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CONSTRUCTION
of
BATHROOM & CONCESSION BUILDING AND TRACK LIGHTING FOR: IVANNA EUDORA KEAN HIGH SCHOOL TRACK & SPORTS FACILITY
St. Thomas U.S. Virgin Islands

Financed Thru: V.I. Public Finance Authority
32-33 Kongens Gade
St Thomas, USVI 00802
PFA Director: Ms. Joanne Bozzuto

Owner: Government of the Virgin Islands
Department of Education
44-46 Kongens Gade
St Thomas, USVI 00802
Commissioner: Honorable Dr. Sharon McCollum

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ITEMIZED BID SHEET

Proposed Construction
Of IEKHS Track Facility
Bathroom and Concession Buildings
located at
No. 172 Estate Nazareth, No.1 Red Hook Quarter
St. Thomas, U.S. Virgin Islands

NOTE: 1. CONTRACTOR'S BID SHALL BE DISQUALIFIED IF ITEMIZED BID SHEET IS NOT FULLY COMPLETED WITH BOTH UNIT AND MATERIAL & LABOR COSTS FOR ALL ITEMS.

2. ******THE QUANTITIES NOTED BELOW ARE NOT NECESSARILY EXACT, AND THE ITEMS NOTED DO NOT NECESSARILY MAKE UP ALL THE WORK REQUIRED, OR NOTED IN THE SPECIFICATIONS AND DRAWINGS, FOR THE COMPLETE CONSTRUCTION AND PROPER OPERATION OF THE PROJECT. THE ITEMS NOTED, WILL BE USED IN ESTABLISHING IF THE COST, WHICH ARE BEING SUBMITTED BY THE BIDDER, ARE WITHIN THE CURRENT ACCEPTABLE PRICES BEING USED IN THE U.S. VIRGIN ISLANDS CONSTRUCTION MARKET; AND ALSO TO ENSURE THAT ALL CONTRACTORS BIDS ARE THE SAME. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SUBMITTING A TOTAL LUMP SUM COST FOR THE COMPLETE CONSTRUCTION OF THE PROJECT.**

3. **IT IS THE CONTRACTOR'S RESPONSIBILITY TO ESTABLISH EXACT QUANTITIES BASED ON DOCUMENTS ISSUED AND SITE VISITS CARRIED OUT, FOR A TOTAL LUMP SUM COST TO CONSTRUCT THE PROJECT.**

4. **ADD ALTERNATES SHALL NOT BE INCLUDED IN THE TOTAL LUMP SUM COST OF CONSTRUCTION. THE ADD ALTERNATE ITEMS ARE FOR UTILIZATION IN THE EVENT THAT ADDITIONAL WORK OR ADJUSTMENT OF THE CONTRACTED WORK IS REQUIRED, DURING THE CONSTRUCTION OF THE PROJECT.**

5. **PRICES BEING SUBMITTED FOR WORK TO BE DONE SHALL INCLUDE THE CONTRACTOR'S OVERHEAD TAXES AND PROFIT ALONG WITH ALL COSTS FOR MATERIALS, EQUIPMENT, LABOR, TRANSPORTATION, FREIGHT, INSURANCES, ETC. NECESSARY TO FACILITATE PROPER, SAFE, AND TIMELY COMPLETION OF THE PROJECT.**

6. **UNIT PRICES SUBMITTED ON THE ITEMIZED BID SHEET SHALL BE UTILIZED FOR ANY CREDITS OR DEBITS TO THE PROJECT; WHICH, IF NECESSARY, SHALL BE ADDRESSED AS A CHANGE ORDER TO THE PROJECT.**

Item No.	Item Description	Quantity	Unit Price	Cost Material & Labor
01.	Mobilization	L.S.	-0-	$
02.	General Conditions	L.S.	-0-	$

Item No.	Item Description	Quantity	Unit Price	Cost Material & Labor
03.	- INSTALL NEW "DANT CLAYTON" POWDER COATED ALUMINUM "ALUMNA STAND" BLEACHERS WITH **12'x40' ENCLOSED GRAND STAND (AS PER THE TYPE INSTALLED BY THE MANUFACTURER AT SPRING HILL SCHOOL OR APPROVED EQUAL.** - THE CONTRACTOR SHALL INSTALL THE BLEACHER SYSTEM AS PER MANUFACTURER'S SPECIFICATIONS ON POURED REINFORCED CONCRETE SLEEPER SLABS TO STABILIZE AND PROPERLY SUPPORT THE **- BLEACHERS. BLEACHER CAPAPCITY TO BE APPROX. 1,500 SEATS**	1500 SEAT CAPACITY IN A SPACE APPROX. 20FT. x 244FT.'	$/SEAT	**$**
04.	- CONSTRUCT NEW POURED REINFORCED 10FT. WIDE CONCRETE WALKWAY 6" THICK WITH 12" THICKENEND EDGES IN FRONT OF THE BLEACHERS	10 Cu Yds.	$	**$**
05.	- CONSTRUCT NEW POURED REINFORCED 10FT. WIDE CONCRETE WALKWAY 6" THICK WITH 12" THICKENEND EDGES FROM THE BLEACHERS TO THE NEW BATHROOM AND CONCESSION BUILDINGS AND AROUND THEM AS NOTED IN THE DRAWINGS. - CONTRACTOR SHALL TAKE INTO CONSIDERATION THAT IN SOME AREAS THE WALKWAY MAY HAVE TO RUN ALONG THE GENTLE SLOPED CONTOURS FROM THE BLEACHERS TO GET TO THE BUILDINGS NOTED. - CONTRACTOR TO ALSO TAKE INTO CONSIDERATION THAT SOME PARTS OF THE WALKWAY WILL ALOS HAVE TURNED UP CURBS TO STOP DIRT FROM WASHING UNTO THE FLAT AREAS OF THE WALKWAY.	93 Cu Yds.	$	**$**
06.	- CONSTRUCT NEW 30"W x 30"D - RIP RAP ROCK DRAIN BED AS INDICATED IN DRAWINGS WITH 8" SCH. 40 PVC PERFORARTED FRENCH DRAIN INSTALLED WITHIN IT - 8" FRENDH DRAIN TO RUN IN GRAVEL BED AFTER THE RIP RAP DRAIN BED ENDS AND CONTINUE TO DAYLIGHT AND NEAREST EXISTING STORM CULVERT FOR WATER TO BE EMPTIED INTO	LS.	$	**$**
07.	- CONSTRUCTION OF REINFORCED CONCRETE RAMPS AND LANDINGS FOR ENTRY AREA INTO BOTH THE MALE AND FEMALE BATHROOMS TO INCLUDE FOUNDATION FOOTINGS, FOUNDATION WALLS AND 2.5" DIA. GALVANIZED STEEL RAILINGS COATED WITH 3 COATS OF RED OXIDE PRIMER AND 1.5" DIA. VERTICAL INTERIOR PIECES, BETWEEN MAIN SUPPORTS @ 4" O.C. TYP.	L.S.	$	**$**

Item No.	Item Description	Quantity	Unit Price	Cost Material & Labor
08.	**CONCESSION BUILDING**			
	• **ENCLOSED KITCHEN AND STORAGE AREA**			
	- CONSTRUCT ENCLOSED PORTION OF THE BUILDING TO INCLUDE FOUNDATION, EXTERIOR AND INTERIOR WALLS, ROOF SYSTEM, REINFORCED CONCRETE FLOOR SLAB, DOORS, WINDOWS, COMPLETE WOOD BASE CABINETS WITH CORIAN TOPS AND COMPLETE WOOD WALL CABINETS, LIGHTING, ELECTRICAL AND PLUMBING AND ALL FINISHES NOTED TO INCLUDE PAINT, TILES, CASINGS, MOULDING ETC TO COMPLETE A FULL WORKING OPERABLE STRUCTURE ACCORDING TO CODE FOR THE KITCHEN/STORAGE PORTION OF THE CONCESSION BUILDING.	324 S.F.	$	$
	- CONTRACTOR SHALL ALSO SUPPLY AND INSTALL ALL COMMERCIAL GRADE EQUIPMENT SHOWN TO INCLUDE LARGE DEEP DOUBLE SINK AND FAUCET, 4 BURNER STOVE PROPANE GAS RANGE WITH GRILLE AND GRIDDLE, DEEP FRYER, DOUBLE DOOR FREEZER AND COOLERS, AS WELL AS 8FT. HIGH HEAVY DUTY WIRE SHELVING FOR THE STORAGE AREAS.	L.S.	$	$
	***NOTE: CONTRACTOR SHAL SUBMIT SPECS. AND CUT SHEETS FOR ALL MATERIALS, CONSTRUCTION ITEMS AND EQUIPMENT TO BE USED ON THE PROJECT.			
	• **ENCLOSED SERVING AREA**	290 S.F.	$	$
	- CONSTRUCT ENCLOSED AREA TO INCLUDE FOUNDATION, EXTERIOR AND INTERIOR WALLS, REINFORCED CONCRETE FLOOR SLAB, DOORS, ROLL DOWN SECURITY DOORS, POURED REINFORCED CONCRETE COUNTERS, FLOOR SLABS, POURED REINFORCED COLUMNS AND BEAMS, CONCRETE SINK ANF COMMERCIAL FAUCET, LIGHTING, ELECTRICAL, PLUMBING AND ALL FINISHES NOTED TO INCLUDE PAINT, TILES, CASINGS, MOULDING ETC TO COMPLETE A FULL WORKING OPERABLE STRUCTURE ACCORDING TO CODE FOR THE SERVING AREA.			
	******NOTE: CONTRACTOR SHALL BE RESPONSIBLE FOR CONNECTING ALL MAIN ELECTRICAL POWER SYSTEMS TO INCLUDE MAIN DISCONNECT PANELS AS WELL AS SECONDARY PANELS AND THE CONNECTION OF THE MAIN WATER SUPPLY TO THE BUILDINGS AS WELL AS ANY CONNECTIONS TO EXISTING PUBLIC SEWAGE SYSTEMS AT THE CLOSEST POINT WITHIN THE AREA FOR BOTH THE CONCESSSION AND THE BATHROOM BUILDINGS.			

Item No.	Item Description	Quantity	Unit Price	Cost Material & Labor
09.	**BATHROOM BUILDING** - CONSTRUCT ENCLOSED PORTION OF THE BUILDING TO INCLUDE FOUNDATION FOOTING & WALLS, EXTERIOR AND INTERIOR WALLS, ROOF SYSTEM, REINFORCED CONCRETE FLOOR SLAB, DOORS, WINDOWS, COUNTERS WITH CORIAN TOPS, ELECTRICAL, LIGHTING, PLUMBING, VANITIES, URINALS, SINKS, TOILETS, TOILET PARTITIONS, FIRE ALARM STROBES AND HORNS, MIRRORS, TOILET DISPENSERS AND ALL OTHER ITEMS SPECIFIED AS PER THE DRAWINGS TO COMPLETE THE STRUCTURE FOR IT TO BE OPERABLE AND USABLE ACCORDING TO CODE. ****** **NOTE**: CONTRACTOR SHALL BE RESPONSIBLE FOR CONNECTING ALL MAIN ELECTRICAL POWER SYSTEMS TO INCLUDE MAIN DISCONNECT PANELSAS WELL AS SECONDARY PANELS AND THE CONNECTION OF THE MAIN WATER SUPPLY TO THE BUILDING AS WELL AS ANY CONNECTION TO EXISTING PUBLIC SEWAGE SYSTEMS WITHIN THE AREA FOR BOTH THE CONCESSSION AND THE BATHROOM BUILDINGS.	910 S.F.	$	$
10.				
11.				

TOTAL COST OF ITEMS ABOVE $_____

LUMP SUM COST of Construction for completing
Entire project as per construction documents
(Drawings and Specifications) Without Add Alternates. $_____

ADD ALTERNATE ITEMS				
Item No.	**Item Description**	**Quantity**	**Unit Price**	**Cost Material & Labor**
01.	- CONSTRUCT 10FT. WIDE HARDSCAPE SURFACE WALKWAY TO BE MADE OUT OF THE INFUSION OF "BASE SEAL" SOIL STABILIZER INTO SOIL AS SPECIFIED BY MANUFACTURER, AND TOPPED WITH 3" THICK ¾" DIA GRAVELIMBEDDED INTO THE TREATED STABILIZED SOIL AND COMPACTED WITH A VIBRATING ROLLER. - THE 10FT. WIDE HARDSCAPE SHALL BE CONFINED WITH A POURED REINFORCED CONCRETE CURB ON BOTH SIDES OF THE HARDSCAPE WALKWAY, AS NOTED ON THE DRAWINGS.	7,000 S.F.	$	**$**
02.	**CHAIN LINK FENCING AROUND RETENTION POND** - SUPPLY AND INSTALL 6FT. HIGH HEAVY DUTY CHAINLINK FENCING WITH 2"DIA. VERTICAL POLES EMBEDDED IN CONCRETE BASE AT 10 FT. SPACING WITH 2" DIA. TOP AND BOTTOM RAIL AND ALL BRCKETS AND CONNECTORS AND STRAPS REQUIRED FOR COMPLETE INSTALLATION AS PER DRAWINGS TO ALSO INCLUDE ONE (1) DOUBLE GATE 6FT. WIDE.	350 L.F.	$	**$**
03.	**CHAIN LINK FENCING AROUND TRACK** - SUPPLY AND INSTALL 6FT. HIGH HEAVY DUTY CHAINLINK FENCING WITH 2"DIA. VERTICAL POLES EMBEDDED IN CONCRETE BASE AT 10 FT. SPACING WITH 2" DIA. TOP AND BOTTOM RAIL AND ALL BRCKETS AND CONNECTORS AND STRAPS REQUIRED FOR COMPLETE INSTALLATION AS PER DRAWINGS TO ALSO INCLUDE FOUR (4) DOUBLE GATES – EACH 6FT. WIDE	1,500 L.F.	$	**$**
04.	**CHAIN LINK FENCING DOWELED INTO TOP OF EXISTING RETAINING WALL** - CORE DRILL TOP OF RETAINING WALL 12" DEEP SPACED AT 10FT. O.C. (IN AREA AS INDICATED IN THE DRAWINGS) AND INSTALL 2" DIA GALV METAL PIPE 3 FT. HIGH (WITH 2" DIA. BOTTOM AND TOP RAILS WITH ALL BRACKET, STRAPS AND CONNECTORS REQUIRED) AS NOTED IN THE DRAWINGS.	530 L.F.	$	**$**

Item No.	Item Description	Quantity	Unit Price	Cost Material & Labor
05.	Acquisition and delivery of MUSCO Sports Lighting system (for the Track ONLY – 6 Towers) as noted on drawings to the site, including ancillary items such as light poles, light fixtures, control boards, panel boxes etc. for an entire operable system	L.S.	$	$
06.	Installation of MUSCO Sports Lighting system w/ required panels, manual and automatic switches, solar eyes etc. (for the Track ONLY- 6 Towers) as noted on "adjusted drawings" for an entire operable system installed as per NEC to also include the Items noted below: **NOTE: Contractor to quote most cost effective way of Installation to meet current NEC Code	L.S.	L.S.	$
	1) Installation of 1 Pad Mtd. Transformers (300 KVA) located as deemed most appropriate for providing power to the Lighting System and Bathrm. and Concession Bldgs. And any other facilities requiring electrical power in the future	1) 1 pc.	1)$	**1) $**
	2) Installation of electrical 3" diameter conduit and required high voltage wiring and connectors etc. as well as any other wiring required to connect power to the Lighting System & the 2 other Bldgs. asrequired by NEC and WAPA installation.	2) 2500 L.F	2)$	**2) $**
	3) Installation of any additional poured Reinf. Conc. Splice Vaults and Stub Out Connector Vaults that may be required for full installation of light towers	3) 08 cu yds.	3)$	**3) $**
	4) Construction of reinforced concrete block Service Panel Enclosure as noted with reinforced concrete roof and reinforced aluminum 36" x 80" metal door with fixed metal grille – Enclosure to be 10ft. x 6ft. for control of lighting and main disconnect and secondary panels as may be required for the installation of the lighting.	4) 60 S.F.	4)$	**4) $**
	****** **NOTE**: PORTIONS OF THE ELECTRICAL INFRASTRUCTURE FOR THE TOWER LIGHTING HAS ALREADY BEEN INSTALLED. THEREFORE ANY PORTION OF THE ELECTRICAL INFRASTRUCTURE THAT IS FOUND TO BE ALREADY INSTALLED, FOR WHICH THE CONTRACTOR HAS BEEN ASKED TO BID ON, IN ANY OF THE ABOVE ITEMS, SHALL BE REMOVED FROM THE SCOPE OF WORK WHEN IT HAS BEEN ESTABLISHED THAT THE WORK HAS ALREADY BEEN DONE. THE OWNER SHALL THEN BE CREDITED FOR THE COST OF ANY WORK IN THE CONTRACT THAT WILL NOT HAVE TO BE DONE, FOR THIS PHASE OF THE PROJECT.			

SECTION 01100 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. Project: CONSTRUCTION OF BATHROOM, CONCESSION, SPORTS LIGHTS & OTHER ANCILLIARY PORTIONS TO THE IAAF TRACK FACILITY @ IVANNA EUDORA KEAN HIGH SCHOOL

B. Owner: V.I. DEPARTMENT OF EDUCATION

C. Architect: CARIBBEAN PROFESSIONAL CONSULTANTS INC.

D. The Work consists of:- The construction of a male and Female Bathrooms Building, a Concession Building, Security Fencing, Walkways, Bleachers, and other ancillary areas as noted in the drawings for the IEKHS, IAAF Track Facility.

E. All work shall be done according to the acceptable quality building standards in the U.S. Building market and all applicable V.I. and National Codes related to the construction.

1.2 WORK RESTRICTIONS

A. Contractor's Use of Premises: During construction, Contractor will have **[full]** use of **[site]** indicated. Contractor's use of premises is limited only by Owner's right to perform work or employ other contractors on portions of Project if required.

1. Owner may occupy premises during construction. Perform construction during normal working hours (8 AM to 5 PM Monday thru Friday, other than holidays), only after consultation and agreement in advance by Owner. Clean up work areas and return to a useable condition at the end of each work period.

B. 1. Contractor shall provide a portable toilet on site for his employees' use.
2. Contractor's employees may not fraternize or engage in any communication with the students of the school.
3. Contractor's employees must not consume alcohol or use drugs or use foul or base language on the school premises.

END OF SECTION 01100

SECTION 01200 - PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 ALLOWANCES (Not Applicable)

1.2 ALTERNATES

A. An alternate is an amount proposed by bidder for certain work that may be added to or deducted from the Base Bid amount if Owner accepts the Alternate. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate the Alternate into the Work. No other adjustments are made to the Contract Sum.

B. Indicate on the Bid Form amounts to be deducted from or added to the Contract Sum for any alternates that are noted on the Itemized Bid Sheet.

1.3 UNIT PRICES

A. A unit price is an amount proposed by bidders and stated on the Bid Form for certain work that is paid for per unit of measure. Bidders shall indicate on the Bid Form unit prices for any items of work where a unit price is noted or requested.

B. Unit prices include all necessary material, plus cost for delivery, installation, insurance,[**applicable taxes,**] overhead, and profit.

C. Changes to the Work incorporating Unit Prices will be made by Change Order.

1.4 CONTRACT MODIFICATION PROCEDURES

A. On Owner's approval of a proposal from Contractor, Architect will issue a Change Order, for all changes to the Contract Sum or the Contract Time.

1.5 PAYMENT PROCEDURES

A. Submit a Schedule of Values at least 10 days before the first Application for Payment. In Schedule of Values, break down the Contract Sum into at least one line item for each Specification Section. Correlate the Schedule of Values with Contractor's Construction Schedule.

B. Submit 5 copies of each application for payment, according to the schedule established in Owner/Contractor Agreement.

1. Submit final Application for Payment after completion of Project closeout procedures with release of liens and supporting documentation. Include consent of surety to final payment and insurance certificates.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01200

SECTION 01300 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 PROJECT MANAGEMENT AND COORDINATION

A. Contractor shall coordinate construction to ensure efficient and orderly installation of each part of the Work.

B. Contractor shall conduct progress meetings at Project site every other week, unless extra meeting/s is authorized/requested. Notify Owner's Representative, Architect and all required Governmental Agencies of meeting dates and times. Require attendance of each subcontractor or other entity concerned with current progress or involved with planning or coordination of future activities.

1. Contractor shall Record minutes and distribute to parties involved, including Owner's Representative, Architect and all required Governmental Agency Representatives.

1.2 SUBMITTAL PROCEDURES

A. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

1. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
2. Architect will not accept submittals from sources other than Contractor.
3. Identify deviations from the Contract Documents.
4. Submit **[three]** copies of each submittal.

B. Place a permanent label or title block on each submittal for identification. Provide a 4- by 5-inch space on the label or beside title block to record review and approval markings and action taken. Include the following information on the label:

1. Project name.
2. Date.
3. Name and address of Contractor.
4. Name and address of subcontractor or supplier.
5. Number and title of appropriate Specification Section.

C. Architect will review each action submittal, mark as appropriate to indicate action taken, and return copies less those retained. Compliance with specified requirements remains Contractor's responsibility.

D. Construction Schedule Submittal Procedure:

1. Submit schedule within seven (7) days after date established for Commencement of the Work. Distribute copies to Owner, Architect, subcontractors, Governmental Agency representatives and parties required to comply with dates.

2. Revise the schedule after each meeting or activity where revisions have been made. As Work progresses, mark each bar to indicate actual completion. Distribute revised copies to Owner, Architect, subcontractors, and parties required to comply with dates.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. Product Data: Mark each copy to show applicable choices and options. Include the following:

1. Data indicating compliance with specified standards and requirements.
2. Notation of coordination requirements.
3. For equipment data, include rated capacities, dimensions, weights, required clearances, and furnished specialties and accessories.

B. Shop Drawings: Submit Project-specific information drawn to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data. Submit 1 reproducible print and 1 blue- or black-line print on sheets at least 8-1/2 by 11 inches but no larger than 24 by 36 inches. Architect will return the reproducible print. Include the following:

1. Dimensions, profiles, methods of attachment, large scale details, and other information, as appropriate for the Work.
2. Identification of products and materials.
3. Notation of coordination requirements.
4. Notation of dimensions established by field measurement.

C. C. Samples: Submit Samples finished as specified and identical with the material proposed. Where variations are inherent in the material, submit sufficient units to show full range of the variations. Include name of manufacturer and product name on label.

2.2 INFORMATION SUBMITTALS

A. Construction Schedule: Prepare a horizontal bar-chart Contractor's construction schedule.

1. Provide a separate time bar for each activity, using same breakdown of Work indicated in the Schedule of Values, and a vertical line to identify the first workday of each week.
2. Coordinate each element with other activities. Show each activity in proper sequence. Indicate sequences necessary for completion of related Work.
3. Indicate Substantial Completion and allow time for Architect's procedures necessary for certifying Substantial Completion.

B. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01300

SECTION 01400 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

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

1. Testing and inspecting services are specified in other Sections of these Specifications or are required by authorities having jurisdiction and shall be performed by independent testing agencies.
2. Owner will provide testing and inspecting services not specified to be provided by Contractor.
3. Contractor is responsible for scheduling inspections and tests and notifying testing agency.
4. Retesting and Reinspecting: Contractor shall pay for additional testing and inspecting required as a result of tests and inspections indicating contractor's noncompliance with requirements.

B. Performance and Design Criteria: Where design services or certifications by a professional engineer are required by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
2. 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.

C. Submittals: Testing agency shall submit a certified written report of each inspection and test to[**Owner,**] Architect, Contractor,[**structural engineer,**] and to Governmental authorities having jurisdiction when authorities so direct. Reports of each inspection, test, or similar service shall include the following:

1. Name, address, and telephone number of testing agency.
2. Project title and testing agency's project number.
3. Date of report and designation (number).
4. Dates and locations where samples were taken or inspections and field tests made.
5. Ambient conditions at the time of sample taking and inspecting or field testing.
6. Names of individuals taking the sample or making the inspection or test.
7. Product and test method.
8. Inspection or test data including interpretation of test results and comments or professional opinion on whether inspected or tested Work complies with requirements.
9. Recommendations on retesting or reinspection.
10. Name and signature of laboratory inspector.

