over seeded areas.
- F. Water newly planted areas.

3.04 MULCHING

- A. Mulch shall be required on all surfaces immediately after seeding.
- B. If mulch is displaced before a growth of 1-inch to 1-1/2 inches is obtained, it shall be replaced by the Contractor at no extra expense.
- C. Seeded areas shall be mulched with thrashed barley, wheat or oat straw and secured by Terra Tack Binders or equal as is manufactured by Grass Growers of Plainfield, New Jersey.

3.05 MAINTENANCE

- A. Maintenance shall consist of repair and replacement of eroded areas, weeding, watering, reseeding and remulching, as necessary to provide an even, full thick and healthy fixed growth of turf grass.
- B. The Contractor shall provide at his own expense protection against trespassing and damage to seeded areas and planted areas until they are accepted. Provide barricades, temporary fencing, signs or policing as required to protect such seeded areas until accepted.
- C. The Contractor will be responsible for normal tenant, poor weather and other damages to lawns until the time of acceptance by the Owner.
 - 1. Damages due to circumstances beyond the Contractor's control (i.e., vandalism) will be repaired after requesting a change order and obtaining approval of same.
- D. Watering:
 - 1. First Week: The Contractor shall provide all labor and furnish all watering necessary for establishment of the seed. In the absence of adequate rainfall, watering shall be performed daily or as often as necessary during the first week and in sufficient quantities to maintain moist soil to a depth of at least 4 inches.
 - 2. During growing seasons: The Contractor shall water the lawn as required to maintain adequate moisture in the upper 4 inches of soil necessary for the promotion of deep root growth. New grass must not be allowed to dry out.
 - 3. Water with a fine spray.
- E. 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 turf-type tall fescue to a height of 2 to 3 inches.
 - 2. Mow turf-type Bermuda grass to the following heights:
 - a. Practice athletic fields: 1.5"
 - b. Baseball/Softball Infields: 3/4"-1"
 - c. Baseball/Softball Outfields: 1.5"-2"
- F. 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.

3.06 REPAIR

- A. After the grass in seeded areas has appeared, all areas and parts of areas which, in the opinion of the Owner's Representative, fail to show a uniform stand of lawn, for any reason whatsoever, shall be reseeded, and mulched and such areas and parts of areas shall be seeded

repeatedly until all areas are covered with a satisfactory growth. Reseeding shall be done at the expense of the Contractor by spreading the seed by an approved method and during an approved season.

- B. If stand is over 60% damaged, or lawn is dominated by invasive weeds, re-establish, following original weed removal, seedbed preparation, and seeding recommendations.

3.07 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Erect barricades and warning signs as required to protect newly seeded areas from traffic. Maintain barricades throughout maintenance period and remove after lawn is established.
- C. Remove erosion-control measures after grass establishment period.

END OF SECTION

SECTION 33 41 00
STORM UTILITY DRAINAGE PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. Refer to Scope Information Sheets for this contract bound in the Project Manual under Section 01 10 00, Summary of Work. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.
- B. This Section includes gravity-flow, nonpressure storm drainage outside the building, with the following components:
 - 1. Precast concrete manholes.
 - 2. Trench drain
 - 3. Storm drain pipe and appurtenances

1.02 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water. Pipe joints shall be at least watertight, unless otherwise indicated.

1.03 SUBMITTALS

- A. Product Data: For the following:
 - 1. Storm drain pipe.
- B. Shop Drawings: For the following:
 - 1. Manholes: Include plans, elevations, sections, details, and frames and covers.
 - 2. Catch Basins and Stormwater Inlets. Include plans, elevations, sections, details, and frames, covers, and grates.
 - 3. Stormwater Detention Structures: Include plans, elevations, sections, details, frames and covers, design calculations, and concrete design-mix report.
- C. Field quality-control test reports.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protect pipe, pipe fittings, and seals from dirt and damage.
- B. Handle manholes according to manufacturer's written rigging instructions.
- C. Handle catch basins and stormwater inlets according to manufacturer's written rigging instructions.
- D. Handle downspout boots according to manufacturer's written instructions.

1.05 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Construction Manager Owner no fewer than five days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of service without Construction Manager's written permission.
- B. Site Information: Perform site survey, research public utility records, and verify existing utility locations. Verify that Storm Drainage System piping may be installed in compliance with original design and referenced standards.
 - 1. Locate existing Storm Drainage System piping and structures that are to be abandoned and closed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.02 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, fitting, and joining materials.

2.03 PE PIPE AND FITTINGS

- A. Corrugated PE Drainage Pipe and Fittings NPS 48 and Smaller: AASHTO M 252M, Type S, with smooth waterway for coupling joints.
 - 1. Watertight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings.
 - 2. Corrugated PE Pipe and Fittings NPS 12 to NPS 48: AASHTO M 294M, Type S, with smooth waterway for coupling joints.
 - 3. Watertight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.
- B. Corrugated PE Pipe and Fittings NPS 56 and NPS 60: AASHTO MP7, Type S, with smooth waterway for coupling joints.
 - 1. Watertight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.