D. Testing Agency Qualifications: Agencies that specialize in the types of inspections and tests to be performed and are acceptable to authorities having jurisdiction.

E. Testing Agency Responsibilities: Testing agency shall cooperate with Architect and Contractor in performing its duties and shall provide qualified personnel to perform inspections and tests.

1. Agency shall promptly notify Architect and Contractor of deficiencies in the Work observed during performance of its services.
2. Agency shall not release, revoke, alter, or enlarge requirements of the Contract Documents nor approve or accept any portion of the Work.
3. Agency shall not perform duties of Contractor.

F. Auxiliary Services: Cooperate with testing agencies and provide auxiliary services as requested, including the following:

1. Access to the Work.
2. Incidental labor and facilities to assist inspections and tests.
3. Adequate quantities of materials for testing, and assistance in taking samples.
4. Facilities for storing and curing test samples.
5. Security and protection for samples and test equipment.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01400

SECTION 01420 - REFERENCES

PART 1 - GENERAL

1.1 GENRAL REQUIREMENTS

A. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.

B. Abbreviations and Acronyms: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association, Inc. (The) www.aluminum.org	(202) 862-5100
AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials www.aashto.org	(202) 624-5800
ACI	American Concrete Institute/ACI International www.aci-int.org	(248) 848-3700
AFPA	American Forest & Paper Association (See AF&PA)	
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AHA	American Hardboard Association www.ahardbd.org	(847) 934-8800
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.e-architect.com	(202) 626-7300

AISC	American Institute of Steel Construction, Inc. www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction www.aitc-glulam.org	(303) 792-9559
ALSC	American Lumber Standard Committee	(301) 972-1700
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
APA	APA-The Engineered Wood Association www.apawood.org	(253) 565-6600
APA	Architectural Precast Association www.archprecast.org	(941) 454-6989
ARI	Air-Conditioning & Refrigeration Institute www.ari.org	(703) 524-8800
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (The American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (212) 591-7722
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	American Society for Testing and Materials www.astm.org	(610) 832-9585
AWCI	AWCI International (Association of the Wall and Ceiling Industries International) www.awci.org	(703) 534-8300
AWI	Architectural Woodwork Institute www.awinet.org	(800) 449-8811 (703) 733-0600

AWPA	American Wood-Preservers' Association www.awpa.com	(817) 326-6300
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BOCA	BOCA International, Inc. www.bocai.org	(708) 799-2300
CABO	Council of American Building Officials (See ICC)	
CCC	Carpet Cushion Council www.carpetcushion.org	(203) 637-1312
CDA	Copper Development Association Inc. www.copper.org	(800) 232-3282 (212) 251-7200
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CFR	Code of Federal Regulations www.access.gpo.gov/nara/cfr	(888) 293-6498 (202) 512-1530
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CRD	Army Corps of Engineers CRD Standards www.wes.army.mil	(601) 634-2355
CRI	Carpet and Rug Institute (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200
CSA	CSA International (Formerly: IAS - International Approval Services) www.iasapprovals.org	(800) 463-6727 (416) 747-4000

CSSB	Cedar Shake & Shingle Bureau www.cedarbureau.org	(604) 820-7700
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
DOC	Department of Commerce www.doc.gov	(202) 482-2000
DOD	Department of Defense DOD Specifications and Standards http://astimage.daps.dla.mil/online/	(215) 697-6257
EIA/TIA	Electronic Industries Alliance/Telecommunications Industry Association www.eia.org	(703) 907-7500
EIMA	EIFS Industry Members Association www.eifsfacts.com	(800) 294-3462 (770) 968-7945
EPA	Environmental Protection Agency www.epa.gov	(202) 260-2090
FDA	Food and Drug Administration www.fda.gov	(888) 463-6332
FMG	FM Global (Formerly: FM - Factory Mutual System) www.fmglobal.com	(401) 275-3000
FS	Federal Specification Available from Defense Automated Printing Service //astimage.daps.dla.mil/online	(215) 697-6257
	Available from General Services Administration www.fss.gsa.gov/pub/fed-specs.cfm	(202) 619-8925
	Available from National Institute of Building Sciences www.nibs.org	(202) 289-7800
GA	Gypsum Association www.gypsum.org	(202) 289-5440
GANA	Glass Association of North America (Formerly: FGMA - Flat Glass Marketing Association) www.glasswebsite.com/gana	(785) 271-0208
HI	Hydraulic Institute www.pumps.org	(888) 786-7744 (973) 267-9700
HPVA	Hardwood Plywood & Veneer Association	(703) 435-2900

	www.hpva.org	
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
IAS	International Approval Services (See CSA International)	
ICC	International Code Council (Formerly: CABO - Council of American Building Officials) www.intlcode.org	(703) 931-4533
ICBO	International Conference of Building Officials www.icbo.org	(800) 284-4406 (562) 699-0541
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(508) 394-4424
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IESNA	Illuminating Engineering Society of North America (The) www.iesna.org	(212) 248-5000
IGCC	Insulating Glass Certification Council www.igcc.org	(315) 646-2234
ITS	Intertek Testing Services www.itsglobal.com	(800) 345-3851 (607) 753-6711
KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LMA	Laminating Materials Association (Formerly: ALA - American Laminators Association) www.lma.org	(201) 664-2700
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864 (847) 577-7200
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MFMA	Maple Flooring Manufacturers Association www.maplefloor.org	(847) 480-9138
ML/SFA	Metal Lath/Steel Framing Association (See SSMA)	
MSS	Manufacturers Standardization Society of The Valve and	(703) 281-6613

	Fittings Industry, Inc. www.mss-hq.com	
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers' Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(303) 697-8441
NFPA	National Fire Protection Association www.nfpa.org	(800) 344-3555 (617) 770-3000
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-6372
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	National Oak Flooring Manufacturers Association www.nofma.org	(901) 526-5016
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NWWDA	National Wood Window and Door Association (See WDMA)	
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDCA	Painting and Decorating Contractors of America www.pdca.com	(800) 332-7322 (703) 359-0826
RCSC	Research Council on Structural Connections c/o AISC www.boltcouncil.org	(800) 644-2400 (312) 670-2400
RMA	Rubber Manufacturers Association	(800) 220-7620

	www.rma.org	(202) 682-4800
SDI	Steel Deck Institute www.sdi.org	(847) 462-1930
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SIGMA	Sealed Insulating Glass Manufacturers Association www.sigmaonline.org/sigma	(312) 644-6610
SJI	Steel Joist Institute www.steeljoist.org	(843) 626-1995
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611
SPRI	SPRI (Single Ply Roofing Institute) www.spri.org	(781) 444-0242
SBCCI	Southern Building Code Congress International, Inc. www.sbcci.org	(205) 591-1853
SSMA	Steel Stud Manufacturers Association (Formerly: ML/SFA - Metal Lath/Steel Framing Association) www.ssma.com	(312) 456-5590
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(800) 837-8303 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
TCA	Tile Council of America, Inc. www.tileusa.com	(864) 646-8453
TFS	Texas Forest Service Forest Products Laboratory //txforestservice.tamu.edu	(409) 639-8180
TPI	Truss Plate Institute	(608) 833-5900
UBC	Uniform Building Code (See: International Conference of Building Officials)	
UL	Underwriters Laboratories Inc.	(800) 704-4050

	www.ul.com	(847) 272-8800
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association (Formerly: AWCMA - American Window Covering Manufacturers Association) www.windowcoverings.org	(212) 661-4261
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (847) 299-5200
WIC	Woodwork Institute of California www.wicnet.org	(916) 372-9943
WMMPA	Wood Moulding & Millwork Producers Association www.wmmpa.com	(800) 550-7889 (530) 661-9591
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01420

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Use Charges: to be used on the site **[Contractor shall]** pay use charges for any temporary utilities and facilities.

B. Any use of **[water] [and] [electric power]** from Owner's existing system shall be metered and payment shall be given to the Owner for use charges.

C. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.

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

D. Temporary Utilities: At earliest feasible time, when acceptable to Owner, change over from use of temporary service to use of permanent service.

PART 2 - PRODUCTS

2.1 EQUIPMENT

1. Heating Equipment: NOT APPLICABLE

PART 3 - EXECUTION

3.1 TEMPORARY UTILITIES

A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder.

B. Sanitary Facilities: **[Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities] [Use of Owner's existing facilities will NOT be permitted,**

C. Heating and Cooling: NOT APPLICABLE

3.2 TEMPORARY FACILITIES

A. Provide field offices, storage trailers, and other support facilities as necessary for the Work.

B. Collect waste daily and, when containers are full, legally dispose of waste off-site.

1. Handle hazardous, dangerous, or unsanitary waste materials in separate closed waste containers. Dispose of material according to applicable laws and regulations.

C. Provide temporary enclosures for protection of construction and workers from inclement weather and from intense sunlight.

D. Install project identification and other signs in locations **[approved by Architect]** to inform the public and persons seeking entrance to Project.

E. CONTRACTOR SHALL INSTALL SIGNAGE FOR THE JOB NOTING THE FOLLOWING:-

1) NAME OF PROJECT
2) OWNER'S NAME
3) DESIGNER'S NAME
4) CONTRACTOR'S NAME AND
5) NAMES OF PRESIDING GOVERNOR AND COMMISSIONER OF EDUCATION

3.3 TEMPORARY CONTROLS

A. Provide temporary environmental controls as required by authorities having jurisdiction including, but not limited to, erosion and sediment control, dust control, noise control, and pollution control.

B. Provide temporary barricades, warning signs, and lights to protect the public and construction personnel from construction hazards.

1. Enclose construction areas with fences with lockable entrance gates, to prevent unauthorized access.

C. Provide temporary fire protection until permanent systems supply fire-protection needs. Comply with NFPA 241.

3.4 TERMINATION AND REMOVAL

A. Remove temporary facilities and controls before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

END OF SECTION 01500

SECTION 01600 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Provide products of same kind from a single source. The term "product" includes the terms "material," "equipment," "system," and similar terms.

B. Product Substitutions: Substitutions include products and methods of construction differing from that required by the Contract Documents and proposed by Contractor after award of the Contract.

1. Submit **[four]** 4 copies of each request for product substitution.
2. Submit requests within **<14>** days after signing the Contract.
3. Submit requests in time to permit processing of request and subsequent submittals, if any, sufficiently in advance of when materials are required in the Work. Do not submit unapproved substitutions on Shop Drawings or other submittals.
4. Identify product to be replaced and provide complete documentation showing compliance of proposed substitution with applicable requirements. Include a full comparison with the specified product, a list of changes to other Work required to accommodate the substitution, and any proposed changes in the Contract Sum or the Contract Time should the substitution be accepted.
5. Architect will review the proposed substitution and notify Contractor of its acceptance or rejection.

C. Comparable Product Submittal:

1. Submit **[four]** 4 copies of each request for approval of products as comparable to basis-of-design products. Submit requests in time to permit processing of request and subsequent submittals, if any, sufficiently in advance of when materials are required in the Work. Do not submit unapproved products on Shop Drawings or other submittals.
2. Identify product to be replaced and provide complete documentation showing compliance of proposed product with applicable requirements. Include a full comparison with the specified product.
3. Architect will review the proposed product and notify Contractor of its acceptance or rejection.

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

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Deliver products to Project site in manufacturer's original sealed container or packaging, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
3. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

4. Store materials in a manner that will not endanger Project structure.
5. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS

A. Provide products that comply with the Contract Documents, are undamaged, and are new at the time of installation.

1. Provide products complete with accessories, trim, finish, and other devices and components needed for a complete installation and the intended use and effect.

B. Select products to comply with all of the following that are applicable:

1. Where only a single product or manufacturer is named, provide the item indicated. No substitutions will be permitted.
2. Where two or more products or manufacturers are named, provide one of the items indicated. No substitutions will be permitted.
3. Where products or manufacturers are specified by name, accompanied by the term "available products" or "available manufacturers," provide one of the named items or comply with provisions for "comparable product" to obtain approval for use of an unnamed product or manufacturer.
4. Where a single product is named as the "basis-of-design" together with the names of other manufacturers, provide the named product or comply with provisions for "comparable product submittal" to obtain approval for use of a product of one of the other named manufacturers.
5. Where a single product is named as the "basis-of-design" and no other manufacturers are named, provide the named product or comply with provisions for "comparable product submittal" to obtain approval for use of a product of another manufacturer.
6. Where a product is described with required characteristics, provide a product that complies with those characteristics.
7. Where compliance with performance requirements is specified, provide products that comply and are recommended in writing by the manufacturer for the application.
8. Where compliance with codes, regulations, or standards, is specified, select a product that complies with the codes, regulations, or standards referenced.

C. Unless otherwise indicated, Architect will select color, pattern, and texture of each product from manufacturer's full range of options that includes both standard and premium items.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01600

SECTION 01701 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 CLOSEOUT SUBMITTALS

A. Record Drawings: **Maintain a set of the Contract Drawings as Record Drawings**. Mark to show installation that varies from the Work originally shown.

B. Operation and Maintenance Data: Organize data into three-ring binders with identification on front and spine of each binder and pocket folders for folded sheet information. . Include the following:

1. Manufacturer's operation and maintenance brochures.
2. Emergency instructions.
3. Spare parts list.
4. Wiring diagrams.
5. Copies of warranties.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Examine substrates and conditions for compliance with manufacturer's written requirements including, but not limited to, surfaces that are sound, level, plumb, smooth, clean, and free of deleterious substances; substrates within installation tolerances; and application conditions within environmental limits. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Verify layout information shown on Drawings, in relation to property survey and existing benchmarks, before laying out the Work.

C. Prepare substrates and adjoining surfaces according to manufacturer's written instructions, including, but not limited to, filler and primer application.

D. Take field measurements as required to fit the Work properly. Where fabricated products are to be fitted to other construction, verify dimensions by field measurement before fabricating and, when possible, allow for fitting and trimming during installation.

3.2 CUTTING AND PATCHING

A. Do not cut structural members[**or operational elements**] without prior written approval of Architect.

B. For patching, provide materials whose installed performance will equal or surpass that of existing materials. For exposed surfaces, provide or finish materials to visually match existing adjacent surfaces to the fullest extent possible.

3.3 INSTALLATION

A. Comply with manufacturer's written instructions for installation. Anchor each product securely in place, accurately located and aligned. Clean exposed surfaces and protect from damage. If applicable, prepare surfaces for field finishing.

B. Clean Project site and work areas daily, including common areas.

3.4 FINAL CLEANING

A. Clean each surface or item as follows before requesting inspection for certification of Substantial Completion:

1. Remove labels that are not permanent.
2. Clean transparent materials, including mirrors. Remove excess glazing compounds. Replace chipped or broken glass.
3. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Leave concrete floors broom clean.
4. Vacuum carpeted surfaces and wax resilient flooring.
5. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication. Clean plumbing fixtures. Clean light fixtures and lamps.
6. Clean the site. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds to a smooth, even-textured surface.

3.5 CLOSEOUT PROCEDURES

A. Substantial Completion: Before requesting Substantial Completion inspection, complete the following:

1. Advise Owner of pending insurance changeover requirements.
2. Submit specific warranties, maintenance agreements, and similar documents.
3. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
4. Submit Record Drawings[**and Specifications**], operation and maintenance manuals,[**property surveys,**] and similar final record information.
5. Deliver tools, spare parts, extra materials, and similar items.
6. Changeover locks and transmit keys to Owner.
7. Complete startup testing of systems and instruction of operation and maintenance personnel.
8. Remove temporary facilities and controls.
9. Advise Owner of changeover information related to Owner's occupancy, operation, and maintenance.
10. Complete final cleaning requirements, including touchup painting.

11. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. On receipt of a request for inspection, Architect will proceed with inspection or advise Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or advise Contractor of items that must be completed or corrected before the certificate will be issued.

C. Request inspection for certification of Final Completion, once the following are complete:

1. Submit a copy of Substantial Completion inspection list stating that each item has been completed or otherwise resolved for acceptance.
2. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

D. Architect will reinspect the Work on receipt of notice that the Work has been completed.

1. On completion of reinspection, Architect will prepare a final Certificate for Payment. If the Work is incomplete, Architect will advise Contractor of the Work that is incomplete or obligations that have not yet been fulfilled.

3.6 DEMONSTRATION AND TRAINING

A. Provide experienced instructors for each piece of equipment that requires operation and maintenance to provide instruction to Owner's personnel. Include a detailed review of the following:

1. Include instruction for system design and operational philosophy, review of documentation, operations, adjustments, troubleshooting, maintenance, and repair.

END OF SECTION 01701

SECTION 01732 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Unless otherwise indicated, demolished materials become Contractor's property. Remove and legally dispose from Project site.

B. Items indicated to be removed and salvaged remain Owner's property. Remove, clean, and deliver to Owner's designated storage area.

C. Comply with EPA regulations and disposal regulations of authorities having jurisdiction.

D. Conduct demolition without disrupting Owner's use of the property.

E. It is not expected that hazardous materials will be encountered in the Work. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 DEMOLITION

A. Maintain and protect existing underground utilities to remain in service before proceeding with demolition, providing bypass connections if they have to be disturbed.

B. Locate, identify, shut off, disconnect, and cap off utility services to be demolished.

C. Conduct demolition operations and remove debris to prevent injury to people and damage or obstruction to proposed site improvements.

D. Provide and maintain shoring, bracing, or structural support to preserve stability to excavations and to prevent movement, settlement, or collapse.

E. Erect and maintain silt fences and retention devices.

F. Properly cover all holes excavated to prevent accidents and ensure safety to anyone accessing the construction site.

G. Promptly remove demolished materials from Owner's property and legally dispose of them. Do not burn demolished materials.

END OF SECTION 01732

SECTION 02230 - SITE CLEARING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

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

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

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

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PREPARATION

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

B. Install erosion and sedimentation control measures before site clearing.

C. Protect site improvements to remain from damage. Restore damaged improvements to condition existing before start of site clearing.

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

E. Protect remaining trees and shrubs from damage and maintain vegetation. Employ a licensed arborist to repair tree and shrub damage. Restore damaged vegetation. Replace damaged trees that cannot be restored to full growth, as determined by arborist.

F. Do not store materials or equipment or permit excavation within drip line of remaining trees.

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

3.2 SITE CLEARING

A. Strip topsoil. Stockpile topsoil that will be reused in the Work.

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

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

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

E. In areas not to be further excavated, fill depressions resulting from site clearing. Place and compact satisfactory soil materials in 6-inch- thick layers to density of surrounding original ground.

F. Dispose of waste materials, including trash and debris, off Owner's property. Burning waste materials on-site is not permitted. Excess topsoil and clean excavated soil shall be stored on the open property to the West of the Project Site

END OF SECTION 02230

SECTION 02300 - EARTHWORK

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by Architect. Unauthorized excavation and remedial work shall be at Contractor's expense.

B. Do not interrupt existing utilities serving facilities occupied by Owner. Provide temporary utility services.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM; free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation, or other deleterious matter.

B. Unsatisfactory Soil: ASTM D 2487 Soil Classification Groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.

C. Backfill and Fill: Satisfactory soil materials.

D. Subbase: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand, ASTM D 2940, with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

E. Bedding: Subbase materials with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

F. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and not more than 5 percent passing a No. 8 sieve.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Protect subgrades and foundation soils from softening and damage by water.

B. Explosives: **[Do not use explosives]**

C. Excavate to subgrade elevations regardless of character of materials and obstructions encountered.

D. Excavate for structures, building slabs, pavements, and walkways. Trim subgrades to required lines and grades.

E. Utility Trenches: Excavate trenches to indicated slopes, lines, depths, and invert elevations. Maintain 12 inches of working clearance on each side of pipe or conduit.

1. Place, compact, and shape bedding course to provide continuous support for pipes and conduits over rock and other unyielding bearing surfaces and to fill unauthorized excavations.
2. Place and compact initial backfill of satisfactory soil material or subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit. Place and compact final backfill of satisfactory soil material to final subgrade.

F. Plow strip or break up sloped surfaces steeper than 1 vertical to 4 horizontal to receive fill.

G. When subgrade or existing ground surface to receive fill has a density less than that required for fill, break up ground surface, pulverize, moisture-condition or aerate soil, and recompact.

H. Place backfill and fill in layers not more than 8 inches in loose depth at optimum moisture content. Compact each layer under structures, building slabs, pavements, and walkways to [95] [98] percent of maximum dry unit weight according to ASTM D 698; elsewhere to 90 percent.

I. Grade areas to a smooth surface to cross sections, lines, and elevations indicated. Grade lawns, walkways, and unpaved subgrades to tolerances of plus or minus 1-1/4 inch and pavements and areas within building lines to plus or minus 1/2 inch.

J. Under pavements and walkways, place subbase course material on prepared subgrades and compact at optimum moisture content to required grades, lines, cross sections, and thicknesses.

K. Under slabs-on-grade, place drainage fill on prepared subgrade and compact to required cross section and thickness.

L. Allow testing agency to inspect and test each subgrade and each fill or backfill layer and verify compliance with requirements.

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

END OF SECTION 02300

SECTION 02361 - TERMITE CONTROL

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and product certificates signed by manufacturer certifying that products used comply with U.S. EPA regulations for termiticides. Include application instructions and EPA-Registered Label.

B. Engage a licensed professional pest control operator to apply termite control solution.

PART 2 - PRODUCTS

2.1 TERMITICIDES

A. Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in a soluable or emulsible, concentrated formulation that dilutes with water or foaming agent. Use only soil treatment solutions that are not harmful to plants. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to the product's EPA-Registered Label.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Prepare surfaces and apply treatment at rates and concentrations recommended in manufacturer's written instructions.

B. Apply termite control to the following:

1. Around perimeter of track where it meets interior field
2. At expansion and control joints and concrete walkways penetrations.

C. Post warning signs in areas of application.

D. Reapply soil termiticide treatment solution to areas disturbed by subsequent excavation or other construction activities following application.

END OF SECTION 02361

SECTION 02510 - WATER DISTRIBUTION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Summary: This Section includes water system piping for potable-water & cistern water service outside the building.

1. This Section does not include tapping of utility company water main by utility company and charged directly to Owner.

B. Comply with NFPA 24, "Standard for the Installation of Private Fire Service Mains and Their Appurtenances," for materials, installations, tests, and flushing.

C. Comply with NSF 14 for plastic potable-water-service piping. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. PVC Plastic Pipe: ASTM D 1785, Schedule [**80**].

1. PVC Socket Fittings: Schedule [**80, ASTM D 2467**].
2. Solvent Cement for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

B. PVC, AWWA Pipe: AWWA C900, [**Class 200**], with bell end with gasket and spigot end.

1. Comply with UL 1285 for fire-service mains if indicated.
2. PVC Fabricated Fittings: AWWA C900,] [**Class 200**], with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
3. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.

2.2 VALVES

A. Nonrising-Stem, Resilient-Seated Gate Valves, **NPS 3 (DN 80)** and Larger: AWWA C509, gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut. Include **200-psig** (1380-kPa) minimum working-pressure design, interior coating according to AWWA C550, and mechanical-joint ends.

B. Nonrising-Stem Gate Valves: UL 262, FMG-approved iron body and bonnet with flange for indicator post, bronze seating material, and inside screw, **175-psig** (1200-kPa) working pressure, and flanged end connections.

C. Valve Boxes: Cast-iron box with top section and cover with lettering "WATER," bottom section with base of size to fit over valve and barrel approximately **5 inches** (125 mm) in diameter, and adjustable cast-iron extension of length required for depth of bury of valve.

D. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of bury of valve.

E. Curb Valves: Comply with AWWA C800. Include bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.

2.3 SPECIALTIES

A. Backflow Prevention Devices: ASSE standard backflow preventers, bronze body, **150-psig** (1035-kPa) working pressure, of size indicated for maximum flow rate and maximum pressure loss indicated.

B. Plastic Underground Warning Tapes: Polyethylene plastic tape, **6 inches** (150 mm) wide by **4 mils** (0.1 mm) thick, solid blue in color with metallic core and continuously printed black-letter caption "CAUTION--WATER LINE BURIED BELOW."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Connect water system piping and water-supply source and building water-distribution and fire-protection systems at the building wall in locations and pipe sizes indicated.

B. Install restrained joints for buried piping within **60 inches** (1500 mm) of building. Use restrained-joint pipe and fittings, thrust blocks, anchors, tie rods and clamps, and other supports at vertical and horizontal offsets.

C. Install fittings for changes in direction and branch connections.

D. Comply with NFPA 24 for fire-service-main piping materials and installation.

E. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.

F. Install copper tube and fittings according to CDA's "Copper Tube Handbook."

G. Install PVC, AWWA pipe according to AWWA M23 and ASTM F 645.

H. Bury piping with depth of cover over top at least **30 inches** (750 mm).

I. Install continuous underground detectable warning tape during backfilling of trench for underground water-service piping. Locate below finished grade, directly over piping.

J. Clean and disinfect water distribution piping according to authorities having jurisdiction. **END OF SECTION 02510**

SECTION 02530 - SANITARY SEWERAGE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Coordination Drawings shall be submitted to A/E showing piping profiles and elevations at a horizontal scale of **1 inch equals 50 feet (1:500)** and a vertical scale of **1 inch equals 5 feet (1:50)**. Indicate underground structures and show pipe types, sizes, and materials and elevations of other utilities crossing system piping.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. Hub-and-Spigot, Cast-Iron Soil Pipe and Fittings: ASTM A 74 Service class, gray cast iron, for gasketed joints. Include ASTM C 564 rubber, compression-type gaskets.

B. PVC Sewer Pipe and Fittings: ASTM D 3034, SDR 35, for gasketed joints. Include ASTM F 477 elastomeric seals.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream.

B. Install piping pitched down in direction of flow, at minimum slope of 2 percent, unless otherwise indicated, with **36-inch (1000-mm)** minimum cover.

C. Use manholes if required, for changes in direction, unless fittings are indicated. Use fittings for branch connections, unless direct tap into existing sewer is indicated.

D. Install hub-and-spigot, cast-iron soil pipe and fittings with rubber gaskets according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Volume I. Use gaskets that match class of pipe and fittings.

E. Install PVC pipe and gasketed fittings with gaskets according to ASTM D 2321.

3.2 FIELD QUALITY CONTROL

A. Clean and inspect piping and structures.

B. Test complete piping for proper operation according to authorities having jurisdiction.

END OF SECTION 02530

SECTION 02620 - SUBDRAINAGE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PIPES AND FITTINGS

A. ABS Sewer Pipe and Fittings: ASTM D 2751, with **[solvent-cemented joints] [ASTM F 477 gaskets]**, [NPS 4 or [NPS 6.

B. Polyethylene Drainage Tubing and Fittings: AASHTO M 252, Interim, Type S, corrugated, with smooth waterway, and AASHTO M 252 corrugated, band-type fittings, [NPS 4 or] [NPS 6.

C. PVC Sewer Pipe and Fittings: ASTM D 3034, SDR 35, bell-and-spigot ends, with ASTM F 477 elastomeric gaskets, [NPS 4 or [NPS 6 .

D. Perforated PVC Sewer Pipe and Fittings: ASTM D 2729, bell-and-spigot ends, for loose joints, NPS 4

1. Joint Covering: Roofing felt ASTM D 226, Type I, asphalt saturated.

2.2 ACCESSORIES

A. Molded-Sheet Drainage Panels: Prefabricated, composite panels, manufactured with geotextile facing laminated to molded-plastic drainage core.

B. Geotextile: Nonwoven fabric of polyolefin or polyester fibers, or combination of both.

C. Soil Materials: As follows:

1. Impervious Fill: Clay, gravel, and sand mixture.
2. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, ASTM D 448, coarse aggregate, Size No. 57, with 100 percent passing 1-1/2-inch sieve and not more than 5 percent passing No. 8 sieve.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install piping beginning at low points of system at a minimum slope of 1 percent (1:100). Bed piping with full bearing, solidly in filtering material.

1. If required, lay open-joint tile spaced 1/4 inch between ends. Cover top two-thirds of joint opening with joint screening material and tie with corrosion-resistant wire.

B. Maintain swab or drag in piping with tight joints and pull past each joint as it is completed.

C. Soil Material Installation: As follows: (If required Manufacturer does not specify installation)

1. Impervious Fill at Footings: Place and compact impervious fill at least 6 inches deep and 12 inches wide on subgrade adjacent to bottom of footing.
2. Filtering Material: Place compacted layer of filtering material at least 4 inches deep over compacted subgrade where drainage pipe is to be laid. Cover drainage piping with 4 inches of filtering material after testing is complete.
3. Drainage Fill: Place and compact drainage fill over filtering material. Surround piping at least 6 inches on each side and above pipe to within 12 inches of finish grade. Place 1 layer of filter fabric, overlapping edges at least 4 inches, over drainage fill material.
4. Fill to Grade: Place and compact impervious fill material over compacted drainage fill.

END OF SECTION 02620

SECTION 02751 - CEMENT CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: **[Product Data] [design mixes for concrete] [and] [laboratory test reports]**.

B. Comply with ACI 301, "Specification for Structural Concrete."

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Welded Steel Wire Fabric: ASTM A 185, flat sheets not rolls.

C. Air-Entraining Admixture: ASTM C 260.

D. Chemical Admixtures: ASTM C 494. Calcium chloride shall not be used.

E. Liquid Membrane-Forming Curing Compound: ASTM C 309, clear, Type I, Class B, **[waterborne]**.

F. Nonslip Aggregate: Factory-produced, rustproof, nonglazing, fused aluminum-oxide granules or crushed emery, unaffected by freezing, moisture, and cleaning materials. **Nonslip aggregate shall be installed in all concrete walkways.**

G. Dry-Shake Color Hardener: NOT APPLICABLE.

H. Pavement-Marking Paint: **[FS TT-P-115, Type I, or AASHTO M-248, Type N, alkyd-resin type]**.

2.2 MIXES

A. Proportion normal-weight concrete mixes to provide the following properties:

1. Compressive Strength: [3000 psi at 28 days.
2. Slump Limit: [3 inches at point of placement.
3. W/C Ratio: 0.45 maximum at point of placement.
4. Air Content: 5.5 to 7.0 percent.

PART 3 - EXECUTION

3.1 PAVING

A. Accurately position and support reinforcement, and secure against displacement.

B. Locate and install contraction, construction, isolation, and expansion joints as indicated or required.

C. Place concrete in a continuous operation within planned joints or sections. Do not add water to adjust slump.

D. Float surfaces to true planes within a tolerance of 1/4 inch in 10 feet **[medium-to-coarse-textured broom]** finish.

E. Tool edges and joints to a radius of **[1/4 inch** to **3/8 inch]**.

F. Uniformly spread 25 lb/100 sq. ft. of dampened nonslip aggregate over float-finished paving surface, tamp, and expose nonslip aggregate.

G. Begin curing after finishing concrete. **[Keep concrete continuously moist for at least seven days]**.

H. Apply traffic paint with mechanical equipment to a minimum wet film thickness of 15 mils.

I. Owner will employ a testing agency to sample concrete, perform tests, and submit test reports during concrete placement, if required.

J. Remove and replace concrete paving that is broken, damaged, or defective. Exclude traffic from paving for at least 14 days.

END OF SECTION 02751

SECTION 02821 - CHAIN-LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SEC TION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 FENCE COMPONENTS

A. Fabric: **[Galvanized steel, ASTM A 392] [or] [aluminum-coated steel, ASTM A 491 and ASTM A 817]**, 1-3/4 inch mesh, 0.120 inch] diameter wire.

B. Posts and Rails: ASTM F 761. Per requirements for **[Heavy]**-Duty Fence.

C. Posts and Rails: **[Galvanized-steel]** pipe complying with ASTM F 1043 requirements for] **[Heavy]** Industrial Fence.

D. Tension Wire: ASTM A 824 with finish to match fabric.

E. Fittings and Accessories: ASTM F 626 and as follows:

1. Post and Line Caps: Provide weathertight cap for each post. Provide line post caps with loop to receive tension wire or top rail.
2. Post Brace Assembly: Same material as top rail with 3/8-inch- minimum diameter rod and adjustable tightener or as noted.
3. Bottom and Center Rail: Same material as top rail with cap on each end.
4. Tie Wires: **[Galvanized steel] [or] [aluminum alloy]** with finish to match fabric.

F. Gate Posts, Swing Gates, and Accessories: ASTM F 654, same metal as posts and rails, with galvanized hardware and accessories or as noted.

G. Gate Posts, Swing Gates, and Accessories: ASTM F 900, same metal as posts and rails, with galvanized hardware and accessories or as noted.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fence to comply with ASTM F 567.

B. Excavation: Drill post holes 8 inches in diameter and 40 inches minimum in depth, equally spaced, but not more than 10 feet) apart or as noted.

C. Setting Posts: Set posts in holes approximately 4 inches above bottom of excavation. Align posts vertically and align tops. Pour concrete footings with tops [**2 inches minimum above grade, troweled to a crown to shed water**].

END OF SECTION 02821

SECTION 02832 - SEGMENTAL RETAINING WALLS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Structural Performance: Provide segmental retaining walls capable of withstanding gravity loads[**and design loads indicated**] according to NCMA's "Design Manual for Segmental Retaining Walls."

B. Seismic Performance: Provide segmental retaining walls capable of withstanding the effects of earthquake motions determined according NCMA's "Segmental Retaining Walls--Seismic Design Manual."

C. Submittals: Product Data[**and structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation**].

D. Submit test reports indicating compliance of retaining wall units[**and soil reinforcement**] with requirements.

PART 2 - PRODUCTS

2.1 RETAINING WALL MATERIALS

A. Concrete Units: ASTM C 1372, Normal Weight.

1. **[Available]**Products:

   a. VERSA-LOK MODULAR CONCRETE UNITS or approved equal.

2. Exposed Faces: **[Machine-split textured]**.
3. Shape and Dimensions: **[Any shape and dimensions that will produce segmental retaining walls of dimensions and profiles indicated]**.
4. **[Corner] [Cap]** units and other special shapes to provide textures on exposed surfaces **[matching faces]**.
5. **[Pins,] [clips,] [cap adhesive,]** and other accessories recommended by retaining wall unit manufacturer.

B. Base: **[Base material per Division 2 Section "Earthwork."] [Drainage fill]**.

C. Drainage Fill: ASTM D 448, Size No. 57, with 100 percent passing 1-1/2-inch sieve and not more than 5 percent passing No. 8 sieve.

D. Soil Fill: Satisfactory soils per Division 2 Section "Earthwork."

E. Filter Fabric: Nonwoven fabric of polyolefin or polyester fibers, or combination of both.

F. Soil Reinforcement: **[Knitted or woven polyester geogrid], [molded polyethylene geogrid] [or] [woven geotextile]**.

1. **[Available]**Products:

a. Contractor to Submit product for approval.

2. Contractor is responsible for acquiring qualified professional engineer to design and seal drawing for segmented retaining wall.

PART 3 - EXECUTION

3.1 RETAINING WALL INSTALLATION

A. Place and compact base material to **[95 percent maximum dry unit weight according to ASTM D 698]**.

B. Place retaining wall units according to NCMA's "Segmental Retaining Wall Installation Guide."

1. Place fills on both sides of wall at same time, where both sides are indicated to be filled.
2. Fill voids with drainage fill.

C. Cap Units: Place cap units and secure with cap adhesive.

3.2 FILL PLACEMENT

A. Place, spread, and compact fill in uniform lifts for full width and length of embankment as wall is laid. Begin at back of wall and place and spread fill toward embankment.

1. Use only hand-operated compaction equipment within 48 inches of wall.
2. Compact drainage fill and reinforced soil fill to **[95 percent maximum dry unit weight according to ASTM D 698] [90 percent maximum dry unit weight according to ASTM D 1557]**.
3. Compact unreinforced soil fill per Division 2 Section "Earthwork."

B. Embed soil reinforcement in horizontal joints of retaining wall 8 inches, stretch tight over compacted backfill, and anchor before placing fill on it.

1. Use additional soil reinforcement at corners and curved walls to provide continuous reinforcement.
2. Do not dump fill material directly onto geosynthetics.

C. In each compacted backfill layer, perform at least 1 field in-place compaction test for each **[100 feet** or less of segmental retaining wall length.

END OF SECTION 02832

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: **[Product Data] [concrete mix designs] [and] [laboratory test reports]**.

B. Comply with ASTM C 94; ACI 301, "Specification for Structural Concrete"; ACI 117, "Specifications for Tolerances for Concrete Construction and Materials"; and CRSI's "Manual of Standard Practice."

C. Engage a qualified independent testing agency to design concrete mixes.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Deformed Reinforcing Bars: ASTM A 615/A 615M, Grade 60.

B. Steel Welded-Wire Fabric: ASTM A 185, flat sheets not rolls.

C. Portland Cement: ASTM C 150, Type I or II.

D. Aggregates: ASTM C 33, uniformly graded.

E. Fiber Reinforcement: ASTM C 1116, Type III, synthetic fibers, 1/2 to 1 inch .

F. Water Stops: **[Flat dumbbell or center-bulb type, of either rubber (CRD C 513) or PVC (CRD C 572)]** or **[Self-expanding, hydrophylic, rectangular or trapezoidal strips]**.

G. Vapor Retarder: **[Clear 10-mil- thick polyethylene sheet] [Reinforced polyethylene sheet, ASTM E 1745, Class C]**.

H. Slip-Resistive Aggregate: Factory-produced, rustproof, nonglazing, fused aluminum-oxide granules or crushed emery, unaffected by freezing, moisture, and cleaning materials.

I. Joint-Filler Strips: ASTM D 1751, cellulosic fiber, or ASTM D 1752, cork.

2.2 MIXES

A. Proportion normal-weight concrete mixes to provide the following properties:

1. Compressive Strength: **[3000 psi (20.7 MPa)]** at 28 days.
2. Slump Limit: **[4 inches (100 mm)]** at point of placement.

3. Air Content: 5.5 to 7.0 percent for concrete exposed to freezing and thawing, 2 to 4 percent elsewhere.

PART 3 - EXECUTION

3.1 CONCRETING

A. Construct formwork and maintain tolerances and surface irregularities within ACI 117 limits of Class A for concrete exposed to view and Class C for other concrete surfaces.

B. Set water stops where indicated to ensure joint watertightness.

C. Place vapor retarder on prepared subgrade, with joints lapped 6 inches and sealed.

D. Accurately position, support, and secure reinforcement.

E. Install construction, isolation, and contraction joints where indicated. Install full-depth joint-filler strips at isolation joints.

F. Place concrete in a continuous operation and consolidate using mechanical vibrating equipment.

G. Protect concrete from physical damage, premature drying, and reduced strength due to hot or cold weather during mixing, placing, and curing.

H. Formed Surface Finish: Smooth-formed finish for concrete exposed to view, coated, or covered by waterproofing or other direct-applied material; rough-formed finish elsewhere.

I. Slab Finishes: **[Nonslip-broom finish to exterior concrete platforms, steps, and ramps]**.

J. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aggregate over initially floated surfaces; tamp and float. Expose nonslip aggregate after curing.

K. Cure formed surfaces by moist curing for at least seven days.

L. Begin curing concrete slabs after finishing. **[Keep concrete continuously moist for at least seven days]**.

M. Owner will engage a testing agency to perform field tests and to submit test reports if required.

N. Protect concrete from damage. Repair surface defects in formed concrete and slabs.

O. Repair slabs not meeting surface tolerances by grinding high areas and by applying a repair underlayment to low areas receiving floor coverings and a repair topping to low areas to remain exposed.

END OF SECTION 03300

SECTION 04810 - UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Samples for [**decorative concrete masonry units**] [**face brick**] [**hollow brick**] [**and**] [**colored mortar**].

B. Comply with ACI 530.1/ASCE 6/TMS 602.

C. Mockups: If required or requested, construct a sample wall panel approximately **48 inches (1200 mm) long by 48 inches (1200 mm)** high to demonstrate aesthetic effects and set quality standards for materials and execution if required.

PART 2 - PRODUCTS

2.1 MASONRY UNITS

A. Concrete Masonry Units: [**ASTM C 90**] [**UBC Standard 21-4**]; Weight Classification, [**Normal Weight**].

1. Special shapes for lintels, corners, jambs, sash, control joints, and other special conditions.
2. [**Square-edged**] units for outside corners as specified or, unless otherwise indicated.

B. Decorative Concrete Masonry Units: [**ASTM C 90**] [**UBC Standard 21-4**]; Weight Classification, [**Normal Weight**].

1. Finish: Exposed faces with [**ground**] finish if required or cement plaster on exposed masonry unit.
2. Special shapes for lintels, corners, jambs, sash, control joints, and other special conditions if noted or required.

C. Face Brick: NOT APPLICABLE

D. Firebox Brick: NOT APPLICABLE

E. Clay Flue Lining Units: NOT APPLICABLE

F. MORTAR AND GROUT

G. Mortar: [**ASTM C 270**] OR [**UBC Standard 21-15**], proportion specification.[**Ready-mixed mortar, ASTM C 1142, may be used at Contractor's option.**]

1. Masonry Cement: .

2. For masonry below grade or in contact with earth, use Type [**M or RM**].
3. For reinforced masonry, use Type [**S or RS**].
4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions, and for other applications where another type is not indicated, use Type [N] [**N or RN**].
5. Colored Mortar: For [**decorative concrete masonry units**] [**face brick**] [**hollow brick**], use colored cement or cement-lime mix of color selected.
6. Water-Repellent Additive: For mortar used with decorative concrete masonry units, use product recommended by manufacturer of units.

H. Grout: [**ASTM C 476**] or [**UBC Standard 21-19**] with a slump of **8 to 11 inches (200 to 280 mm).**

2.2 REINFORCEMENT, TIES, AND ANCHORS

A. Steel Reinforcing Bars: ASTM A 615/A 615M, **Grade 60 (Grade 400).**

B. Joint Reinforcement: [**ASTM A 951**] [**UBC Standard 21-10**].

1. Coating: [**Hot-dip galvanized at both interior and exterior walls**].
2. Wire Diameter for Side Rods: [**W1.7 or** 0.148 inch (3.8 mm)]
3. Wire Diameter for Cross Rods: [**W1.7 or** 0.148 inch (3.8 mm)]
4. For single-wythe masonry, provide either ladder design or truss design.

C. Rigid Anchors: Fabricate from steel bars **1-1/2 inches (38 mm) wide by 1/4 inch (6.4 mm)** thick by **24 inches (600 mm) long, with ends turned up 2 inches (50 mm)** or with cross pins.

2.3 EMBEDDED FLASHING MATERIALS

A. Sheet Metal Flashing: [**Galvanized steel, 0.0156 inch (0.4 mm) thick**]

B. Rubberized Asphalt Sheet Flashing: Pliable and highly adhesive rubberized asphalt compound, **26 mils (0.7 mm)** thick, bonded to a polyethylene film, **4 mils (0.1 mm)** thick, to produce an overall thickness of **30 mils (0.8 mm).**

2.4 MISCELLANEOUS MASONRY ACCESSORIES

A. Extruded-Polystyrene Board Insulation: NOT APPLICABLE.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cut masonry units with saw. Install with cut surfaces and, where possible, cut edges concealed.

B. Fill cores in hollow concrete masonry units with grout **24 inches (600 mm)** under bearing plates, beams, lintels, posts, cells with reinforcing rods and similar items, unless otherwise indicated.

C. Build non-load-bearing interior partitions full height and install compressible filler in joint between top of partition and underside of structure above.

D. Tool exposed joints slightly concave when thumbprint hard, unless otherwise indicated.

E. Keep cavities clean of mortar droppings and other materials during construction. Strike joints facing cavities flush if reqired.

3.2 LINTELS

A. Construct all reinforced concrete lintels for all door and window openings.

B. Use precast lintels only if required or noted made from concrete matching concrete masonry units in color, texture, and compressive strength and with reinforcement bars indicated or required to support loads indicated.

C. Minimum bearing of **8 inches** (200 mm) at each jamb, unless otherwise indicated.

3.3 FLASHING AND WEEP HOLES

1. Extend flashing **4 inches** (100 mm) into masonry at each end and turn up **2 inches** (50 mm) to form a pan.

B. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.

3.4 FIELD QUALITY CONTROL

A. If required, Owner will engage a qualified independent testing agency to perform the following tests for each **5000 sq. ft.** (460 sq. m) of wall area or portion thereof:

1. Mortar: **[ASTM C 780] [UBC Standard 21-16]**.
2. Grout: **[ASTM C 1019] [UBC Standard 21-18]**.
3. Brick: ASTM C 67.
4. Concrete Masonry Units: ASTM C 140.

3.5 CLEANING

A. Clean masonry as work progresses. Remove mortar fins and smears before tooling joints or plastering.

END OF SECTION 04810

SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: **[Product Data] [Shop Drawings] [and] [mill test reports]**.

B. Comply with AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design," RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts," and AWS D1.1, "Structural Welding Code--Steel."

C. Structural Steel Requirements shall apply to the prefabricated Reidsteel Grandstand and FS Industries IBC prefabricated Steel Stairways

PART 2 - PRODUCTS

2.1 STRUCTURAL STEEL AND ACCESSORIES

A. Structural-Steel Shapes, Plates, and Bars: **[ASTM A 36/A 36M, carbon steel]** .

B. Cold-Formed Structural-Steel Tubing: ASTM A 500, Grade B.

C. Steel Pipe: ASTM A 53, Type E or S, Grade B, standard weight (Schedule 40), black finish.

D. Anchor Rods, Bolts, Nuts: **[ASTM A 36/A 36M, unheaded rods] [ASTM A 325], headed bolts, Type 1, heavy hex steel structural bolts and heavy hex carbon-steel nuts]**.

E. Bolts, Nuts, and Washers: **[ASTM A 307, Grade A; nonhigh-strength carbon-steel, hex-head bolts; carbon-steel nuts; and flat, unhardened steel washers, uncoated] [ASTM A 325, Type 1, high-strength heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers, uncoated]**.

F. Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd, rust-inhibiting primer.

G. Grout: ASTM C 1107, nonmetallic, shrinkage resistant, premixed.

2.2 FABRICATION

A. Fabricate structural steel according to AISC specifications and tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.

B. Shop Priming: Prepare surfaces according to SSPC-SP 2, "Hand Tool Cleaning" or SSPC-SP 3, "Power Tool Cleaning." Shop prime steel to a dry film thickness of at least 1.5 mils. Do not prime surfaces to be embedded in concrete or mortar or to be field welded.

PART 3 - EXECUTION

3.1 ERECTION

A. Erect structural steel according to AISC specifications and within erection tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

B. Set base and bearing plates on wedges, shims, or setting nuts. Tighten anchor bolts, cut off wedges or shims flush with edge of plate, and pack grout solidly between bearing surfaces and plates.

C. Bolted Connections: Install and tighten nonhigh-strength bolts, unless high-strength bolts are indicated. Snug tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Weld Connections: Comply with AWS D1.1.

END OF SECTION 05120

SECTION 05520 - HANDRAILS AND RAILINGS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Structural Performance: Provide handrails and railings capable of withstanding structural loads required by ASCE 7.

B. Submittals: **[Product Data] [Shop Drawings] [structural analysis data signed and sealed by a qualified professional engineer registered in the state where Project is located] [and] [manufacturer's color charts showing the full range of colors available for factory-applied finishes]**.