2.04 REINFORCED CONCRETE PIPE:

- A. Materials shall be in accordance with ASSHTO M-170.
- B. Pipe class shall be Class III unless otherwise indicated on the drawings.
- C. Joints to be tongue and groove.
- D. Joining material may be either:
 - 1. Portland cement mortar consisting of 1 part Portland cement, 2 parts sand and enough water to provide a workable mix, or
 - 2. Bitumastic joint filler equal to Ram-Neck.
- E. Joints shall be watertight under full flow conditions.

2.05 PVC GRAVITY SEWER PIPING:

- A. Pipe and Fittings: ASTM F 679, T-2 wall thickness, PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM F 477, elastomeric seals for gasketed joints.

2.06 NONPRESSURE-TYPE PIPE COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:
 - 1. For Concrete Pipes: ASTM C 443, rubber.
 - 2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

2.07 MANHOLES

- A. Precast Concrete Manholes: ASTM C 478, precast reinforced concrete, of depth indicated with provision for rubber gasket joints.
 - 1. Base Section: 8-inch minimum thickness for floor slab and 5-inch minimum thickness for walls and base riser section, and having a separate base slab or base section with integral floor.
 - 2. Riser Sections: 5-inch minimum thickness; 48-inch diameter, and lengths to provide depth indicated.
 - 3. Top Section: Eccentric cone type, unless concentric cone or flat-slab-top type is indicated. Top of cone to match grade rings.
 - 4. Grade Rings: Provide 2 or 3 reinforced concrete rings, with 12 maximum inches total thickness and match 24-inch diameter frame and cover.
 - 5. Gaskets: ASTM C 443, rubber.
 - 6. Steps: Cast into base, riser, and top sections sidewall at 12-to 16-inch intervals.
 - 7. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.
 - 8. Channel and Bench: Concrete or Brick.
 - 9. Coat Exterior Surface with two (2) coats of coal-tar epoxy, 15 mil. Minimum thickness.
- B. Manhole Steps: Wide enough for a man to place both feet on one step and designed to prevent lateral slippage off the step.
 - 1. Material: Steel-reinforced plastic.
 - 2. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, heavy-duty, ductile iron, 24-inch inside diameter by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch-diameter cover, indented top design, with lettering "STORMDRAIN" cast into cover.

2.08 CATCH BASINS & INLETS

- A. Standard Precast Concrete Catch Basins & inlets: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
 - 1. Catch basins & inlets shall be according to the local utility standard as noted on the structure schedule.
 - 2. All materials for catch basins, steps, frames and grates, curb inlets and other appurtenances and incidentals shall conform to Section 708 of DelDOT Specifications and Standard Details for structures noted as DelDOT structures on the plans.
- B. Standard PVC Surface Drainage Inlets and In-Line Drains as indicated on the drawings.
 - 1. Ductile Iron Grates shall be considered an integral part of the surface drainage structure and shall be furnished by the same manufacturer.
 - 2. Structures shall be as manufactured by Nyloplast a division of Advanced Drainage Systems, Inc. or approved equal.

2.09 STORMWATER DETENTION STRUCTURES

- A. Cast-in-Place Concrete, Stormwater Detention Structures: Construct of reinforced-concrete bottom, walls, and top; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, dimensions, and appurtenances indicated.
 - 1. Ballast: Increase thickness of concrete, as required to prevent flotation.
 - 2. Steps: Individual FRP steps, FRP ladder, or ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of structure to finished grade is less than 36 inches.

- B. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service. Include indented top design with lettering "STORM SEWER" cast into cover.

2.10 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318, and the following:
 - 1. Cement: ASTM C 150, Type II.
 - 2. Fine Aggregate: ASTM C 33, sand.
 - 3. Coarse Aggregate: ASTM C 33, crushed gravel.
 - 4. Water: Potable.
- B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.
 - 1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
 - 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.
- C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.
 - 1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
 - a. Invert Slope: 1 percent through manhole.
 - 2. Benches: Concrete, sloped to drain into channel.
 - a. Slope: 4 percent.
- D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.
 - 1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
 - 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

2.11 POLYMER-CONCRETE, CHANNEL DRAINAGE SYSTEMS

- A. General Requirements for Polymer-Concrete, Channel Drainage Systems: Modular system of precast, polymer-concrete channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling. Include quantity of units required to form total lengths indicated.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide ACO Klassik KS100S sloped channel with ADA compliant black ductile iron "wave" pattern grates (Class C) and in-line catch basins at locations shown on the plans, or approved equal product. Provide ACO Sport System 3000 neutral channel with in-line catch basins around the straight and curved areas of the running track as shown on the plans. Provide ACO Sport System 4000 with in-line catch basins and ADA compliant black polyethylene slotted grates at Auxiliary Field, baseball field and softball field at the locations shown on the plans.
- C. Sloped and Neutral Invert, Polymer-Concrete Systems:
 - 1. Channel Sections:
 - a. Interlocking-joint, precast, modular units with end caps.
 - b. 4-inch inside width and deep, rounded bottom. Sloped channels shall have a built-in invert slope of 0.6 percent. Provide outlets in quantities, sizes, and locations indicated. Bottom outlets are to be used unless shown otherwise. Outlets shall include fitting required to transition from oval to round. Klassik system shall provide V-shaped profile.
 - c. Extension sections necessary for required depth.
 - d. Frame: Include integral stainless steel frame for Klassik systems.