PART 2 - PRODUCTS

2.1 METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Pipe: ASTM A 53, Schedule 40.

C. Steel Tube: ASTM A 500.

D. Iron Castings: ASTM A 47, Grade 32510) or ASTM A 48, Class 30 .

E. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

2.2 OTHER MATERIALS

A. Nonshrink, Nonmetallic Grout: ASTM C 1107; recommended by manufacturer for exterior applications.

2.3 RAILING SYSTEMS

A. **[Available**]Manufacturers

2.4 <FS Industries IBC Prefabricated Steel Stairways

www.fsindustries.com

PO Box 72659 providence RI 02907 Tel # 800-421-0314 0r 401-421-0314

A. Assemble railing systems in shop to the greatest extent possible. Use connections that maintain structural value of joined pieces.

B. Form changes in direction of railing members by **[bending]**, **[mitering at elbow bends]** or **[use of prefabricated fittings]**.

C. Fabricate railing systems and handrails for connecting members **[by welding]** or **[with concealed mechanical fasteners and fittings]**.

D. Provide manufacturer's standard wall brackets, flanges, miscellaneous fittings, and anchors to connect handrail and railing members to other construction.

E. Provide wall returns at ends of wall-mounted handrails.

2.5 FINISHES

A. Steel Railings: **[Hot-dip galvanized after fabrication, ASTM A 123; cleaned and shop primed after galvanizing]** **[Cleaned and shop primed]**.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fit exposed connections accurately together to form tight, hairline joints.

B. Set handrails and railings accurately in location, alignment, and elevation and free from rack.

C. Coat concealed surfaces of aluminum that will be in contact with cementitious materials or dissimilar metals, with a heavy coat of bituminous paint.

D. Anchor posts in concrete by forming or core-drilling holes 5 inches deep and 3/4 inch greater than OD of post. Fill annular space between post and concrete with nonshrink, nonmetallic grout.

E. Attach handrails to wall with wall brackets.

END OF SECTION 05520

SECTION 1009
STAIRWAYS AND HANDRAILS

1009.1 Stairway Width. The width of stairways shall not be less than 44 inches (1118 mm).

Exceptions:

1. Stairways serving an occupant load of 50 or less shall have a width of not less than 36 inches (914 mm).

1009.2 Headroom. Stairways shall have a minimum headroom clearance of 80 inches (2032 mm) measured vertically from a line connecting the edge of the nosings. The headroom shall be continuous above the stairway to the point where the line intersects the landing below, one tread depth beyond the bottom riser. The minimum clearance shall be maintained the full width of the stairway and landing.

1009.3 Stair Treads and Risers. Stair riser heights shall be 7 inches (178 mm) maximum and 4 inches (102 mm) minimum. Stair tread depths shall be 11 inches (279 mm) minimum. The riser height shall be measured vertically between the leading edges of adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than 0.375 inch (9.5 mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at right angle to the tread's leading edge. The greatest tread depth within any flight of stairs shall not exceed the smallest by more than 0.375 inch (9.5 mm).

1009.11.5 Handrail Extensions. Handrails shall return to a wall, guard or the walking surface or shall be continuous to the handrail of an adjacent stair flight. Where handrails are not continuous between flights, the handrails shall extend horizontally at least 12 inches (305 mm) beyond the top riser and continue to slope for the depth of one tread beyond the bottom riser.

Exceptions:

1. Handrails within a dwelling unit that is not required to be accessible need extend only from the top riser to the bottom riser.
2. Aisle handrails in Group A occupancies in accordance with Section 1024.13.

1009.11.6 Clearance. Clear space between a handrail and a wall or other surface shall be a minimum of 1.5 inches (38 mm). A handrail and a wall or other surface adjacent to the handrail shall be free of any sharp or abrasive elements.

1009.11.7 Stairway Projections. Projections into the required width at each handrail shall not exceed 4.5 inches (114 mm) at or below the handrail height. Projections into the required width shall not be limited above the minimum headroom height required in Section 1009.2.

1009.3.1 Dimensional Uniformity. Stair treads and risers shall be of uniform size and shape. The tolerance between the largest and smallest riser or between the largest and smallest tread shall not exceed 0.375 inch (9.5 mm) in any flight of stairs.

1009.3.2 Profile. The radius of curvature at the leading edge of the tread shall be not greater than 0.5 inch (12.7 mm). Beveling of nosings shall not exceed 0.5 inch (12.7 mm). Risers shall be solid and vertical or sloped from the underside of the leading edge of the tread above at an angle not more than 30 degrees (0.52 rad) from the vertical. The leading edge (nosings) of treads shall project not more than 1.25 inches (32 mm) beyond the tread below and all projections of the leading edges shall be of uniform size, including the leading edge of the floor at the top of a flight.

1009.4 Stairway Landings. There shall be a floor or landing at the top and bottom of each stairway. The width of landings shall not be less than the width of stairways they serve. Every landing shall have a minimum dimension measured in the direction of travel equal to the width of the stairway. Such dimension need not exceed 48 inches (1219 mm) where the stairway has a straight run.

1009.5 Stairway Construction. All stairways shall be built of materials consistent with the types permitted for the type of construction of the building, except that wood handrails shall be permitted for all types of construction.

1009.5.1 Stairway Walking Surface. The walking surface of treads and landings of a stairway shall not be sloped steeper than one unit vertical in 48 units horizontal (2-percent slope) in any direction. Stairway treads and landings shall have a solid surface. Finish floor surfaces shall be securely attached.

Exception: In Group F, H and S occupancies, other than areas of parking structures accessible to the public, openings in treads and landings shall not be prohibited provided a sphere with a diameter of 1 1/8 inches (29 mm) cannot pass through the opening.

1009.5.2 Outdoor Conditions. Outdoor stairways and outdoor approaches to stairways shall be designed so that water will not accumulate on walking surfaces. In

SECTION 1012
GUARDS

1012.1 Where Required. Guards shall be located along open-sided walking surfaces, mezzanines, industrial equipment platforms, stairways, ramps and landings which are located more than 30 inches (762 mm) above the floor or grade below. Guards shall be adequate in strength and attachment in accordance with Section 1607.7. Guards shall also be located along glazed sides of stairways, ramps and landings that are located more than 30 inches (762 mm) above the floor or grade below where the glazing provided does not meet the strength and attachment requirements in Section 1607.7.

Exception: Guards are not required for the following locations:

1. On the loading side of loading docks or piers.
2. On the audience side of stages and raised platforms, including steps leading up to the stage and raised platforms
3. On raised stage and platform floor areas such as runways, ramps and side stages used for entertainment or presentations.
4. At vertical openings in the performance area of stages and platforms.
5. At elevated walking surfaces appurtenant to stages and platforms for access to and utilization of special lighting or equipment.
6. Along vehicle service pits not accessible to the public.
7. In assembly seating where guards in accordance with Section 1024.14 are permitted and provided.

1012.2 Height. Guards shall form a protective barrier not less than 42 inches (1607 mm) high, measured vertically above the leading edge of the tread, adjacent walking surface or adjacent seat board

Exceptions:

1. For occupancies in Group R-3, and within individual dwelling units in occupancies in Group R-2, both as applicable in section 101.2, guards whose top rail also serves as a handrail shall have a height not less than 34 inches (864 mm) and not more than 38 inches (965 mm) measured vertically from the leading edge of the stair tread nosing.
2. The height in assembly seating areas shall be in accordance with Section 1024.14.

other than occupancies in Group R-3, and occupancies in Group U that are accessory to an occupancy in Group R-3, treads, platforms and landings that are part of exterior stairways in climates subject to snow or ice shall be protected to prevent the accumulation of same.

1009.6 Vertical Rise. A flight of stairs shall not have a vertical rise grater than 12 feet (3658 mm) between floor levels or landings.

1009.11 Handrails. Stairways shall have handrails on each side.

Exceptions:

1. Aisle stairs complying with Section 1024 provided with a center handrail need not have additional handrails.
2. Stairways within dwelling units, spiral stairways and aisle stairs serving seating only on one side are permitted to have a handrail on one side only.
3. Decks, patios and walkways that have a single change in elevation where the landing depth on each side of the change of elevation is greater than what is required for a landing do not require handrails.
4. In Group R-3 occupancies, a change in elevation consisting of a single riser at and entrance or egress door does not require handrails.
5. Changes in room elevations of only one riser within dwelling units ands sleeping units in Group R-2 and R-3 occupancies do not require handrails.

1009.11.1 Height. Handrail height, measured above stair tread nosings, or finish surface of ramp slope, shall be uniform, not less than 34 inches (864 mm) and not more than 38 inches (965 mm).

1009.11.2 Intermediate Handrails. Intermediate handrails are required so that all portions of the stairway width required for egress capacity are within 30 inches (762 mm) of a handrail. On monumental stairs, handrails shall be located along the most direct path of egress travel.

1009.11.3 Handrail Graspability. Handrails with lar cross section shall have an outside diameter of ast 1.25 inches (32 mm) and not greater than 2 inches (51 mm) or shall provide equivalent graspability. If the handrail is not circular, it shall have a perimeter dimension of at least 4 inches (102 mm) and not greater than 6.25 inches (160 mm) with a maximum cross-section dimension of 2.25 inches (57 mm). Edges shall have a minimum radius of 0.01 inch (0.25 mm).

1012.3 Opening Limitations. Open guards shall have balusters or ornamental patterns such that a 4-inch-diameter (102 mm) sphere cannot pass through any opening up to a height of 34 inches (864 mm). From a height of 34 inches (864 mm) to 42 inches (1067 mm) above the adjacent walking surfaces, a sphere 8 inches (203 mm) in diameter shall not pass.

Exceptions:

1. The triangular openings formed by the riser, tread and bottom rail at the open side of a stairway shall be of a maximum size such that a sphere of 6 inches (152 mm) in diameter cannot pass through the opening.
2. At elevated walking surfaces for access to and use of electrical, mechanical or plumbing systems or equipment, guards shall have balusters or be of solid materials such that a sphere with a diameter of 21 inches (533 mm) cannot pass through any opening.
3. In areas which are not open to the public within occupancies in Group I-3, F, H or S, balusters, horizontal intermediate rails or other construction shall not permit a sphere with a diameter of 21 inches (533 mm) to pass through any opening.
4. In assembly seating areas, guards at the end of aisles where they terminate at a fascia of boxes, balconies and galleries shall have balusters or ornamental patterns such that a 4-inch-diameter (102 mm) sphere cannot pass through any opening up to a height of 26 inches (660 mm). From a height of 26 inches (660 mm) to 42 inches (1067 mm) above the adjacent walking surfaces, a sphere 8 inches (203 mm) in diameter shall not pass.

1012.4 Screen Porches. Porches and decks which are enclosed with insect screening shall be provided with guards where the walking surface is located more than 30 inches (762 mm) above the adjacent walking surfaces, a sphere 8 inches (203 mm) in diameter shall not pass.

1012.5 Mechanical Equipment. Guards shall be provided where appliances, equipment, fans or other components that require service are located within 10 feet (3048 mm) of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches (762 mm) above the floor, roof or grade below. The guard shall be constructed so as to prevent

ADDENDUM TO SECTION 05520

1009.11.4 Continuity. Handrail-gripping surfaces shall be continuous, without interruption by newel posts or other obstruction.

Exceptions:

1. Handrails within dwelling unit are permitted to be interrupted by a newel post at a stair landing.
2. Within a dwelling unit, the use of a volute, turnout or starting easing is allowed on the lowest tread.
3. Handrail brackets or balusters attached to the bottom surface of the handrail that do not project horizontally beyond the sides of the handrail within 1.5 inches (38 mm) of the bottom of the handrail shall not be considered to be obstructions and provided further that for each 0.5 inch (13 mm) of additional handrail perimeter dimension above 4 inches (102 mm), the vertical clearance dimension of 1.5 inches (38 mm) shall be permitted to be reduced by 0.125 inch (3 mm).

the passage of a 21-inch-diameter (533 mm) sphere.

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Model code evaluation reports for **[treated wood] [engineered wood products] [foam-plastic sheathing] [and] [building wrap]**.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: Provide dressed lumber, S4S, **[19] [15]** percent maximum moisture content for 2-inch nominal thickness or less, marked with grade stamp of inspection agency.

B. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

C. Wood Structural Panels: DOC PS 2. Provide plywood complying with DOC PS 1, where plywood is indicated.

1. Comply with "Code Plus" provisions in APA Form No. E30K.

2.2 TREATED MATERIALS

A. Preservative-Treated Materials: AWPA C2 lumber and AWPA C9 plywood, labeled by an inspection agency approved by ALSC's Board of Review. After treatment, kiln-dry lumber and plywood to 19 and 15 percent moisture content, respectively. Treat indicated items and the following:

1. Wood members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Concealed members in contact with masonry or concrete.
3. Wood framing members less than 18 inches above grade.
4. Wood floor plates installed over concrete slabs directly in contact with earth.

2.3 LUMBER

A. Miscellaneous Lumber: **[Construction, Stud, or No. 3]**or **[Standard, Stud, or No. 3]** grade of any species for nailers, blocking, and similar members.

2.4 ENGINEERED WOOD PRODUCTS

A. Engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be demonstrated by comprehensive testing.

2.5 PANEL PRODUCTS

A. Plywood Wall Sheathing: **[Exterior, Structural I]** or **[Exposure 1, Structural I]** sheathing.

B. Plywood Roof Sheathing: **[Exterior, Structural I]** or **[Exposure 1, Structural I]** sheathing.

C. Telephone and Electrical Equipment Backing Panels: Plywood, Exposure 1, C-D Plugged, fire-retardant treated, not less than 1/2 inch thick.

2.6 MISCELLANEOUS PRODUCTS

A. Fasteners: Size and type indicated. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners **[with hot-dip zinc coating complying with ASTM A 153/A 153M.**

1. Power-Driven Fasteners: CABO NER-272.
2. Bolts: Steel bolts complying with **ASTM A 307, Grade A**; with **ASTM A** 563 hex nuts and, where indicated, flat washers.

B. Metal Framing Anchors: Hot-dip galvanized steel of structural capacity, type, and size indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Securely attach rough carpentry to substrates, complying with the following:

1. CABO NER-272 for power-driven fasteners.
2. Published requirements of metal framing anchor manufacturer.
3. **[Table 602.3(1), "Fastener Schedule for Structural Members and [Table 2306.1, "Fastening Schedule," in the Standard Building Code] [Table 23-II-B-1, "Nailing Schedule".**

C. Fastening Methods: Comply with recommendations**[and "Code Plus" provisions]** in APA Form No. E30K.

END OF SECTION 06100

SECTION 06105 - MISCELLANEOUS CARPENTRY

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Model code evaluation reports for treated wood.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: Provide dressed lumber, S4S, **[19] [15]** percent maximum moisture content for 2-inch nominal thickness or less, marked with grade stamp of inspection agency.

B. Wood Structural Panels: DOC PS 2. Provide plywood complying with DOC PS 1, where plywood is indicated.

1. Comply with "Code Plus" provisions in APA Form No. E30K.

2.2 TREATED MATERIALS

A. Preservative-Treated Materials: AWPA C2 lumber and AWPA C9 plywood, labeled by an inspection agency approved by ALSC's Board of Review. After treatment, kiln-dry lumber and plywood to 19 and 15 percent moisture content, respectively. Treat indicated items and the following:

1. Wood members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Concealed members in contact with masonry or concrete.
3. Wood framing members less than 18 inches above grade.

2.3 LUMBER

A. Other Framing: Construction or No. 2 grade: **[Douglas fir-larch: NLGA, WCLIB, or WWPA;] [Douglas fir south: WWPA;] [or] [Southern pine: SPIB]**.

B. Exposed Boards: **[Eastern white, Idaho white, lodgepole, ponderosa, or sugar pine, D Select (Quality);] [Southern pine, B & B Finish;] [**

C. Concealed Boards: **[Northern species: No. 3 Common per NLGA rules;] [Mixed southern pine: No. 2 per SPIB rules.**

D. Miscellaneous Lumber: Construction, Stud, or No. 3 grade of any species for nailers, blocking, and similar members.

2.4 INTERIOR WOOD TRIM

A. NOT APPLICABLE

2.5 PANEL PRODUCTS

A. NOT APPLICABLE

2.6 FASTENERS

A. Fasteners of size and type indicated. Where carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners **[with hot-dip zinc coating complying with ASTM A 153/A 153M]**.

1. Power-Driven Fasteners: CABO NER-272.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set carpentry to required levels and lines, with members plumb and true to line. Fit carpentry to other construction; scribe and cope for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.

C. Countersink nail heads on exposed carpentry work and fill holes with wood filler.

D. Installation of Panel Products: Comply with recommendations**[and "Code Plus" provisions]** in APA Form No. E30K

END OF SECTION 06105

SECTION 07210 - BUILDING INSULATION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

B. Surface-Burning Characteristics: ASTM E 84, and as follows:

1. Flame-Spread Index: 25 or less where exposed; otherwise, as indicated in Part 2 "Insulation Products" Article.
2. Smoked-Developed Index: 450 or less.

PART 2 - PRODUCTS

2.1 INSULATION PRODUCTS

A. Slag-Wool-/Rock-Wool-Fiber Board Insulation: ASTM C 612, [**unfaced**] [**foil-scrim-kraft or foil-scrim-polyethylene faced on one side**]; nominal density of [**4 lb/cu. ft. (64 kg/cu. m)**] [**6 lb/cu. ft. (96 kg/cu. m)**] [**8 lb/cu. ft. (128 kg/cu. m)**], with flame-spread index of 25 or less.

B. Mineral-Fiber-Blanket Insulation: ASTM C 665, [**Type I, unfaced**] [**Type III, Class A, foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on one face**] with fibers manufactured from [**glass, slag wool, or rock wool**] [**glass**] [**slag or rock wool**], with flame-spread index of 25 or less.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install insulation in areas and in thicknesses indicated or required to produce R-values indicated. Cut and fit tightly around obstructions and fill voids with insulation.

B. Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage. Locate seams at framing members, overlap, and seal with tape.

END OF SECTION 07210

SECTION 07411 - METAL ROOF PANELS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Summary: Factory-formed metal roof panels, and trim.

B. Submittals: Product Data**[, Shop Drawings,]** and color Samples.

C. Provide roof assemblies that comply with requirements in UL 580 for 120mph wind-uplift resistance.

D. Warranties: Provide standard manufacturer's written warranty, without monetary limitation, signed by manufacturer agreeing to promptly repair or replace metal roof panels that fail to remain weathertight within **[five]** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METAL ROOF PANELS

A. **[Available]**Products:

1. 24 gague MBCI Corrugated metal roofing or approved equal

B. Roof Panel Type: 24 gague minimum corrugated metal roof panels.

C. Metallic-Coated Steel Roof Panels: Fabricated from galvanized structural-steel sheet, ASTM A 653/A 653M, G90 (Z275).

1. Metal Thickness: 24 gague minimum.
2. Finish: Manufacturer's standard **[fluoropolymer 2-coat system with topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2604]**.

D. Aluminum Roof Panels: Fabricated from aluminum sheet, ASTM B 209 (ASTM B 209M) for alclad Alloy 3003, 3004, or 3105.

1. Metal Thickness: [24 gague minimum].
2. Finish: Manufacturer's standard] **[fluoropolymer 2-coat system with topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2604]**.

2.2 ACCESSORIES

A. Provide components required for a complete roof panel assembly including trim, fasciae, clips, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Formed from **0.0179-inch-** (0.45-mm-) thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet. Provide flashing and trim as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal roof panels.

C. Underlayment: **Bituminous sheet ASTM D 1970; 40 mils (1 mm) thick**] or [**Asphalt-saturated organic felt ASTM D 226, Type II (No. 30)**]

D. Slip Sheet: Rosin-sized building paper, **5 lb/100 sq. ft. (2.4 kg/sq. m).**

E. Thermal Spacers: Where panels attach directly to purlins, provide thermal spacers recommended by panel manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install underlayment on roof sheathing under metal roof panels, unless otherwise recommended by metal roof panel manufacturer.

1. Apply slip sheet over underlayment before installing metal roof panels.

B. Anchor panels securely in place, with provisions for thermal and structural movement. Field cutting exterior panels by torch is not permitted. Install panels with concealed fasteners, unless otherwise indicated.

1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized steel fasteners for surfaces exposed to the interior.
2. Aluminum Roof Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior and aluminum or galvanized steel fasteners for surfaces exposed to the interior.

C. Install gaskets, joint fillers, and sealants where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants recommended by metal roof panel manufacturer.

D. Separate dissimilar metals with a bituminous coating or polymer-modified bituminous sheet underlayment.

E. Coat back side of aluminum panels with bituminous coating where they will contact wood, ferrous metal, or cementitious construction.

F. Nail and Screw roofing as per FEMA post Hurricane Marilyn Standards.

END OF SECTION 07411

SECTION 07610 - SHEET METAL ROOFING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data[, **Shop Drawings,**] and color Samples.

B. Comply with SMACNA's "Architectural Sheet Metal Manual," unless otherwise indicated.

PART 2 - PRODUCTS

2.1 ROOFING SHEET METALS

A. Metallic-Coated Steel Sheet: Corrugated Galvanized structural-steel sheet, ASTM A 653/A 653M, G90, or aluminum-zinc alloy-coated structural-steel sheet, ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 [**0.0276 inch** thick.

1. Finish: Manufacturer's standard [**epoxy primer and silicone-modified, polyester-enamel topcoat**] or [**fluoropolymer 2-coat system with topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2604**].

2.2 FABRICATION

A. Fabricate sheet metal roofing to comply with details shown and recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of installation indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install underlayment on roof sheathing under sheet metal roofing, unless otherwise recommended by metal roofing manufacturer.

1. Apply slip sheet over underlayment before installing metal roofing.

B. Anchor roofing securely in place, with provisions for thermal and structural movement. Install with concealed fasteners, unless otherwise indicated.

C. Separate dissimilar metals with a bituminous coating or polymer-modified, bituminous sheet underlayment.

D. Coat back side of **[aluminum]** **[stainless-steel]** roofing with bituminous coating where it will contact wood, ferrous metal, or cementitious construction.

E. Install work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves, and avoidable tool marks, considering temper and reflectivity of metal. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant. Fold back sheet metal to form a hem on concealed side of exposed edges, unless otherwise indicated.

1. Install cleats to hold sheet metal panels in position. Attach each cleat with two fasteners to prevent rotation.
2. Nail cleats not more than 12 inches o.c. Bend tabs over nails.

F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches, except where pretinned surface would show in finished Work.

1. Do not solder **[metallic-coated steel]** **[and]** **[aluminum]** sheet.
2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

G. Seal joints as shown and as required for leakproof construction. Provide low-slope transverse seams using cleats where backup of moisture may occur.

END OF SECTION 07610

SECTION 07620 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data[, **Shop Drawings,**] and Samples.

B. Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

C. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.1 SHEET METAL

A. Aluminum Sheet: ASTM B 209 , Alloy 3003, 3004, 3105, or 5005, temper suitable for forming and structural performance required, but not less than H14; not less than 0.032 inch thick; and **[with mill finish]** .

1. Fluoropolymer 2-Coat System: Manufacturer's standard system with topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2604.

B. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, with No. 2D finish; not less than 0.0156 inch (0.4 mm) thick.

2.2 FLASHING AND TRIM

A. Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.

2.3 ACCESSORIES

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Solder for Zinc-Tin Alloy-Coated Stainless Steel: ASTM B 32, 100 percent tin.

C. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with SMACNA's "Architectural Sheet Metal Manual." Allow for thermal expansion; set true to line and level. Install Work with laps, joints, and seams permanently watertight and weatherproof; conceal fasteners where possible.

1. Roof-Edge Flashings: Secure metal flashings at roof edges according to FMG Loss Prevention Data Sheet 1-49 for specified wind zone.

B. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

C. Fabricate nonmoving seams in sheet metal with flat-lock seams. For **[metals other than aluminum, tin edges to be seamed, form seams, and solder.] [aluminum, form seams and seal with epoxy seam sealer. Rivet joints for additional strength.]**

1. Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of **1-1/2 inches** unless pre-tinned surface would show in finished Work.

D. Separation: Separate noncompatible metals or corrosive substrates with a coating of asphalt mastic or other permanent separation.

END OF SECTION 07620

SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and door schedule.

B. Comply with ANSI A 250.8.

C. Fire-Rated Door Assemblies: NFPA 80, tested per NFPA 252, and labeled and listed by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Hot-Rolled Steel Sheets: ASTM A 1011/A 1011M.

B. Cold-Rolled Steel Sheets: ASTM A 1008/A 1008M or ASTM A 620/A 620M.

C. Galvanized Steel Sheets: ASTM A 653/A 653M, **A40 or G40 (ZF120 or Z120)** coating.

2.2 STEEL DOORS AND FRAMES

A. Products:

1. **<Republic Metal or Steel Craft door or Approved Equal. The Contractor shall submit product data, specifications and samples for review and approval>**

B. Steel Doors: Complying with ANSI 250.8 for level and model and ANSI A250.4 for physical-endurance level indicated, **1-3/4-inch- (44-mm-)** thick, unless otherwise indicated.

1. Interior Doors: Level 2 and Physical Performance Level B (Heavy Duty), Model [**1 (Full Flush)**].
2. Exterior Doors: Level 2 and Physical Performance Level B (Heavy Duty), Model [**1 (Full Flush)**], galvanized steel sheet faces.

C. Door Louvers: [**Sight**] -proof per SDI 111C if required.

D. Frames: ANSI A250.8; conceal fastenings, unless otherwise indicated.

1. Steel Sheet Thickness for Heavy-Duty Interior Doors: **0.053 inch (1.3 mm)**.
2. Steel Sheet Thickness for Exterior Doors: **0.053 inch (1.3 mm)**.

3. Fabricate with interior frames with mitered or coped [**and continuously welded corners,**] or [**corners knocked down for field assembly**].
4. Fabricate with exterior frames from galvanized steel sheet, with mitered or coped and continuously welded corners.

E. Glazing Stops: Nonremovable stops on outside of exterior doors and on secure side of interior doors; screw-applied, removable, glazing stops on inside.

F. Door Silencers: Three on strike jambs of single-door frames and two on heads of double-door frames.

G. Plaster Guards: Provide where mortar might obstruct hardware operation.

H. Supports and Anchors: Not less than **0.042-inch- (1.0-mm-)** thick galvanized steel sheet.

I. Prepare doors and frames to receive mortised and concealed hardware according to ANSI A250.6 and ANSI A115 Series standards if required.

J. Reinforce doors and frames to receive surface-applied hardware if required.

K. Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.

L. Door Accessories: All doors shall have the following accessories installed with it

Hinges: Each door shall have 3 (three) hinges installed- Stanley Five Knuckle full Motise hinges FBB191 or an approved equal.

Locksets: Best Dead Bolts 82T/ 7 pin core with accessories or approved equal

Latch sets: Best Heavy Duty Lever Locks 9K Series /finish: Satin Nickel/ 7 pin core/ for classrooms (R) with accessories or approved equal

Sill plates: Aluminum sill plates with rubber gaskets (submit for Architect's review and approval)

Miscellaneous: Gasket Door seals, Automatic closers for exterior doors (submit for Architect's review and approval)

NOTE: Contractor shall supply **A Master Key System for all doors** located in the Cafeteria

PART 3 - EXECUTION

3.1 INSTALLATION

A. Place steel frames to comply with SDI 105.

1. Fire-Rated Frames: Install according to NFPA 80.

B. Install doors to comply with ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/DHI A115.1G.

1. Fire-Rated Doors: Install with clearances specified in NFPA 80.
2. Smoke-Control Doors: Comply with NFPA 105.

C. After installation, remove protective wrappings from doors and frames and touch up prime coat with compatible air-drying primer.

END OF SECTION 08110

SECTION 08211 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Samples for [**factory-finished**] doors.

B. Quality Standard: NWWDA I.S.1-A.

C. Fire-Rated Wood Doors: Labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing per [**UBC Standard 7-2 at positive pressure**].

PART 2 - PRODUCTS

2.1 FLUSH WOOD DOORS

A. Doors for Opaque Finish: [**Premium**] grade.

1. Faces: [**Hardboard**].

B. Exterior Solid-Core Doors: [**Seven**]-ply, structural composite lumber cores.

C. Interior Veneer-Faced Solid-Core Doors: [**Five**]-ply, [**structural composite lumber**] cores.

D. Provide structural composite lumber cores for doors with [**closers**] [**exit devices**] [**and**] [**kick plates**].

E. Fire-Rated Solid-Core Doors: Core construction to provide fire rating indicated, faces and grade to match non-fire-rated doors.

1. Composite blocking where required to eliminate through-bolting hardware.
2. Laminated-edge construction.

F. Hollow-Core Doors: Seven-ply, [**Standard**] hollow cores with lock blocks both sides.

G. Hollow-Core Doors with Hardboard Faces: Three-ply, [**Standard**] hollow cores with lock blocks both sides.

2.2 FABRICATION AND FINISHING

A. Factory fit doors to suit frame-opening sizes indicated and to comply with referenced quality standard.

1. Comply with NFPA 80 for fire-resistance-rated doors.

B. Factory machine doors for hardware that is not surface applied.

C. Cut and trim openings to comply with referenced standards.

1. Trim light openings with moldings indicated.
2. Factory install louvers in prepared openings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with WDMA's "How to Store, Handle, Finish, Install, and Maintain Wood Doors."

1. Install fire-rated doors to comply with NFPA 80.

B. Align[**and fit**] doors in frames with uniform clearances and bevels.[**Machine doors for hardware. Seal cut surfaces after fitting and machining.**]

C. Repair, refinish, or replace factory-finished doors damaged during installation, as directed by Architect.

END OF SECTION 08211

SECTION 08212 - STILE AND RAIL WOOD DOORS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data, including details of construction **[and factory-finishing specifications]**.

B. Quality Standard: NWWDA I.S.6, "Industry Standard for Wood Stile and Rail Doors."

C. Fire-Rated Wood Doors: Labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing per NFPA 252. Test at atmospheric pressure.

D. Safety Glass: Comply with 16 CFR 1201.

PART 2 - PRODUCTS

2.1 STILE AND RAIL DOORS

A. Exterior Doors and Sidelights: NWWDA **[Standard]** grade assembled with wet-use adhesives and made from [**Douglas fir or western hemlock**] without raised panels.

1. All Exterior Doors: Solid Hardwood Imbura doors. **Contractor shall submit products data and specifications for review and approval.**

B. Interior Doors: NWWDA [**Douglas fir or western hemlock**] with [**flat**] panels.

1. Room Doors: **See Drawings for specifications.**
2. Louvered Doors: **See Drawings for specifications.**
3. Bifold Doors: **See Drawings for specifications.**

2.2 FABRICATION AND FINISHING

A. Factory fit doors to suit frame-opening sizes and to comply with referenced quality standard.

1. Provide 1/8-inch) clearance at jambs, heads, and meeting stiles and 1/2 inch at bottom. At thresholds, provide 3/8-inch clearance.
2. Comply with NFPA 80 for fire-resistance-rated doors.

B. Factory machine doors for hardware that is not surface applied.

C. Glaze doors at factory.

D. Factory treat exterior doors after fabrication with water repellent to comply with NWWDA I.S.4.

E. Factory finish wood doors with manufacturer's standard stain and two-coat conversion varnish finish in color selected.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fire-rated doors to comply with NFPA 80.

B. Align and fit doors in frames with uniform clearances and bevels indicated below. Machine doors for hardware. Seal cut surfaces after fitting and machining.

1. Provide 1/8-inch clearance at jambs, heads, and meeting stiles and 1/8 inch) at bottom. At thresholds, provide 1/4-inch clearance from bottom of door.

C. Align factory-fitted doors in frames for uniform clearances.

D. Repair, refinish, or replace factory-finished doors damaged during installation as directed by Architect.

END OF SECTION 08212

SECTION 08520 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

B. Quality Standard: Comply with AAMA/NWWDA 101/I.S.2.

PART 2 - PRODUCTS

2.1 ALUMINUM WINDOWS

A. [**Available**]Products:

1. **<Centerline Corporation in ST Croix heavy duty, security metal awning with bar in each leaf or Airmaster Awning equal**

B. All windows to be supplied with heavy duty non-corrosive insect screens or heavy duty plastic screens (if rooms are to be air conditioned).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set units level, plumb, and true to line, without warp or rack of frames and panels and anchor securely in place.

B. Set sill members in bed of sealant or with gaskets, as indicated, to provide weathertight construction.

C. Adjust operating panels, screens, and hardware for smooth operation and weathertight closure. Lubricate hardware and moving parts.

END OF SECTION 08520

SECTION 08710 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Hardware Schedule and Manufacturer's product data and specifications.

B. Establish Master Keying System with Owner and deliver labeled keys to Owner.

C. For fire-rated openings provide hardware tested and listed by UL or FMG (NFPA 80). On exit devices provide UL or FMG label indicating "Fire Exit Hardware."

PART 2 - PRODUCTS

2.1 HARDWARE

A. Manufacturers:

1. Door Latch and Lockset Manufacturers Schlage, Yale or Best

B. Hinges:

1. Stainless-steel or brass/bronze hinges with stainless-steel pins for exterior.
2. Nonremovable hinge pins for exterior and public interior exposure.
3. Ball-bearing hinges for doors with closers and entry doors.
4. Three hinges for **1-3/8-inch-** (35-mm-) thick wood doors.
5. Three hinges for **1-3/4-inch-** (45-mm-) **thick doors 90 inches** (2300 mm) **or less in height; four hinges for doors more than 90 inches** (2300 mm) **in height.**

C. Locksets and Latchsets:

1. BHMA A156.2, Series 4000, Grade [**2**] or [**3**] for bored locks and latches.
2. BHMA A156.3, Grade 1 for exit devices.
3. BHMA A156.5, Grade [**2**] or [**3**] for auxiliary locks.
4. BHMA A156.12, Series 5000, Grade [**2**] or [**3**] for interconnected locks and latches.
5. BHMA A156.13, Series 1000, Grade [**2**] or [**3**] for mortise locks and latches.
6. [**Knobs**] [**Lever handles**] on locksets and latchsets, (noted on drawings or to be chosen by A/E.
7. Provide trim on exit devices matching locksets.

D. Key locks to Owner's [**existing**] master-key system. If no Master System exists, establish new Master Key System for new doors.

1. Cylinders with [**five**] or [**six**]-pin tumblers[**and removable cores**].

2. Provide cylinders for [**overhead doors,**] [**storefront doors,**] and other locking doors that do not require other hardware.
3. Provide construction keying.
4. Provide key control system, including cabinet.

E. Closers:

1. Mount closers on interior side (room side) of door opening. Provide regular-arm, parallel-arm, or top-jamb-mounted closers as necessary.
2. Adjustable delayed opening (accessible topeople with disabilities) feature on closers.

F. Provide wall stops or floor stops for doors without closers.

G. Provide hardware finishes as follows:

1. Hinges: [**Matching finish of lockset/latchset**].
2. Locksets, Latchsets, and Exit Devices:
3. Closers: [**Matching finish of lockset/latchset**].
4. Other Hardware: Matching finish of lockset/latchset.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount hardware in locations recommended by the Door and Hardware Institute, unless otherwise indicated.

3.2 HARDWARE SCHEDULE

A. Hardware Sets for each door as noted on Door (Hardware schedule on drawings. If no hardware schedule exists on drawings contractor shall provide heavy duty hardware for hinges, closers, push or pull plates, astragals, door thresholds and weather stripping for all doors as required from the following manufactures:

1. Sargent

2. Russwin

3. LCN

4. Zero

5. GNP

END OF SECTION 08710

SECTION 09220 - PORTLAND CEMENT PLASTER

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and finish Samples.

B. STC-Rated Assemblies: Provide materials and construction identical to assemblies whose STC ratings were determined according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

C. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to assemblies tested according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 METAL FRAMING AND SUPPORTS

A. Ceiling Support Components if required: Comply with ASTM C 1063.

1. Wire for Hangers and Ties: **ASTM A 641** (ASTM A 641M), Class 1 zinc coating, soft temper.
2. Rod Hangers and Flat Hangers: Mild steel, zinc coated.
3. Cold-Rolled Steel Carrying Channels: Minimum **0.0598-inch-** (1.5-mm-) **thick base metal, 1-1/2 inches** (38.1 mm) **deep,** 475 lb/1000 feet (0.7 kg/m), **and** 7/16-**inch-** (11.1-mm-) **wide flanges, with [hot-dip galvanized finish, ASTM A 653/A 653M,** G60 (Z180)**].**
4. Cold-Rolled Steel Furring Channels: Minimum **0.0598-inch-** (1.5-mm-) **thick base metal, 3/4 inch** (19 mm) **deep,** 300 lb/1000 feet (0.45 kg/m), **and** 7/16-inch-(11.1-mm-) **wide flanges, with [hot-dip galvanized finish, ASTM A 653/A 653M,** G60 (Z180)**].**
5. Studs for Furring Channels: ASTM C 645, in depth indicated, minimum **0.0179-inch-** (0.455-mm-) **thick base (uncoated) metal, with [ASTM A 653/A 653M,** G40 (Z90) **hot-dip galvanized] coating.**

B. Non-Load-Bearing Studs and Runners: ASTM C 645 with **[ASTM A 653/A 653M,** G40 (Z90) **hot-dip galvanized] coating. Minimum** 0.0179-inch- (0.455-mm-) **thick base metal for studs and minimum** 0.0329-inch- (0.836-mm-) thick base metal for head and sill runners, and jamb and cripple studs at openings.

C. Load-Bearing Studs and Runners: ASTM C 955 with **[ASTM A 653/A 653M,** G40 (Z90) **hot-dip galvanized] coating. [**Grade 33 (Grade 230) **for thickness of** 0.0329 inch

(0.836 mm) **or less] [Grade 50** (Grade 340) **Class 1 for thickness of** 0.0428 **inch** (1.087 mm) **or more**].

D. Vertical Metal Furring: Complying with the following:

1. Channel Furring and Braces: Cold-rolled steel, minimum **0.0598-inch-** (1.5-mm-) **thick base metal and 3/4-inch-** (19-mm-) **deep-by-7/16-inch-** (11.1-mm-) **wide flanges, 300 lb/1000 feet** (0.45 kg/m).
2. Hat Channels: Hat-shaped screwable furring channels, **7/8 inch** (22.2 mm) **deep, formed from (galvanized) steel sheet, minimum 0.0179 inch** (0.455 mm) thick, Grade 33.
3. Z-Furring Members: Screw-type, Z-shaped furring members formed from minimum **0.0179-inch-** (0.455-mm-) thick, (galvanized) steel sheet.
4. Furring Brackets: Serrated-arm type, minimum **0.0329-inch-** (0.836-mm-) **thick base metal, adjustable from 1/4- to 2-1/4-inch** (6- to 57-mm) wall clearance for channel furring.
5. Protective Coating: [**ASTM A 653/A 653M, G40** (Z90) **hot-dip galvanized**] coating.

2.2 LATH

A. Expanded-Metal Lath: ASTM C 847, diamond mesh, flat or self-furring configuration as indicated, and with minimum [**2.5-lb/sq. yd.** (1.4-kg/sq. m)] weight.

B. Rib Lath: ASTM C 847, flat, rib depth of not more than [**3/8 inch** (9.5 mm)] **with minimum** [3.4-lb/sq. yd. (1.8-kg/sq. m)] **weight.**

C. Woven-Wire Lath: ASTM C 1032, fabricated into **1-1/2-inch** (38-mm) **hexagonal-shaped mesh with minimum 0.0510-inch-** (1.3-mm-) diameter, galvanized steel wire.

D. Welded-Wire Lath: ASTM C 933, fabricated into **2-by-2-inch** (50-by-50-mm) openings with minimum **0.0625-inch-** (1.6-mm-) diameter, galvanized steel wire.

E. Paper Backing: Asphalt-impregnated paper complying with FS UU-B-790, Type I, Grade D (vapor permeable), Style 2, factory bonded to back of lath.

2.3 ACCESSORIES

A. Comply with material provisions of ASTM C 1063 and requirements indicated below; coordinate depth of accessories with thicknesses and number of plaster coats required.

1. Aluminum Components: **ASTM B 221** (ASTM B 221M) for Alloy and Temper 6063-T5 or aluminum extrusions with similar properties.
2. Galvanized Steel Components: Fabricated from zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, **G40** (Z90) minimum coating designation.

3. Zinc-Alloy Components: ASTM B 69, 99 percent pure zinc.
4. Plastic Components: ASTM D 4216, high-impact PVC for building products.

B. Bonding Agent: ASTM C 932.

2.4 PORTLAND CEMENT PLASTER

A. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, **1/2 inch** (13 mm) long, free of contaminates, manufactured for use in portland cement plaster if required.

B. Lime: ASTM C 206, Type S; ASTM C 207, Type S.

C. Base-Coat Cements: **[Portland cement, ASTM C 150, Type I] [Masonry cement, ASTM C 91, Type N]**, **[white]** or **[gray]** color as required.

D. Base-Coat Aggregate: Sand, ASTM C 897.

E. Job-Mixed Finish Coat: Comply with ASTM C 926.

1. **[Portland cement, ASTM C 150, Type I] [Masonry cement, ASTM C 91, Type N]**, **[white]** or **[gray]** as required.
2. Manufactured or natural sand, ASTM C 897, (in color if required) to produce plaster of color selected.

F. Factory-Mixed Stucco Finish Coat: Formulation of portland cement, aggregate, coloring agent, and other proprietary ingredients.

1. **[Available]**Products:

a. If required contractor shall submit manufacturer's product data, specifications, colors and finish samples.

G. Factory-Mixed Acrylic-Based Finish Coat: Formulation of acrylic emulsion, colorfast mineral pigments, and fine aggregates specifically recommended by acrylic-based finish manufacturer for use over portland cement plaster base coats.

1. **[Available]**Products:

a. Sherwin Williams, Pittsburg or Martin Senor or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install furring and lathing materials to comply with ASTM C 1063 and ML/SFA 920, "Guide Specification for Metal Lathing and Furring."

1. Comply with ASTM C 754 for installing non-load-bearing stud systems.
2. Comply with ASTM C 1007 for installing load-bearing stud systems.

B. Install supplementary framing, blocking, and bracing at terminations in Work and for support of fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, and similar work.

C. Proportion, mix, apply, and cure plaster materials and finishes to comply with ASTM C 926. Apply **[two]** coats. Apply **[float] [prepared]** finish coat.

D. STC-Rated Assemblies: Comply with ASTM C 919 for location of edge trim and closing off sound-flanking paths around or through assemblies.

END OF SECTION 09220

SECTION 09310 - CERAMIC TILE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and Samples.

B. Floor Tiles: Static coefficient of friction not less than 0.6[**for level surfaces and 0.8 for ramps**], per ASTM C 1028.

PART 2 - PRODUCTS

Date:

2.1 CERAMIC TILE

A. Ceramic tile that complies with standard grade requirements in ANSI A137.1, "Specifications for Ceramic Tile."

B. Ceramic Mosaic Floor Tile: [**vitreous or impervious natural clay or porcelain**] cushion-edged tile.

1. Products:

a. Contractor shall submit specifications and samples for review and approval.

2. Surface: [**Slip resistant, with**] abrasive admixture.
3. Module Size: [**6 by 6 inch or/ 12 x 12 inch**
4. Color: [**As selected**].
5. Tiles mounted, by manufacturer's standard method, into sheets.

C. Unglazed Quarry Tile: Flat, square-edged tile.

1. Products:

a. Contractor shall submit specifications and samples for review and approval.

2. Wearing Surface: [**Abrasive aggregate embedded in surface**].
3. Facial Dimensions: [**6 by 6 inches or** [**8 by 8 inches**.
4. Thickness: [**1/2 inch (12.7 mm)**].
5. Color: [**As selected**].

D. Glazed Wall Tile: Cushion-edged, flat tile.

1. Products:

a. Contractor shall submit specifications and samples for review and approval.

2. Module Size: [**6 by 6 inches**].
3. Color: [**As selected**].
4. Finish: [**Bright, opaque**] [**Bright, clear**] glaze.
5. Tiles mounted, by manufacturer's standard method, into sheets and grouted with silicone rubber grout complying with ANSI A118.6.

E. Tile trim units that match characteristics of adjoining flat tile.

F. Where indicated, protect exposed surfaces of tile against adherence of mortar and grout by factory precoating them with a hot-applied continuous film of petroleum paraffin wax. Do not coat unexposed tile surfaces.

2.2 INSTALLATION MATERIALS

A. Setting and Grouting Materials: Comply with material standards in ANSI's "Specifications for the Installation of Ceramic Tile" that apply to materials and methods indicated.

1. Thin-Set Mortar Type: [**Dry-set**] portland cement.

a. Products:

b. Contractor shall submit specifications and samples for review and approval.

2. Grout Type: [**Polymer modified**] , unless otherwise indicated.

a. Products:

b. Contractor shall submit specifications and samples for review and approval.

3. Grout Color: [**As selected**].

B. Setting-Bed Accessories: ANSI A108.1A.

C. Cementitious Backer Units: Complying with ANSI A118.9, of thickness indicated.

D. Waterproofing Membranes for Thin-Set Installations: ANSI A118.10, [**reinforced modified bituminous product**] and as follows:

1. Products:

a. Contractor shall submit specifications and samples for review and approval.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with tile installation standards in ANSI's "Specifications for the Installation of Ceramic Tile" that apply to materials and methods indicated.

B. Comply with TCA's "Handbook for Ceramic Tile Installation."

C. Floor Tile Installation Method[s]:

1. Exterior Patios and Walkways Over Concrete: TCA [**F101 (cement mortar bed bonded to concrete slab)**] [**F102 (thin-set mortar bonded to concrete slab)**]
2. Over Concrete Subfloors: TCA [**F111 (cement mortar bed with cleavage membrane, over concrete subfloor)**] [**F112**
3. Over Wood Subfloors: [**F144 (thin-set mortar bonded to cementitious backer units over wood subfloor)**].

D. Wall Tile Installation Method[s]:

1. Exterior Walls Over Concrete or Masonry: TCA [**W202 (latex-portland cement mortar over concrete or masonry)**].
2. Over Concrete and Masonry: TCA [**W202 (latex-portland cement mortar over concrete or masonry)**] [**W211 (cement mortar bed, bonded)**]

E. At showers, tubs, and where indicated, provide cementitious backer units and treat joints to comply with ANSI A108.11.

F. Lay tile in grid pattern, unless otherwise indicated. Align joints where adjoining tiles on floor, base, walls, and trim are the same size.

G. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

END OF SECTION 09310

SECTION 09910 - PAINTING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Summary: Paint exposed surfaces,[**new and existing,**] interior spaces unless otherwise indicated.

1. Paint the back side of access panels.
2. Color-code mechanical piping in accessible ceiling spaces.
3. Do not paint prefinished items, items with an integral finish, operating parts, and labels, unless otherwise indicated.

B. Submittals: Product Data and Samples.

C. Mockups: Full-coat finish Sample of each type of coating, color, and substrate, applied where directed, if so requested.

D. Obtain block fillers and primers for each coating system from same manufacturer as finish coats.

E. Extra Materials: Deliver to Owner **[5 gallons]** of each color and type of finish coat paint used on Project, in containers, properly labeled and sealed.

PART 2 - PRODUCTS

2.1 PAINT

A. [**Available**]Products:

1. Paint **manufacturer's : Pittsburg, Sherwin Williams, Martin Senor**
2. Colors: To be submitted for approval, review and selection.

B. Material Compatibility: Provide materials that are compatible with one another and with substrates.

C. Material Quality: Manufacturer's best-quality paint material of coating types specified that are formulated and recommended by manufacturer for application indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove hardware lighting fixtures and similar items that are not to be painted. Mask items that cannot be removed. Reinstall items in each area after painting is complete.

B. Clean and prepare all surfaces in an area before beginning painting in that area. Schedule painting so cleaning operations will not damage newly painted surfaces.

3.2 APPLICATION

A. Apply coatings by brush, roller, spray or other applicators according to coating manufacturer?s written instructions.

1. Use brushes , rollers or spray systems only for exterior painting and where the use of other applicators is not practical.
2. Use rollers or brushes for finish coat on interior walls and ceilings.