2. Grates:
 - a. Manufacturer's designation ACO Type with ADA compliant slotted openings suitable for use in pedestrian locations that fit recesses in channels.
 - b. Grates shall be 'QuickLok' locking and removable for easy access to the channel in order to maintain and clean the system.
 - c. Material: Ductile Iron in plaza areas; Polyethylene at Auxiliary Stadium and Baseball/Softball fields.
3. Covers: Solid gray iron if indicated.
4. Locking Mechanism: Manufacturer's standard locking, removable device for securing grates to channel sections.
5. In-line catch basins will accompany each drainage system.
 - a. In-line catch basins compatible with each series system shall be provided. Eight shall be provided around the 400m running track. Four shall be provided at the Auxiliary stadium. Three each shall be provided at Competition baseball/softball fields as shown (including at the outfall location. Klassik pedestrian systems shall include a minimum of one catch basin per system at each outfall location or as recommended by the manufacturer.
 - b. Drill-out features for Schedule 40 4" and 6" pipes shall be provided.
 - c. Shall include trash bucket and removable cover to collect debris washed into the system.

2.12 CLEANOUTS

A. Cast-Iron Cleanouts:

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. Josam Company.
 - b. MIFAB, Inc.
 - c. Smith, Jay R. Mfg. Co.
 - d. Tyler Pipe.
 - e. Watts Water Technologies, Inc.
 - f. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
2. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
3. Top-Loading Classification(s): Heavy Duty.
4. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

B. Plastic Cleanouts:

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. Canplas LLC.
 - b. IPS Corporation.
 - c. Nyloplast, a division of Advanced Drainage Systems, Inc.
 - d. Plastic Oddities; a division of Diverse Corporate Technologies, Inc.
 - e. Sioux Chief Manufacturing Company, Inc.
 - f. Zurn Light Commercial Products Operation; Zurn Plumbing Products Group.
2. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

PART 3 EXECUTION

3.01 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.02 PIPING APPLICATIONS

- A. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping, unless otherwise indicated.
 - a. Flexible or rigid couplings for same or minor difference OD pipes.
 - b. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
 - c. Join dissimilar pipe materials with nonpressure-type flexible or rigid couplings.
- B. Gravity-Flow, Nonpressure Sewer Piping: Use the following pipe materials for each size range and material as indicated on drawings:
1. NPS 4 and NPS 36 Corrugated PE drainage pipe and fittings, watertight couplings, and coupled joints.
 2. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76, with groove and tongue ends.

3.03 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing stormdrain system is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.
- F. Install gravity-flow, nonpressure drainage piping according to the following:
1. Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.
 2. Install piping below frost line.
 3. Install corrugated steel piping according to ASTM A 798/A 798M.
 4. Install nonreinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
 5. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
 6. Install PE corrugated sewer piping according to CPPA's "Recommended Installation Practices for Corrugated Polyethylene Pipe and Fittings."

3.04 PIPE JOINT CONSTRUCTION

- A. Basic pipe joint construction is specified in Division 33 Section "Common Work Results for Utilities." Where specific joint construction is not indicated, follow piping manufacturer's written instructions.
- B. Join gravity-flow, nonpressure drainage piping according to the following:
 - 1. Join nonreinforced-concrete sewer piping according to ASTM C 14 and ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
 - 2. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
 - 3. Join dissimilar pipe materials with nonpressure-type flexible or rigid couplings.
 - 4. Join corrugated PE piping according to CPPA 100 and the following:
 - a. Use watertight couplings for Type 1, watertight joints.

3.05 MANHOLE INSTALLATION

- A. General: Install manholes, complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections according to ASTM C 891.

3.06 CATCH BASIN INSTALLATION

- A. Construct catch basins to sizes and shapes indicated.
- B. Set frames and grates to elevations indicated.

3.07 STORMWATER INLET AND OUTLET INSTALLATION

- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
- B. Install outlets that spill onto grade, anchored with concrete, where indicated.
- C. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.
- D. Construct energy dissipaters at outlets, as indicated.

3.08 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318/318R.

3.09 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Division 22.

3.10 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
 - 1. Close open ends of piping with at least 8-inch- thick, brick masonry bulkheads.
 - 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Manholes and Structures: Excavate around manholes and structures as required and use one procedure below:
 - 1. Remove manhole or structure and close open ends of remaining piping.
 - 2. Remove top of manhole or structure down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
- C. Backfill to grade according to Division 31 Section "Earth Moving."

3.11 IDENTIFICATION

- A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
 - 1. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.12 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 - 1. Submit separate reports for each system inspection.
 - 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 - 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 - 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
 - 1. Do not enclose, cover, or put into service before inspection and approval.
 - 2. Test completed piping systems according to authorities having jurisdiction.
 - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' notice.
 - 4. Submit separate report for each test.

3.13 CLEANING

- A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

END OF SECTION