B. Pigmented (Opaque) Finishes: Completely cover surfaces to provide a smooth, opaque surface of uniform appearance. Provide a finish free of cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections.

C. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.

3.3 EXTERIOR PAINT APPLICATION SCHEDULE

A. Concrete, Stucco, and Masonry:

1. [**Low-Luster**] Acrylic: [**Two coats**] over primer.
2. [**Semigloss**] Acrylic Enamel:] [**Two coats**] over primer.

B. Concrete Masonry Units:

1. [**Low-Luster**] Acrylic: [**Two coats**] over block filler.
2. [**Semigloss**], Acrylic Enamel: [**Two coats**] over block filler.

C. Exterior Gypsum Soffit Board:

1. [**Low-Luster**] Acrylic: [**Two coats**] over primer.
2. [**Semigloss**], Acrylic Enamel: [**Two coats**] over primer.

D. Smooth Wood:

1. [**Low-Luster**] Acrylic: [**Two coats**] over primer.
2. [**Semigloss**], Acrylic Enamel: [**Two coats**] over primer.
3. Alkyd Enamel: [**Two coats**] over primer.

E. Wood Trim:

1. [**Semigloss**], Acrylic Enamel: [**Two coats**] over primer.
2. Alkyd Enamel: [**Two coats**] over primer.

F. Plywood:

1. [**Low-Luster**] Acrylic: [**Two coats**] over primer.

G. Wood Shakes and Rough Siding and Trim: A/E shall notify contractor which should be used for the project

1. Semitransparent Oil/Alkyd Stain: [**Two coats**].
2. Semitransparent Acrylic Stain: [**Two coats**].
3. Semisolid Oil/Alkyd Stain: [**Two coats**].
4. Oil/Alkyd Stain: [**Two coats**] over primer.
5. Solid Acrylic Stain: [**Two coats**] over primer.
6. Clear Wood Finish: [**Two coats**] oil-based clear wood finish.

H. Ferrous Metal:

1. [**Semigloss**], Acrylic Enamel: [**Two coats**] over rust-inhibitive primer.
2. Alkyd Enamel: [**Two coats**] over rust-inhibitive primer.

I. Aluminum:

1. [**Semigloss**], Acrylic Enamel: [**Two coats**] over primer.

3.4 INTERIOR PAINT APPLICATION SCHEDULE

A. Concrete and Masonry (Other Than Concrete Unit Masonry):

1. [**Semigloss**], Acrylic Enamel: [**Two coats**] over primer.
2. Semigloss, Alkyd Enamel: [**Two coats**] over primer.
3. Low Lustre Epoxy Paint [Two Coats] over primer (in Kitchen Area) & Storage Rooms

B. Concrete Masonry Units:

1. [**Semigloss**], Acrylic Enamel: [**Two coats**] over block filler.

C. Gypsum Board:

1. [**Semigloss**], Acrylic Enamel: [**Two coats**] over primer.
2. [**Semigloss**], Alkyd Enamel: [**Two coats**] over primer.

D. Plaster:

1. [**Semigloss**], Acrylic Enamel: [**Two coats**]over primer.

E. Woodwork and Hardboard:

1. [**Semigloss**]], Alkyd Enamel: [**Two coats**] over primer.

F. Stained Woodwork:

1. Alkyd-Based, Satin Varnish: Two coats over sealer and wood stain.

G. Natural-Finish Woodwork:

1. Alkyd-Based, Satin Varnish: Two coats over sealer.

H. Ferrous Metal:

I.

1. **[Semigloss] [Full-Gloss]**, Acrylic Enamel: **[Two coats]** over 2 coats of ferrous metal primer.
2. **[Semigloss]**, Alkyd Enamel: **[Two coats]** over 2 coats of ferrous metal primer.

END OF SECTION 09910

SECTION 10155 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data, Shop Drawings, and Samples.

PART 2 - PRODUCTS

2.1 TOILET COMPARTMENTS AND SCREENS

A. **[Available]**Products:

1. Bobrick or Approved Equal. Contractor to submit product data, specifications and color samples for review and approval by Architect

2.2 MATERIALS

A. Panel, Pilaster, and Door Material:

1. Steel Sheets for Color-Coated Finish: Mill-phosphatized, corrosion-resistant steel sheet; ASTM A 591/A 591M, Class C, or ASTM A 653/A 653M.
2. Solid-Plastic, Phenolic Core: Solid phenolic core with melamine facing on both sides, without visible glue line or seam, with eased edges and with minimum 3/4-inch- (19-mm-) thick doors and pilasters and minimum 1/2-inch- (13-mm-) thick panels and screens.
3. Color: **[As selected]**.

B. Core Material for Metal-Faced Units: Sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch (25 mm) minimum for doors, panels, and screens and 1-1/4 inches (32 mm) minimum for pilasters.

C. Pilaster Shoes and Sleeves (Caps): **[Stainless steel]**, not less than 3 inches (75 mm) high.

D. Brackets: **[Stirrup]** or **[Continuous]**.

1. Material: **[Stainless steel]** or **[Chrome-plated brass]**.

2.3 FABRICATION

A. Toilet Compartments: **[Overhead braced and floor anchored]**.

B. Urinal Screens: **[Floor anchored]**.

C. Metal Units: Internally reinforce metal panels for hardware, accessories, and grab bars.

D. Solid-Plastic, Polymer-Resin Units: Provide aluminum heat-sink strips at exposed bottom edges of panels and doors.

E. Doors: Unless otherwise indicated, 30 inch wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments indicated to be accessible to people with disabilities.

F. Door Hardware: **[Stainless steel]** or **[Chrome-plated brass]**. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be accessible to people with disabilities.

1. Hinges: Self-closing type, adjustable to hold door open at any angle up to 90 degrees.
2. Latches and Keepers: **[Surface-mounted]** unit designed for emergency access and with combination rubber-faced door strike and keeper.
3. Coat Hook: Combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
4. Door Bumper: Rubber-tipped bumpers at out-swinging doors or entrance screen doors.
5. Door Pull: Provide at out-swinging doors. Provide units on both sides of doors at compartments indicated to be accessible to people with disabilities.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units rigid, straight, level, and plumb, with not more than 1/2 inch (13 mm) between pilasters and panels and not more than 1 inch (25 mm) between panels and walls. Provide brackets, pilaster shoes, bracing, and other components required for a complete installation. Use theft-resistant exposed fasteners finished to match hardware. Use sleeve nuts for through-bolt applications.

1. Stirrup Brackets: Align brackets at pilasters with brackets at walls.**[Locate wall brackets so holes for wall anchors occur in masonry or tile joints.]**
2. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and swing doors in entrance screens to return to fully closed position.

END OF SECTION 10155

SECTION 10801 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, No. 4 finish (satin), 0.0312-inch (0.8-mm) minimum nominal thickness, unless otherwise indicated.

B. Brass: ASTM B 19, ASTM B 16 (ASTM B 16M), or ASTM B 30 castings.

C. Sheet Steel: ASTM A 1008/A 1008M, 0.0359-inch (0.9-mm) minimum nominal thickness.

D. Galvanized Steel Sheet: ASTM A 653/A 653M, G60 (Z180).

E. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

F. Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic-enamel coating.

G. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.

H. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

I. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

J. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of **[six]** **<Insert number>** keys to Owner's representative.

2.2 TOILET AND BATH ACCESSORIES

A. Paper Towel Dispenser **<Insert drawing designation, e.g., TBA-1>**:

1. **[Available]**Products:

a. **<Insert manufacturer's name; product.>**

2. Mounting: **[Recessed] [Surface]**.
3. **<Insert towel types and capacities.>**
4. Material: Stainless steel.
5. Lockset: Tumbler type.
6. Refill Indicators: Pierced slots at sides or front.

B. Toilet Tissue Dispenser **<Insert drawing designation, e.g., TBA-2>**:

1. **[Available]**Products:

   a. **<Insert manufacturer's name; product.>**

2. Type: **[Roll-in-reserve dispenser with hinged front secured with tumbler lockset] [Single-roll dispenser] [Double-roll dispenser] [Folded-tissue dispenser with cover hinged at bottom and secured with vandal-resistant lockset].**
3. Mounting: **[Surface mounted with concealed anchorage] [Recessed] [Partition mounted serving two adjacent toilet compartments].**
4. Material: **[Stainless steel] [Chrome-plated zinc alloy (zamac) or steel] [Satin-finish aluminum bracket with plastic spindle].**
5. Operation: **[Noncontrol delivery with standard spindle] [Spindleless with tension-spring controlled delivery] [Spindleless with tension-spring controlled delivery and self-locking device extending through core that prevents core removal until roll is empty] [Eccentric-shaped, molded-plastic spindle revolves one-half revolution per dispensing operation for controlled delivery; core cannot be removed until roll is empty].**
6. Capacity: **[Designed for 4-1/2- or 5-inch- (114- or 127-mm-) diameter-core tissue rolls] [Designed for 5-inch- (127-mm-) diameter-core tissue rolls] [Designed to dispense not less than 1250 single-fold tissues].**

C. Waste Receptacle **<Insert drawing designation, e.g., TBA-3>**:

1. **[Available]**Products:

   a. **<Insert manufacturer's name; product.>**

2. Type: **[Open top, recessed] [Surface mounted] [Wall mounted for corner installation] [Freestanding] [Undercounter].**
3. Capacity: **<Insert capacity.>**
4. Liner: **[Reusable vinyl liner] <Insert liner description>.**

D. Liquid-Soap Dispenser **<Insert drawing designation, e.g., TBA-4>**:

1. **[Available]**Products:

   a. **<Insert manufacturer's name; product.>**

2. Mounting: **[Deck mounted on vanity] [Deck mounted on lavatory] [Horizontal recessed] [Surface].**
3. Capacity: **<Insert capacity.>**
4. Materials: **<Insert material descriptions.>**
5. Stainless-Steel Soap Valve: Designed for dispensing soap in **[liquid] [lather]** form.

6. Lockset: Tumbler type.
7. Refill Indicator: Window type.

E. Grab Bar **<Insert drawing designation, e.g., TBA-5>**:

1. **[Available**]Products:

a. **<Insert manufacturer's name; product.>**

2. Material: Stainless steel, 0.05 inch (1.3 mm) thick.
3. Mounting: **[Concealed] [Exposed]**.
4. Gripping Surfaces: **[Smooth, satin finish] [Slip-resistant texture]**.
5. Outside Diameter: **[1-1/4 inches (32 mm) for medium] [1-1/2 inches (38 mm) for heavy]**-duty applications.

F. Sanitary Napkin Disposal Unit **<Insert drawing designation, e.g., TBA-6>**:

1. **[Available**]Products:

a. **<Insert manufacturer's name; product.>**

2. Mounting: **[Recessed] [Partition mounted, dual access] [Surface] [Freestanding]**.
3. Material: Stainless steel.
4. Door or Cover: Self-closing.
5. Receptacle: Removable and reusable.

G. Seat-Cover Dispenser **<Insert drawing designation, e.g., TBA-7>**:

1. **[Available**]Products:

a. **<Insert manufacturer's name; product.>**

2. Mounting: **[Surface] [Recessed] [Partition mounted, dual access]**.
3. Capacity: **<Insert capacity.>**
4. Material: Stainless steel.
5. Lockset: Tumbler type.

H. Mirror Unit **<Insert designation, e.g., TBA-8>**:

1. **[Available**]Products:

a. **<Insert manufacturer's name; product.>**

2. Frame: **[Stainless-steel angle, 0.05 inch (1.3 mm) thick] [Stainless-steel channel] [Stainless steel, fixed tilt] [Stainless steel, adjustable tilt]**.

I. Warm-Air Dryer **<Insert drawing designation, e.g., TBA-9>**:

1. **[Available**]Products:

a. **<Insert manufacturer's name; product.>**

2. Type: [**Touch-button**] [**Electronic-sensor**] activated.
3. Mounting: Surface.
4. Material: White-painted metal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

1. Install grab bars to withstand a downward load of at least 250 lbf (1112 N), when tested according to method in ASTM F 446.

B. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items. Remove temporary labels and protective coatings.

END OF SECTION 10801

SECTION 12356 - KITCHEN CASEWORK

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data, Shop Drawings, and material Samples.

B. Comply with KCMA A161.1.[**Provide cabinets with KCMA's "Certified Cabinet" seal affixed in a semiexposed location of each unit.]**

C. Verify dimensions by field measurements; measure for countertops after base cabinets are installed

PART 2 - PRODUCTS

2.1 KITCHEN CASEWORK

A. Kitchen Cabinets:

1. [**Available**]Products:

   a. Contractor shall submit specifications and samples for review and approval.

2. [**Wood**] faced cabinets, [**flush**] [**lipped**] overlay style.
3. Exposed Wood: [**Red oak**] [**Natural birch**] [**Hard maple**] clear solid wood or hardwood plywood with Grade A faces per HPVA HP-1, selected for compatible color and grain.
4. Semiexposed Materials: [**Solid wood or hardwood plywood with Grade C faces per HPVA HP-1, stained to match faces**] [**Plastic laminate, NEMA LD 3, Grade VGS**]

B. Countertops and Splashes to be Corian or Granite:

C. Solid-Surface Material Countertops and Splashes: Homogeneous solid sheets of filled plastic resin complying with material and performance requirements of ANSI Z124.3, Type 5 or Type 6, without a precoated finish, [**1/2 inch (12.7 mm)**] [**3/4 inch (19 mm)**] thick.

1. Products:

   a. Corian or Granite or Approved Equal

D. Countertop Configuration:

1. Front Style: [**Rolled**] [**Bevel**] [**Self-edge**].
2. Backsplash: [**Curved or waterfall shape**] [**Square edge**].
3. End Splash: [**Square edge**].

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cabinets with no variations in flushness of adjoining surfaces by using concealed shims. Where casework abuts other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match casework face.

B. Install cabinets without distortion so doors and drawers fit openings properly and are aligned.

C. Install level and plumb to a tolerance of 1/8 inch in 8 feet (3.2 mm in 2.4 m).

D. Fasten each cabinet to adjacent unit and to structural members of wall construction. Fasten wall cabinets through back, near top and bottom, at ends and not less than 24 inches (600 mm) o.c.

E. Fasten plastic-laminate countertops by screwing through corner blocks in base units into underside of countertop. Spline and glue joints in countertops and use concealed mechanical clamps.

F. Fasten solid surface countertops by screwing through corner blocks in base units into underside of countertop. Align adjacent surfaces. Form seams 1/8 inch (3.2 mm) wide and adhere with manufacturer's recommended joint adhesive in color to match countertop. Dress joints smooth, remove surface scratches, and clean entire surface.

G. Hinges to be commercial concealed adjustable BLUM or AMEROCK

END OF SECTION 12356

SECTION 13851 - FIRE ALARM

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Summary: Noncoded system with manual and automatic alarm initiation; [**zoned, using individual circuits for each zone of alarm initiation and notification appliances**]. Alarms include bells, horns, and xenon-strobe units. Class [**A**] [**B**] wiring.

B. Submittals: System operating description[**and device address list coordinated with final system programming**].

C. Submit system plans, connection diagrams, and component descriptions to authorities having jurisdiction.

D. Comply with NFPA 70.

E. Comply with NFPA 72.

F. UL listed and labeled.

PART 2 - PRODUCTS

2.1 ALARM-INITIATING DEVICES

A. Manual Pull Stations: Double acting, metal or plastic, red in color with molded, raised-letter operating instructions in contracting color.

B. Smoke Detectors: UL 268, 24-V dc, self-restoring, photoelectric type, plug-in arrangement.

C. Thermal Detectors: Combination 135 deg F (57 deg C) fixed-temperature and rate-of-rise unit.

2.2 ALARM-INDICATING DEVICE

A. Horns: Electric-vibrating-polarized type, 90 dB at 10 feet (3 m).

B. Visual Alarm Device: Xenon-strobe lights with the word "FIRE" engraved in 1-inch- (25-mm-) high letters. Rated Light Output: [**110**] candela.

C. Central Fire Alarm Control Panel: UL 864.

D. Emergency Power Supply: Components include[**nickel-cadmium**] battery, charger, and an automatic transfer switch.

E. Wires: Solid copper, with 600-V-rated, 75 deg C, color-coded insulation.

1. Low-Voltage Circuits: No. **[18]** AWG, minimum.
2. Line-Voltage Circuits: No. 12 AWG, minimum.
3. Power-Limited Circuits: NFPA 70, Types FPL, FPLR, FPLP,**[or substitutes permitted by NFPA 70]**.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install and test systems according to NFPA 72. Comply with **[EIA/TIA 570 requirements for light-commercial and residential occupancies]** **[EIA/TIA 568]**.

B. Wiring Method: Install wiring **[in metal raceways]** **["fished" in concealed spaces]** **[and exposed on ceilings and walls]** **[where indicated]**.

C. Ground cable shields and equipment.

END OF SECTION 13851

SECTION 15050 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL (Not Applicable)

PART 2 - PRODUCTS

2.1 MOTOR REQUIREMENTS

A. Motor Characteristics:

1. Motors [1/2] or [3/4] HP and Larger: Three phase.
2. Motors Smaller Than [1/2] or [3/4] HP: Single phase.
3. Frequency Rating: 60 Hz.
4. Voltage Rating: NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.
5. Service Factor: 1.15 for open dripproof motors; 1.0 for totally enclosed motors.
6. Duty: Continuous duty at ambient temperature of **105 deg F (40 deg C)** and at altitude of **3300 feet (1005 m)** above sea level.
7. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.
8. Enclosure: Unless otherwise indicated, open dripproof.

2.2 SUPPORTING DEVICES

A. Hanger and Pipe Attachments: Factory fabricated with galvanized coatings; nonmetallic coated for hangers in direct contact with copper tubing.

B. Building Attachments: Powder-actuated-type, drive-pin attachments with pullout and shear capacities appropriate for supported loads and building materials; UL listing and FMG approval for fire-protection systems.

C. Mechanical-Anchor Fasteners: Insert-type attachments with pullout and shear capacities appropriate for supported loads and building materials; UL listing and FMG approval for fire-protection systems.

2.3 VIBRATION ISOLATION DEVICES

A. Vibration Supports:

1. Elastomeric Mounts: Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure

2. Spring Isolators: Freestanding, laterally stable, open-spring isolators: Manufacturer to submit shop drawing to address specific site conditions.

B. Vibration Hangers:

1. Elastomeric Hangers: Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements bonded to steel housings with threaded connections for hanger rods.
2. Spring Hangers: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression. Manufacturer to submit shop drawing to address specific site conditions.

PART 3 - EXECUTION

3.1 GENERAL PIPING INSTALLATIONS

A. Install piping free of sags and bends.

B. Install fittings for changes in direction and branch connections.

C. Install sleeves for pipes passing through concrete[**and masonry**] walls,[**gypsum-board partitions,**] and concrete floor and roof slabs.

D. Exterior Wall, Pipe Penetrations: Mechanical sleeve seals installed in steel or cast-iron pipes for wall sleeves.

E. Fire-Barrier Penetrations: Seal pipe penetrations with through-penetration firestop systems if firewalls are required.

F. Install unions adjacent to each valve and at final connection to each piece of equipment.

G. Install dielectric unions and flanges to connect piping materials of dissimilar metals in gas, compressed air, and vacuum piping.

H. Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals in water and steam piping.

3.2 GENERAL EQUIPMENT INSTALLATIONS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.3 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than **6 inches** larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **24-inch** centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Use **[3000-psi (20.7-MPa)]**, 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

3.4 HANGERS AND SUPPORTS

A. Install building attachments within concrete or to structural steel. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping.

B. Install powder-actuated drive-pin fasteners in concrete after concrete is cured. Do not use in lightweight concrete or in slabs less than **4 inches (100 mm)** thick.

C. Install mechanical-anchor fasteners in concrete after concrete is cured. Do not use in lightweight concrete or in slabs less than **4 inches (100 mm)** thick.

D. Load Distribution: Install hangers and supports so piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

E. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types if systems specified requires it.

1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, **NPS 1/2 to NPS 30 (DN 15 to DN 750)**.
2. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, **NPS 1/2 to NPS 24 (DN 15 to DN 600)**, if little or no insulation is required.
3. Pipe Hangers (MSS Type 5): For suspension of pipes, **NPS 1/2 to NPS 4 (DN 15 to DN 100)**, to allow off-center closure for hanger installation before pipe erection.
4. Adjustable Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, **NPS 1/2 to NPS 8 (DN 15 to DN 200)**.

5. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, **NPS 1/2 to NPS 8 (DN 15 to DN 200).**
6. Adjustable Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, **NPS 1/2 to NPS 2 (DN 15 to DN 50).**
7. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of noninsulated stationary pipes, **NPS 3/8 to NPS 8 (DN 10 to DN 200).**
8. U-Bolts (MSS Type 24): For support of heavy pipe, **NPS 1/2 to NPS 30 (DN 15 to DN 750).**
9. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
10. Pipe Saddle Supports (MSS Type 36): For support of pipes, **NPS 4 to NPS 36 (DN 100** to DN 900), with steel pipe base stanchion support and cast-iron floor flange.
11. Pipe Stanchion Saddles (MSS Type 37): For support of pipes, **NPS 4 to NPS 36 (DN 100 to DN 900)**, with steel pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.

F. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, **NPS 3/4 to NPS 20 (DN 20 to DN 500).**
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, **NPS 3/4 to NPS 20 (DN 20 to DN 500)**, if longer ends are required for riser clamps.

END OF SECTION 15055

SECTION 15140 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Performance Requirements: Unless otherwise indicated, minimum pressure requirements for water piping are as follows:

1. Service Entrance Piping: **[120 psig (1100 kPa)] [100 psig (690 kPa)].**
2. Domestic Water Piping: **[90 psig (860 kPa)] [80 psig (550 kPa)].**

B. Comply with NSF 14, "Plastic Piping Components and Materials."

C. Comply with NSF 61, "Drinking Water System Components -- Health Effects."

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. Steel Piping: Schedule 40, galvanized steel pipe, with Class 125, galvanized, standard pattern gray-iron, threaded fittings.

B. Soft Copper Tubing: **Types K and L (Types A and B)**, water tube, annealed temper with copper pressure fittings, cast-copper-alloy or wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.

C. Hard Copper Tubing: **Types L and M (Types B and C)**, water tube, drawn temper with wrought- copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.

1. Copper Unions: Cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

D. Schedule 40 PVC Piping: PVC pipe and PVC Schedule 40 socket-type or threaded fittings.

E. Schedule 80 PVC Pipe: PVC pipe and Schedule 80 [**socket**] or [**threaded**]-type fittings.

F. Special Duty Valves:

1. PVC Non-Union Ball Valves: Full- or reduced-port ball, socket or threaded ends, and pressure rating not less than **[125 psig (860 kPa)]**.
2. PVC Butterfly Valves: With lever handle and pressure rating not less than **[125 psig (860 kPa)]** **<Insert additional requirements>**.
3. PVC Check Valves: Swing or ball-check design and pressure rating not less than **[125psig (860 kPa)]** **<Insert additional requirements>**.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Install listed pipe materials and joining methods below in the following applications:

1. Underground, Service Entrance Piping: **[Schedule 80 PVC piping]**.
2. Aboveground Distribution Piping: **[Steel piping]** or **[Schedule 80 PVC piping]**.

3.2 VALVE APPLICATIONS

A. Install gate valves close to main on each branch and riser serving two or more plumbing fixtures or equipment connections and where indicated.

B. Install gate or ball valves on inlet to each plumbing equipment item, on each supply to each plumbing fixture not having stops on supplies, and elsewhere as indicated.

C. Install drain valve at base of each riser, at low points of horizontal runs, and where required to drain water distribution piping system.

D. Install swing check valve on discharge side of each pump and elsewhere as indicated.

E. Install ball valves in each hot-water circulating loop and discharge side of each pump.

3.3 PIPING INSTALLATIONS

A. Install hangers and supports at intervals indicated in the applicable plumbing code and as recommended by pipe manufacturer.

B. Support vertical piping at each floor.

3.4 INSPECTING AND CLEANING

A. Inspect and test piping systems following procedures of authorities having jurisdiction.

B. Clean and disinfect water distribution piping following procedures of authorities having jurisdiction.

END OF SECTION 15140

SECTION 15150 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Minimum Pressure Requirement for Soil, Waste and Vent: **10 feet head (30 kPa).**

B. Comply with NSF 14, "Plastic Piping Components and Related Materials."

PART 2 - PRODUCTS

2.1 PIPES AND FITTINGS

A. Copper Drainage Tube: Type DWV, drawn temper with **[Type DWV] [sovent] [wrought]** - copper drainage fittings

B. Hub-and-Spigot, Soil Pipe: Service class cast iron; ASTM C 564 rubber gaskets.

C. Hubless, Soil Pipe: Cast-iron pipe and **[hubless, cast-iron fittings with neoprene sealing sleeve and stainless-steel corrugated shield and clamp assembly]**.

D. PVC Plastic, DWV Pipe: ASTM D 2665, Schedule 40, plain ends and socket-type PVC DWV pipe fittings.

PART 3 - EXECUTION

3.1 PIPE APPLICATIONS

A. Aboveground applications: **[PVC plastic, DWV pipe and fittings with solvent-cemented joints]** schedule 80.

B. Belowground applications: **[PVC plastic, DWV pipe and drainage-pattern fittings with cemented joints]** schedule 80

3.2 PIPING INSTALLATION

A. Install cleanout and extension to grade at connection of building sanitary drain and building sanitary sewer.

B. Locate drainage piping runouts as close as possible to bottom of floor slab supporting fixtures or drains.

3.3 INSPECTION

A. Inspect and test piping systems following procedures of authorities having jurisdiction.

END OF SECTION 15150

SECTION 15160 - STORM DRAINAGE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Minimum Pressure Requirement for Storm Drainage: 10 feet head (30 kPa).

B. Comply with NSF 14, "Plastic Piping Components and Related Materials."

PART 2 - PRODUCTS

2.1 PIPES AND TUBES

A. PVC Plastic, DWV Pipe: Schedule 40, plain ends pipe with PVC socket-type; drain, waste, and vent pipe patterns.

PART 3 - EXECUTION

3.1 PIPE APPLICATIONS

A. Aboveground Applications: **[PVC plastic, DWV pipe and fittings with solvent-cemented joints]** .

B. Belowground Applications: **[PVC plastic, DWV pipe and fittings with solvent-cemented joints]**.

3.2 PIPING INSTALLATION

A. Install cleanout and extension to grade at connection of building storm drain and storm sewer.

B. Locate drainage piping runouts as close as possible to bottom of floor slab supporting drains.

3.3 INSPECTION

A. Inspect and test piping systems following procedures and standards of Current National Plumbing Code.

END OF SECTION 15160

SECTION 15183 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Comply with ASME B31.5, "Refrigerant Piping," and ASHRAE 15, "Safety Code for Mechanical Refrigeration."

PART 2 - PRODUCTS

2.1 TUBES AND FITTINGS

A. Hard Copper Tube: **[Type L (Type B)]**, drawn temper with wrought copper streamline fittings and BAg-1 (Silver) brazing metal.

B. Soft Copper Tube: **[Type K (Type A)]**, annealed temper with wrought copper streamline fittings and BAg-1 (Silver) brazing metal.

C. Flexible Connectors: **500-psig (3450-kPa)** operating pressure; minimum **7 inches (180 mm)** long.

2.2 VALVES

A. Minimum Pressure and Temperature Ratings: **500-psig (3450-kPa)** working pressure and **275 deg F (135 deg C)** working temperature, unless otherwise indicated.

B. Solenoid Valves: Comply with ARI 760; **250 deg F (121 deg C)** temperature rating, **400-psig (2760-kPa)** working pressure, and 24-V normally closed holding coil.

C. Pressure-Regulating Valves: [**Direct acting**] and comply with ARI 770.

D. Pressure Relief Valves: ASME labeled, for standard pressure setting.

E. Thermal-Expansion Valves: Comply with ARI 750; with sensing bulb, distributor having side connection for hot-gas bypass line, and external equalizer line.

F. Hot-Gas Bypass Valve: Pulsating-dampening design, stainless-steel bellows and polytetrafluoroethylene valve seat; adjustable; sized for capacity equal to last step of compressor unloading; with solder-end connections.

2.3 REFRIGERANT PIPING SPECIALTIES

A. Strainers: **500-psig (3450-kPa)** working pressure.

B. Moisture/Liquid Indicators: **500-psig (3450-kPa)** operating pressure, **200 deg F (93 deg C)** operating temperature, with replaceable, polished, optical viewing window with color-coded moisture indicator.

C. Replaceable Core Filter Dryers: **500-psig (3450-kPa)** operating pressure; with replaceable core kit, including gaskets, and **[filter]** [**filter dryer**] [**wax removal**] cartridge.

D. Mufflers: **500-psig (3450-kPa)** operating pressure.

E. Refrigerant: ASHRAE 34, **[R-123]** [**R-134a**] [**R-22**] [**R-500**].

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Aboveground, within Building: **[Type L (Type B)]** drawn copper tubing.

B. Belowground for **[Type K (Type A)]** annealed-copper tubing.

3.2 INSTALLATION

A. Install refrigerant piping according to ASHRAE 15.

B. Belowground, install copper tubing in conduit. Vent conduit outdoors.

C. Insulate suction lines and liquid lines, but insulate them together if adjacent.

D. Install branch lines to parallel compressors of equal length, and pipe identically and symmetrically.

E. Install bypass around moisture/liquid indicators in lines larger than **NPS 2 (DN 50).**

F. Install unions to allow removal of solenoid valves, pressure-regulating valves, expansion valves, and at connections to compressors and evaporators.

G. Install flexible connectors at the inlet and discharge connection, at right angles to axial movement of compressor, parallel to crankshaft.

H. Charge and purge systems, after testing, and dispose of refrigerant by following ASHRAE 15 procedures.

I. Install valves on suction and discharge of compressor, for gage taps at compressor inlet and outlet, for gage taps at hot-gas bypass regulators, on inlet and outlet, and on each side of strainers.

J. Install check valves on compressor discharge and on condenser liquid lines on systems with multiple condensers.

K. Install refrigerant charging (packed angle) valve in liquid line between receiver shutoff valve and expansion valve.

L. Install globe valves on each side of strainers and dryers, in liquid and suction lines at evaporators, and elsewhere as indicated.

M. Install a full-sized, three-valve bypass around each dryer.

N. Install solenoid valves ahead of each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at top.

O. Install liquid indicators in liquid line leaving condenser, in liquid line leaving receiver, and on leaving side of liquid solenoid valves.

P. Install strainers immediately upstream from each automatic valve, including expansion valves, solenoid valves, hot-gas bypass valves, and compressor suction valves.

Q. Install strainers on main liquid line where multiple expansion valves with integral strainers are used.

R. Install moisture/liquid indicators in liquid lines between filter dryers and thermostatic-expansion valves and in liquid line to receiver.

S. Install pressure relief valves on ASME receivers, and pipe to outdoors.

END OF SECTION 15183

SECTION 15410 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data for each type of plumbing fixture.

B. Comply with requirements of Public Law 102-486, "Energy Policy Act," regarding water flow rate and water consumption of plumbing fixtures.

C. Comply with applicable standards below:

1. National Sanitation Foundation Construction: NSF 61.
2. Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act."
3. Public Law 102-486, "Energy Policy Act."

PART 2 - PRODUCTS

Contractor shall submit commercial plumbing fixtures as noted for review and subsequent approval by A/E

2.1 COMMERCIAL SINK

A. Heavy duty commercial 10 inch deep minimum, Stainless-Steel Sink: Counter-mounting[, **self-rimming**] type, **[0.063 inch (1.6 mm)].**

B. Faucet: [**Cast-brass underbody and brass escutcheon**] and polished, chrome-plated finish, unless otherwise indicated. [**Maximum** 2.5-gpm (0.16-L/s) **flow rate.**]

1. Type: [**commercial faucet for installation in commercial kitchen**] [**Center set with central inlets**] or [**Widespread with inlets on 8-inch (203-mm) centers**].
2. Handle(s): [**Dual lever**] or [**Single-lever toggle**].
3. Spout: [**Swing**] [**Swing gooseneck**] with [**aerator**] **[1-1/2-gpm (0.1-L/s) laminar flow**].
4. Products: <Manufacturer: Commercial kitchen sink American Standard of Kohler

2.2 SERVICE SINK

A. Enameled, Cast-Iron, Service Sink: [**Floor**]-mounting type, 30 x 30 dimension.

1. [**Available**]Products:

a. <Commercial **Kholer or American Standard or other approved Equal**>

B. Faucet: Widespread, cast brass,[**chrome plated,**] with supplies on **8-inch (203-mm)** centers. Wall braced spout with integral vacuum breaker, pail hook, and hose-thread outlet.

1. Products:

a. < Commercial **Kholer or American Standard or other approved Equal** >

C. Mounting: [**Trap standard and wall bracket**] [**Floor**].

D. Rim Guard: [**Manufacturer's standard**] [**Coated wire**].

E. Trap Standard: **[NPS 3 (DN 80)]** with grid strainer, enameled interior, cleanout, floor support, and pipe waste to wall.

F. Drain: **[NPS 3 (DN 80)]** with grid strainer.

G. P-Trap: **[NPS 3 (DN 80)]** drainage piping.

H. Supplies: **[NPS 1/2 (DN 15)]** copper tubing[**with ball, gate, or globe valve**].

I. Mop Rack: <**Manufacturer Standard.**>

J. Reinforcement: Provide for wall-mounting [**faucet and wall brace**].>

PART 3 - EXECUTION

3.1 INSTALLATIONS

A. Install fitting insulation kits on fixtures forpeople with disabilities.

B. Install fixtures with flanges and gasket seals.

C. Fasten wall-hanging plumbing fixtures securely to supports attached to building substrate where necessary, and to building wall construction where no support is indicated.

D. Fasten floor-mounted fixtures to substrate. Fasten fixtures having holes for securing fixture to wall construction, to reinforcement built into walls.

E. Fasten wall-mounted fittings to reinforcement built into walls.

F. Fasten counter-mounting plumbing fixtures to casework.

G. Secure supplies to supports or substrate within pipe space behind fixture.

H. Install individual supply inlets, supply stops, supply risers, and tubular brass traps with cleanouts at fixture.

I. Install water-supply stop valves in accessible locations.

J. Install traps on fixture outlets. Omit traps on fixtures having integral traps. Omit traps on indirect wastes, unless otherwise indicated.

K. Install disposers in sink outlets where noted as part of scope. Install switch where indicated, or in wall adjacent to sink if location is not indicated.

L. Install hot-water dispensers in back top surface of sink or in counter with spout over sink (where noted as part of scope).

M. Install escutcheons at wall, floor, and ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons where required to conceal protruding pipe fittings.

N. Seal joints between fixtures and walls, floors, and counters using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color.

O. Install piping connections between plumbing fixtures and piping systems and plumbing equipment. Install insulation on supplies and drains of fixtures for people with disabilities.

P. Ground equipment where required. Tighten electrical connectors and terminals according to UL 486A and UL 486B.

END OF SECTION 15410

SECTION 15430 - PLUMBING SPECIALTIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Cleanouts,

1. Application: [**Floor cleanout**] or [**Wall cleanout**] as required.
2. Body or Ferrule Material: Schedule 40 PVC.
3. Clamping Device: as required.
4. Outlet Connection: [**Threaded**].
5. Closure: [**Plastic plug**].
6. Adjustable Housing Material: [**Plastic**] with [**threads**].
7. Frame and Cover Shape: [**Round**].
8. Top Loading Classification: [**Heavy Duty**].

B. Copy first paragraph and subparagraphs below and edit for each type of floor drain required for Project.

C. Floor Drains,:

1. Application: [**Area drain**] or [**Floor drain**].
2. Body Material: schedule 4o pvc.
3. Seepage Flange: [**Required**].
4. Clamping Device: [**Not required**].
5. Outlet: [**Bottom**].
6. Exposed Surfaces and Interior Lining: [**Not required**].
7. Sediment Bucket: [**Not required**].
8. Top or Strainer Material: [**Stainless steel**] or [**Nickel bronze**].
9. Top of Body and Strainer Finish: [**Nickel bronze**] or [**Stainless steel**].
10. Top Shape: [**Round**].
11. Dimensions of Top or Strainer: As per Manufacturer Standard
12. Top Loading Classification: [**Heavy Duty**].
13. Funnel: [**Not required**].
14. Inlet Fitting: [**Not required**].
15. Trap Material: [**Not required**].
16. Trap Pattern: [**Not required**].
17. Trap Features: [**Cleanout**] [**Trap seal primer valve drain connection**] [**Cleanout and trap seal primer valve drain connection**] [**Not required**].

D. Plastic Floor Drains,:

1. Material: [**PVC**].
2. Seepage Flange: [**Required**].
3. Clamping Device: [**Not required**].
4. Outlet: [**Bottom**].
5. Sediment Bucket: [**Not required**].
6. Top or Strainer Material: Bronzed or stainless steel.
7. Top of Body and Strainer Finish: [**Nickel bronze**]or [**Stainless steel**].
8. Top Shape: [**Round**].
9. Dimensions of Top or Strainer: As per manufacturer standard
10. Shape: [**Round**].
11. Trap Material: [**Not required**].
12. Trap Pattern: [**Not required**].

E. Roof Drains, :

F. Dishwasher Air-Gap Fittings: Chrome-plated brass cover.

G. Hose Connection Vacuum Breakers: [**Nickel-plated**] bronze, with nonremovable and manual drain features and garden-hose threaded connection.

H. Water Filters: Cartridge type, including housing, fittings, filter cartridges, and cartridge end caps..

I. Thermostatic Mixing Valves: Manually adjustable, bronze body. Include check stop and union on hot- and cold-water-supply inlets.

J. Hose Bibbs: Bronze body in [**chrome-plated**] finish, with removable composition disc, threaded or soldered inlet, garden-hose threaded outlet, and [**wheel**] [**loose-key**] handle.

K. Water Hammer Arrester: If required use Bellows or piston type with pressurized cushioning chamber.

L. Strainers: Y-pattern, bronze body, **125-psig (860-kPa)** minimum steam working pressure.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install backflow preventers at each water-supply connection to mechanical equipment and where required by authorities having jurisdiction.

B. Install hose bibbs with integral or field-installed vacuum breaker.

C. Install floor drains at low pints of surface areas and where indicated. Set tops of drains flush with finished floor.

1. Trap drains connected to sanitary building drain.
2. Install drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes.

END OF SECTION 15430

SECTION 15480 - DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

B. Electric Water Heaters: Bear AGA certification label. Ariston Point of Use water Heaters (8 Gallons) No. GL8Ti. Hard Wiring of the Unit is required.

C. Comply with requirements of applicable NSF, AWWA, or FDA and EPA regulatory standards for tasteless and odorless, potable-water-tank linings.

D. Comply with performance efficiencies prescribed in ASHRAE 90.2, "Energy Efficient Design of New Low-Rise Residential Buildings."

E. Warranties: Submit a written warranty executed by manufacturer agreeing to repair or replace water heaters and accessories that fail in materials or workmanship within [**three**> years from date of Substantial Completion. Failures include, but are not limited to, tanks and elements.

PART 2 - PRODUCTS

2.1 WATER HEATERS, GENERAL

A. Insulation: Suitable for operating temperature and required insulating value. Include insulation material that surrounds entire tank except connections and controls.

B. Anode Rods: Factory installed, magnesium.

C. Combination Temperature and Pressure Relief Valve: ASME rated and stamped and complying with ASME PTC 25.3. Include relieving capacity at least as great as heat input and pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into tank.

D. Drain Valve: Factory or field installed.

2.2 ELECTRIC WATER HEATERS

A. Products:

1. **<Ariston Point of use water heater (8 Gallon) No. GL8Ti. Hardwiring of the unit is required for under counter use for kitchen sink and dishwasher areas**

2. **60 gallon capacity tant GE electric water heater or approved equal>**

B. Light-Commercial, Storage, Electric Water Heaters: UL 174 or UL 1453, but listed by manufacturer for commercial applications, or UL 1453, **[60-gal.** capacity. Steel tank with **150-psig (1035-kPa)** working-pressure rating**[, ASME labeled]**. Two electric, screw-in, immersion-type heating elements with adjustable thermostat for each element and wiring arrangement for nonsimultaneous operation.**[NSF 5 construction.]**

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install temperature and pressure relief valves and extend to closest floor drain.

B. Install vacuum relief valves in cold-water-inlet piping.

C. Install shutoff valves and unions at hot- and cold-water piping connections.

D. Make piping connections with dielectric fittings where dissimilar piping materials are joined.

E. Electrically ground units according to authorities having jurisdiction.

F. Water Heater to be installed under counter and enclosed with venting area in enclosure.

END OF SECTION 15480

SECTION 16050 – BASIC ELECTRICAL MATERIAL AND METHODS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data & Shop Drawings for items specified or on drawings.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 SUPPORTING DEVICES

A. Channel and angle support systems, hangers, anchors, sleeves, brackets, fabricated items, and fasteners are designed to provide secure support from the building structure for electrical components.

1. Material: Steel, except as otherwise indicated, protected from corrosion with zinc coating or with treatment of equivalent corrosion resistance using approved alternative finish or inherent material characteristics.
2. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel, except as otherwise indicated.

B. Steel channel supports have 9/16-inch (14-mm) diameter holes at a maximum of 8 inches (203 mm) o.c., in at least 1 surface.

1. Fittings and accessories mate and match with channels and are from the same manufacturer.

C. Nonmetallic Channel and Angle Systems: Structural-grade, factory-formed, fiberglass-resin channels and angles with 9/16-inch (14-mm) diameter holes at a maximum of 8 inches (203 mm) o.c., in at least 1 surface.

1. Fittings and accessories mate and match with channels or angles and are from the same manufacturer.
2. Fitting and Accessory Material: Same as channels and angles, except metal items may be stainless steel.

D. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring steel clamps or "click"-type hangers.

E. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Body constructed of malleable iron casting with hot-dip galvanized finish.

F. Expansion Anchors: Carbon-steel wedge or sleeve type.

G. Toggle Bolts: All-steel springhead type.

H. Powder-Driven Threaded Studs: Heat-treated steel.

2.2 ELECTRICAL IDENTIFICATION

1. Type: Preprinted, flexible, self-adhesive, vinyl. Legend is over-laminated with a clear, weather- and chemical-resistant coating.
2. Color: Black legend on orange field.
3. Legend: Indicates voltage.

A. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape not less than 3 mils thick by 1 inch wide (0.08 mm thick by 25 mm wide).

B. Engraved, Plastic-Laminated Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched for mechanical fasteners 1/16-inch (1.6-mm) minimum thick for signs up to 20 sq. in. (129 sq. cm), 1/8 inch (3.2 mm) thick for larger sizes. Engraved legend in black letters on white face.

C. Interior Warning and Caution Signs.

D. Fasteners for Plastic-Laminated and Metal Signs.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION REQUIREMENTS

A. Install components and equipment to provide the maximum possible headroom where mounting heights or other location criteria are not indicated.

3.2 ELECTRICAL SUPPORTING METHODS

A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.

B. Dry Locations: Steel materials.

C. Support Clamps for PVC Raceways: Click-type clamp syste

3.3 INSTALLATION

A. Install wires in raceway according to manufacturer's written instructions and NECA's "Standard of Installation."

B. Conductor Splices: Keep to the minimum and comply with the following:

1. Install splices and taps that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

2. Use splice and tap connectors that are compatible with conductor material.

C. Connect outlets and components to wiring systems and to ground as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque-tightening values for equipment connectors.

D. Install devices to securely and permanently fasten and support electrical components.

E. Raceway Supports: Comply with NFPA 70 and the following requirements:

1. Conform to manufacturer's recommendations for selecting and installing supports.
2. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.
3. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
4. Spare Capacity: Size supports for multiple conduits so capacity can be increased by a 25 percent minimum in the future.
5. Support individual horizontal raceways with separate, malleable iron pipe hangers or clamps.
6. Hanger Rods: 1/4-inch (6-mm) diameter or larger threaded steel, except as otherwise indicated.
7. Spring Steel Fasteners: Specifically designed for supporting single conduits or tubing. May be used in lieu of malleable iron hangers for 1-1/2-inch (38-mm) and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to channel and slotted angle supports.
8. In vertical runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports, with no weight load on raceway terminals.

F. Vertical Conductor Supports: Install simultaneously with conductors.

G. Miscellaneous Supports: Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices except where components are mounted directly to structural features of adequate strength.

H. In open overhead spaces, cast boxes threaded to raceways need not be separately supported, except where used for fixture support; support sheet-metal boxes directly from the building structure or by bar hangers. Where bar hangers are used, attach the bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches (610 mm) from the box.

I. Firestopping: Apply to cable and raceway penetrations of fire-rated floor and wall assemblies. Perform firestopping as specified in Division 7 Section "Firestopping" to reestablish the original fire-resistance rating of the assembly at the penetration.

J. Fastening: Unless otherwise indicated, securely fasten electrical items and their supporting hardware to the building structure. Perform fastening according to the following:

1. Fasten by means of wood screws or screw-type nails on wood; toggle bolts on hollow masonry units; concrete inserts or expansion bolts on concrete or solid masonry; and by machine screws, welded threaded studs, or spring-tension clamps on steel.
2. Threaded studs driven by a powder charge and provided with lock washers and nuts may be used instead of expansion bolts, machine screws, or wood screws.
3. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or any other items.
4. In partitions of light steel construction use sheet-metal screws.
5. Select fasteners so the load applied to any fastener does not exceed 25 percent of the proof-test load.

K. Install identification devices where required.

1. Install labels where indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.
2. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated on the Contract Documents or required by codes and standards. Use consistent designations throughout the Project.
3. Self-Adhesive Identification Products: Clean surfaces of dust, loose material, and oily films before applying.
4. Identify raceways and cables of certain systems with color banding as follows:

    a. Bands: Colored adhesive marking tape. Make each color band 2 inches (51 mm) wide, completely encircling conduit, and place adjacent bands of 2-color markings in contact, side by side.
    b. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25 feet (8 m) in congested areas.
    c. Colors: As follows:

5. Tag or label power circuits for future connection and circuits in raceways and enclosures with other circuits. Identify source and circuit numbers in each cabinet, pull box, junction box, and outlet box. Color coding may be used for voltage and phase indication.

A. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.

END OF SECTION 16050

SECTION 16120 – CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and Shop Drawings for all items specified and on drawings.

B. Comply with NEMA WD 3. – Rubber Insulation Material.

C. Comply with NEMA WC 5. - Thermoplactic Insulation Material.

D. Comply with NEMA WC 7. – Cross-Linked Polyethylene Insulation Material.

E. Comply with NEMA WC 8. - Ethylene Propylene Rubber Insulation Material.

F. Comply with NEMA WC 26.

G. OSHA Regulation 1910.7.

H. NFPA 70

1.2 SUBMITTALS

A. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.3 COORDINATION

A. Coordinate layout and installation of cables with other installations.

B. Revise locations and elevations from those indicated, as required to suit field conditions and as approved by Architect.

PART 2 - PRODUCTS

2.1MANUFACTURERS

A. Manufacturers: For the following wire, cables and accessories.

1. Wires and Cables:

a. American Insulated Wire Corp.; Leviton Manufacturing Co.
b. BICC Brand-Rex Company.
c. Carol Cable Co., Inc.
d. Senator Wire & Cable Company.
e. Southwire Company.

2. Connectors for Wires and Cables:

   a. AMP Incorporated.
   b. General Signal; O-Z/Gedney Unit.
   c. Monogram Co.; AFC.
   d. Square D Co.; Anderson.
   e. 3M Company; Electrical Products Division.

2.2 BUILDING WIRES AND CABLES

A. UL-listed building wires and cables with conductor material, insulation type, cable construction.

B. Conductor Material: Copper only. Aluminum wire is not acceptable.

C. Stranding: Solid conductor for No. 10 AWG and smaller; stranded conductor for larger than No. 10 AWG.

2.3 CONNECTORS AND SPLICES

A. UL-listed, factory-fabricated wiring connectors of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine raceways and building finishes to receive wires and cables for compliance with requirements for installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 WIRE AND INSULATION APPLICATIONS

A. Feeders: Type THHN/THWN, in raceway.

B. Branch Circuits: Type THHN/THWN, in raceway.

3.3 INSTALLATION

A. Install wires and cables as indicated, according to manufacturer's written instructions.

B. Pull Conductors: Use manufacturer-approved pulling compound or lubricant where necessary.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Support cables as required by code.

E. Seal around cables penetrating fire-rated elements as required by code.

F. Identify all wires and cables as required.

3.4 CONNECTIONS

A. Conductor Splices: Keep to minimum.

B. Use splice and tap connectors compatible with conductor material.

C. Install conductor at each outlet, with at least 12 inches (300 mm) of slack.

D. Connect outlets and components to wiring and to ground as instructed by manufacturer.

E. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

F. Testing installation of wires and cables and before electrical circuitry has been energized.

END OF SECTION 16120

SECTION 16130 – RACEWAY AND BOXES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data and Shop Drawings for all items specified and on drawings.

B. Comply with NFPA 70

C. NECA's "Standard of Installation".

1.2 SUMMARY

A. This Section shall include the following items.

1. Boxes, enclosures, and cabinets include the following:

a. Device boxes.
b. Floor boxes.
c. Outlet boxes.
d. Pull and junction boxes.
e. Cabinets and hinged-cover enclosures

B. Raceway shall include the following.

1. EMT: Electrical metallic tubing.

2. FMC: Flexible metal conduit.

3. LFMC: Liquidtight flexible metal conduit.

4. RMC: Rigid metal conduit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements.

1. Metal Conduit and Tubing:

a. Alflex Corp.
b. Anamet, Inc.; Anaconda Metal Hose.
c. Anixter Brothers, Inc.
d. Carol Cable Co., Inc.
e. Cole-Flex Corp.
f. Electri-Flex Co.
g. Flexcon, Inc.; Coleman Cable Systems, Inc.
h. Grinnell Co.; Allied Tube and Conduit Div.
i. Monogram Co.; AFC.

j. Spiraduct, Inc.
k. Triangle PWC, Inc.
l. Wheatland Tube Co.

2. Conduit Bodies and Fittings:

a. American Electric; Construction Materials Group.
b. Crouse-Hinds; Div. of Cooper Industries.
c. Emerson Electric Co.; Appleton Electric Co.
d. Hubbell, Inc.; Killark Electric Manufacturing Co.
e. Lamson & Sessions; Carlon Electrical Products.
f. O-Z/Gedney; Unit of General Signal.
g. Scott Fetzer Co.; Adalet-PLM.
h. Spring City Electrical Manufacturing Co.

2. Boxes, Enclosures, and Cabinets:

a. American Electric; FL Industries.
b. Butler Manufacturing Co.; Walker Division.
c. Crouse-Hinds; Div. of Cooper Industries.
d. Electric Panelboard Co., Inc.
e. Erickson Electrical Equipment Co.
f. Hoffman Engineering Co.; Federal-Hoffman, Inc.
g. Hubbell Inc.; Killark Electric Manufacturing Co.
h. Hubbell Inc.; Raco, Inc.
i. Lamson & Sessions; Carlon Electrical Products.
j. O-Z/Gedney; Unit of General Signal.
k. Parker Electrical Manufacturing Co.
l. Robroy Industries, Inc.; Electrical Division.
m. Scott Fetzer Co.; Adalet-PLM.
n. Spring City Electrical Manufacturing Co.
o. Thomas & Betts Corp.
p. Woodhead Industries, Inc.; Daniel Woodhead Co.

2.2 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.

B. EMT and Fittings: ANSI C80.3.

1. Fittings: Set-screw type for conduit 2-1/2" and larger.
2. Fittings: Compression type for conduit less than 2-1/2".

C. FMC: Zinc-coated steel.

D. LFMC: Flexible steel conduit with PVC jacket.

E. Fittings: NEMA FB 1; compatible with conduit/tubing materials.

2.3 OUTLET AND DEVICE BOXES

A. Sheet Metal Boxes: NEMA OS 1.

B. Cast-Metal Boxes: NEMA FB 1, Type FD, cast box with gasketed cover.

2.4 FLOOR BOXES

A. Floor Boxes: Cast metal, fully adjustable, rectangular.

2.5 PULL AND JUNCTION BOXES

A. Small Sheet Metal Boxes: NEMA OS 1.

2.6 ENCLOSURES AND CABINETS

A. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

B. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage, and include accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1EXAMINATION

A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of raceway installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2WIRING METHODS

A. Outdoors: Use the following wiring methods:

1. Exposed: Rigid steel.
2. Concealed: Rigid steel.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
4. Boxes and Enclosures: NEMA 250, Type 3R or Type 4.

B. Indoors: Use the following wiring methods:

1. Exposed: EMT.
2. Concealed: EMT.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except in wet or damp locations, use LFMC.

4. Boxes and Enclosures: NEMA 250, Type 1, except as follows:

   a. Damp or Wet Locations: NEMA 250, Type 4, stainless steel.

3.3 INSTALLATION

A. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.

B. Minimum Raceway Size: 3/4-inch trade size (DN21).

C. Conceal conduit and EMT, unless otherwise indicated, within finished walls, ceilings, and floors.

D. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

E. Install raceways level and square and at proper elevations. Provide adequate headroom.

F. Complete raceway installation before starting conductor installation.

G. Support raceways as specified in Division 16 Section "Basic Electrical Materials and Methods."

H. Use temporary closures to prevent foreign matter from entering raceways.

I. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

J. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.

K. Use raceway fittings compatible with raceways and suitable for use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings, unless otherwise indicated.

L. Run concealed raceways, with a minimum of bends, in the shortest practical distance considering the type of building construction and obstructions, unless otherwise indicated.

M. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.

   1. Run parallel or banked raceways together, on common supports where practical.
   2. Make bends in parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

N. Join raceways with fittings designed and approved for the purpose and make joints tight.

   1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.

2. Use insulating bushings to protect conductors.

O. Tighten set screws of threadless fittings with suitable tools.

P. Terminations: Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against the box. Where terminations are not secure with 1 locknut, use 2 locknuts: 1 inside and 1 outside the box.

Q. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align raceways so the coupling is square to the box and tighten the chase nipple so no threads are exposed.

R. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of the pull wire.

S. Telephone and Signal System Raceways, 2-Inch Trade Size (DN53) and Smaller: In addition to the above requirements, install raceways in maximum lengths of 150 feet (45 m) and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.

T. Install raceway sealing fittings according to manufacturer's written instructions. Locate fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as the boundaries of refrigerated spaces.

U. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches (150 mm) above the floor. Install screwdriver-operated, threaded flush plugs flush with floor for future equipment connections.

V. Flexible Connections: Use maximum of 6 feet (1830 mm) of flexible conduit for recessed and semi-recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquidtight flexible conduit in wet or damp locations. Install separate ground conductor across flexible connections.

W. Do not install aluminum conduits embedded in or in contact with concrete.

X. Set floor boxes level and adjust to finished floor surface.

Y. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

END OF SECTION 16130

SECTION 16140 – WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Comply with NEMA WD 1.

B. Comply with NEMA WD 6.

C. NFPA 70, Article 100

D. Submittals: Product Data, Shop Drawings for all items specified and on drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

0. Wiring Devices:

a. Bryant Electric, Inc.
b. GE Company; GE Wiring Devices.
c. Hubbell, Inc.; Wiring Devices Div.
d. Killark Electric Manufacturing Co.
e. Leviton Manufacturing Co., Inc.
f. Pass & Seymour/Legrand; Wiring Devices Div.

2.2 RECEPTACLES

A. Straight-Blade Receptacles.

2.3 CORD AND PLUG SETS

A. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.

1. Cord: Rubber-insulated, stranded-copper conductors, with type SOW-A jacket. Green-insulated grounding conductor, and equipment-rating ampacity plus a minimum of 30 percent.
2. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.4 SWITCHES

A. Snap Switches: Heavy-duty, quiet type.

2.5 WALL PLATES

A. Single and combination types match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish or safety type as indicated.
2. Material for all Spaces: Steel with wrinkled finish, white baked enamel, suitable for field painting.

2.6 FINISHES

A. Color: Ivory, unless otherwise indicated or required by Code.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install devices and assemblies plumb and secure.

B. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates. Receptacles mounted at 18" AFF and switches at 48" AFF, unless noted

B. Connect wiring device grounding terminal to branch-circuit equipment grounding conductor.

END OF SECTION 16140

SECTION 16410 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL (Not Applicable)

PART 2 - PRODUCTS

2.1 SWITCHES

A. Enclosed, Nonfusible Switch: NEMA KS 1, Type HD, with lockable handle.

B. Enclosed, Fusible Switch, 800 A and Smaller: NEMA KS 1, Type HD, clips to accommodate specified fuses, enclosure consistent with environment where located, handle lockable with 2 padlocks, and interlocked with cover in closed position.

2.2 CIRCUIT BREAKERS

A. Enclosed, Molded-Case Circuit Breaker: NEMA AB 1, with lockable handle, standard frame sizes, trip ratings, and number of poles[**and thermal-magnetic trip, unless otherwise indicated**].

1. Lugs: [**Compression**] style suitable for number, size, trip ratings, and material of conductors.
2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
3. Ground-Fault Protection: [**Integrally**] mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
4. Communication Capability: if required [**Circuit-breaker-mounted**] communication module with functions and features compatible with power monitoring and control system.
5. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at] [**75**] percent of rated voltage.
6. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage [**without intentional**] time delay.
7. Auxiliary Switch: [**One SPDT switch**] with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b"contacts operate in reverse of circuit-breaker contacts.

PART 3 - EXECUTION

3.1 TESTING

A. Perform visual and mechanical inspections and electrical tests stated in NETA ATS.

END OF SECTION 16410

SECTION 16410 – UNDERGROUND ELECTRIC

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data & Shop Drawings for all items specified and on drawings.

B. Comply with NFPA 70

B. The following sections contain requirements that relate to this section.

1. Raceways.

2. Wire and Cable.

1.3 SYSTEM DESCRIPTION

A. Provide all concrete pads, manholes, handholes and ductbank shown on the drawings and as required.

B. Verify all existing underground utilities prior to installation of equipment.

PART 2 - PRODUCTS

2.1 UNDERGROUND DUCT

A. Thinwall plastic conduit concrete encased

B. Heavy wall plastic non-metallic conduit

2.2 CONCRETE PADS

A. Materials: Reinforced concrete, 4000 psi, Minimum 10" thickness extending 8" above grade and with 1" chamfer around all edges.

B. Standards as per utility company (W.A.P.A.).

A. Reinforcing Steel: #5 reinforcing steel at 8" centers in both Directions; 3" from bottom of pad and per W.A.P.A.'s standard details.

B. Conduit Openings: Provide pad openings to accept conduit required. Size opening for a minimum 3" clear space around all conduit. Provide ground rod outside of pad perimeter with #4 ground wire extending into conduit opening. Leave 4'-0" slack conductor.

C. Base: Provide pea gravel base, minimum 6" deep, under entire pad.

2.3 PRECAST MANHOLES AND HANDHOLES

A. Acceptable Manufacturers:

1. A.C. Miller, Inc.
2. Quickset Utility Vaults, Inc.
3. Penn-Cast Products.
4. Precast Products.

B. Option: Cast-in-place work. To use cast-in-place manholes and handholes in lieu of precast, comply with the following provisions:

1. Construct manholes generally to conform with details of precast manholes and handholes. Comply with applicable sections in Division 3 for cast-in-place concrete materials.

2. Submit shop drawings of proposed construction showing reinforcing details and dimensions. Prepare and submit structural calculations.

C. Materials: Reinforced concrete, 4000 psi.

D. Standards: H-20-44 bridge loading; Precast Concrete Testing Society.

E. Description: Assembly of floor section, intermediate rings if required and roof section, with tongue and groove key joints between sections; field dampproof mastic seal at each joint; knock-out windows for future duct entrances.

F. Duct Entrances: Molded plastic.

G. Manufacturer: Formex Manufacturing, Inc.

H. Description: High impact styrene, molded with integral end bell and shoulder for termination of duct; cast in place in manhole and supported in place by reinforcing steel.

I. Duct termination: Solvent cement.

H. Dampproofing: Non-Asbestos Karnak 86 Fibrated Trowel Mastic, or acceptable substitution.

I. Accessories: Hot-dip galvanize ferrous metals. Provide the following:

1. Pulling eyes opposite each duct entrance.

2. Sump in floor, accessible from manhole and handhole opening at grade.

3. Linear inserts and cable racks on each wall.

4. Porcelain pillow blocks and pillow block supports.

5. Ground rod.

6. Reinforcing rod stubs for connection to concrete encased duct lines.

7. Non-shrink grout.

8. Ladder.

9. Others as required by Project.

J. Manhole Cover and Frame: Cast iron; 30 inch diameter opening: designed for heavy weight traffic; lifting ring or lifting eye; ribbed non-skid top surface; 4 inch high letters in cover spelling "ELEC" for power and "TELE" for signal; locking device operated by screw driver.

K. Handhole Cover: Two section ribbed steel with non-skid diamond plate top; 4 inch high letters in cover spelling "ELEC" for power and "TELE" for signal; locking device operated by screw driver.

2.5 WARNING TAPE

A. Acceptable Manufacturer:

1. Bradey Label.

2. T&B.

3. Substitutions: Under provisions of Section 01630.

B. Description: 3 inch wide plastic ribbon designed for direct burial in earth; yellow background with black warning lettering "Electric Line" for 600V lines and below, red background with black warning lettering "High Voltage Line" for 1OOOV lines and above.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify all existing underground utilities prior to installation of materials.

3.2 PREPARATION

A. Provide all excavation, backfill and surface repair work required for installation of materials specified.

B. Protect all existing sitework to remain from damage.

3.3 CONCRETE PADS

A. Provide concrete pads for all electrical equipment mounted at grade level outdoors.

3.4 INSTALLATION

A. Slope service to drainage point.

B. Terminate conduit in main switch with grounding bushing. Make 1/0 AWG ground connection from bushing to panelboard ground bus.

B. Terminate service conduit at padmounted transformer with grounding bushing. Make 1/0 AWG ground connection or size as noted from bushing to transformer housing or ground bus.

3.5 MANHOLES AND HANDHOLES

A. Comply with applicable sections for earthwork.

B. Install 6 inches of compacted sand under manholes and handholes.

C. Pre-Cast Work: Set pre-cast sections in place, apply dampproofing mastic in joints between sections. Grout exterior of joints, and around ducts that enter manhole or handhole.

D. Cast-In-Place Work: Comply with applicable sections in Division 3 for concrete work. Grout around ducts entering manhole or handhole. Trowel on dampproofing mastic to entire outside wall surface at rate of 5 to 6 gallons per 100 sq. ft.

D. Provide at least three courses of brick and mortar between roof and frame for manhole cover to allow for future adjustment of grade.

E. Where manhole or handhole is set in paved area, provide premolded expansion joint between manhole and adjacent paving.

F. Provide ground rod in each manhole, and handhole and connect to metallic non-current carrying parts with flexible copper bonding straps.

G. Locate knockout windows for future duct banks to clear obstructions. For stubs, use 30 inch long rigid steel nipple for last section of raceway Encase 24 inches of nipple in concrete envelope and allow 6 inches to protrude.

END OF SECTION 16410

SECTION 16442 - PANELBOARDS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

B. Comply with NEMA PB 1.

C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 PANELBOARDS AND LOAD CENTERS

A. **[Flush]** or **[Surface]** mounted, as noted or specified NEMA PB 1, Type 1.

1. Front: **[Hinged to box with standard door within hinged cover]**.
2. Doors: With, flush catches, and tumbler locks, all keyed alike.
3. Bus: **[Hard-drawn copper, 98 percent conductivity]** **[Tin-plated aluminum]**.
4. Main and Neutral Lugs: **[Compression]** or **[Mechanical]** type suitable for use with conductor material.
5. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.
6. Feed-through Lugs: **[Compression]** **[Mechanical]** type suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

B. Panelboard Short-Circuit Rating: UL label indicating series-connected rating with integral or remote upstream devices. Include size and type of upstream device allowable, branch devices allowable, and UL series-connected short-circuit rating.

C. Load Centers:

1. Overcurrent Protective Devices: Plug-in, full-module circuit breaker.
2. Conductor Connectors: Mechanical type for main, neutral, and ground lugs and buses.

D. Lighting and Appliance Branch-Circuit Panelboards:

1. Branch Overcurrent Protective Devices: **[Plug-in]** circuit breakers, replaceable without disturbing adjacent units.
2. Doors: Front mounted with concealed hinges; secured with flush latch with tumbler lock; keyed alike.

E. Distribution Panelboards:

1. Doors: Front mounted, except omit in fused-switch panelboards; secured with vault-type latch with tumbler lock; keyed alike.
2. Main Overcurrent Protective Devices: [**Circuit breaker**] or [**Fused switch**].
3. Branch overcurrent protective devices shall be one of the following:

   a. For Circuit-Breaker Frame Sizes 125 A and Smaller: [**Plug-in**] or [**Bolt-on**] circuit breakers.
   b. For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.
   c. Fused switches.

F. Molded-Case Circuit Breakers: NEMA AB 1, [**plug-in**] type. Single handle for multipole circuit breakers. Appropriate for application, including Type SWD for repetitive switching lighting loads and Type HACR for heating, air-conditioning, and refrigerating equipment.

G. Fused Switches: NEMA KS 1, Type HD, with[**rejection**] clips to accommodate indicated fuses, handle lockable.

H. Motor Controllers: NEMA ICS 2, Class A combination controllers.

I. Contactors: NEMA ICS 2, Class A combination contactors.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards and accessory items according to NEMA PB 1.1. Indicate installed circuit loads on a typed circuit directory after balancing panelboard loads.

B. Mounting Heights: Top of trim **74 inches (1880 mm)** above finished floor, unless otherwise indicated.

C. Future Circuit Provisions at Flush Panelboards: Stub four empty **3/4-inch (19-mm)** conduits from panelboard into accessible or designated ceiling space and four empty conduits into [**space below**] floor if required.

D. Wiring in Panelboard Gutters: Arrange conductors into groups[**, bundle and wrap with wire ties**].

E. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

F. Perform visual and mechanical inspections and electrical tests stated in NETA ATS.

G. All electrical installations shall be governed by the most recent version of the National Electrical Code.

END OF SECTION 16442

SECTION 16435 - PANELBOARDS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Comply with NEMA AB 1

B. Comply with NEMA PB 1.1

C. Comply with NEMA AB 1

D. Comply with NFPA 70 – National Electric Code; National Fire Protection Association.

E. Comply with Standards of Installation; National Electric Contractors Association (NECA).

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. General Electric.
2. Cutler-Hammer/Westinghouse.
3. Square D.
4. Siemens.

2.3 LIGHTING AND APPLIANCE BRANCH CIRCUIT PANELBOARD

A. Description: NEMA PB 1, branch circuit panelboard as scheduled.

B. Molded Case Circuit Breakers: NEMA AB 1; provide the following where indicated:

1. Thermal magnetic molded case circuit breakers.
2. Circuit breakers shall be of the bolt-on type.
3. Multi-pole breakers shall have a common internal trip. Single breakers with handle ties are not acceptable.
4. Tandem and half-size breakers shall not be used.
5. One-pole circuit breakers 20 ampere and smaller: Suitable for switching duty.
6. Circuit breakers suitable for heating and air-conditioning loads.

B. Bus Material: Copper

1. Provide with an insulated, full capacity neutral bus where indicated and a bonded equipment ground bus, mounted at the opposite end of the panelboard enclosure from the main connection.

D. Provide breaker mounting brackets, drilled and threaded breaker bus bar connections, and blank covers for spaces.

E. Wiring Terminations: Match conductor materials and sizes indicated on the drawings.

1. All lug sizes shall be compatible with conductor sizes. Provide multiple lugs for multiple conductors.

F. Provide galvanized steel panelboard enclosure with cover, trim and flush mounting screws, concealed hinged door, and flush door catch and tumbler lock. Key all panelboards alike. Provide two keys for each panelboard.

2.4 THERMAL MAGNETIC TRIP CIRCUIT BREAKERS

A. Circuit protective devices shall be thermal magnetic molded case circuit breakers. Circuit breakers shall have interrupting ratings as shown on the drawings and as required by the short circuit study. Ampere ratings shall be as shown on the drawings.

1. Manufacturer shall submit one set of published Ip and I2t let- through curves (as required by UL) to the Architect.

B. All circuit breakers shall be UL Listed for reverse connection without restrictive and line and load markings and be suitable for mounting in any position.

C. Circuit breakers shall be constructed using glass reinforced insulating material providing superior dielectric strength. Current carrying components shall be completely isolated from the handle and the accessory mounting area.

D. Each circuit breaker shall have common tripping of all poles and shall be trip-free.

E. The circuit breakers shall be quick-make, quick-break with an overcenter toggle operating mechanism and shall not be able to be teased into a neutral position.

F. Breaker handle and faceplate shall indicate rated ampacity. Breaker faceplate shall indcate UL and IEC certification standards with applicable voltage system and corresponding AIC ratings.

G. Circuit breaker shall be factory sealed and shall have a date code on the face of the circuit breaker. Poles shall be labeled with respective phase designations.

H. Handle position shall provide local trip indication.

I. Circuit breaker escutcheon shall have International I/O markings, in addition to standard ON/OFF markings. Circuit breaker handle accessories shall provide provisions for locking handle in the "ON" or "OFF" position.

2.6 TERMINATIONS

A. All lugs shall be UL Listed to accept solid and/or stranded copper conductors only. Lugs shall be suitable for 90 degrees C. rated wire, sized according to the 75 degrees C.

temperature rating in the NEC. Lug body shall be bolted in place, snap-in designs are not acceptable.

B. All circuit breakers shall be UL Listed to accept field installable/removable compression type lugs.

C. All circuit breakers shall be suitable for bus connection.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces intended to support products.

B. Examine each product prior to installation to determine conformance to regulatory requirements and specification requirements.

C. Do not proceed until unsatisfactory conditions have be remedied.

D. Mounting height: Conform to NECA "Standards of Installation", except where height is specified or indicated on drawings.

1. Panelboard shall be mounted with centerlines approximately 5'-0" above finished floor, except that the highest breaker shall in no case be more than 6'-6" above the finished floor.

2. Provide a typewritten directory in each panelboard. Indicate breaker position number, equipment served, room name and number.

END OF SECTION 16405

SECTION 16440 – DISCONECT SWITCHED & ENCLOSED CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data for all items specified and on drawings.

B. Comply with NEMA KS- 1. – Enclosed Switches.

C. Comply with NEMA 250 – Enclosure for Electrical equipment.

D. Comply with NFPA 70 – National Electric Code; National Fire Protection Association.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Square D.
2. General Electric.
3. Siemens.
4. Cutler-Hammer/Westinghouse

2.2 ENCLOSED SWITCHES

A. Switch Assemblies: NEMA KS 1, heavy duty, horsepower rated, quick-make, quick-break type.

B. Fuse Clips: Designed to accept Class R fuses only for up to 600 amperes and Class L fuses over 600 amperes.

C. Provide ground bus, and where required, neutral bus.

D. Wiring terminations: Match conductor materials and sizes indicated.

D. Enclosure: NEMA KS 1

E. Type NEMA 1 General Purpose enclosure: Dry locations only.

F. Type NEMA 3R for all outdoor and wet locations.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

C. Install disconnects readily accessible and with clearance required by code.

D. All switches and enclosed circuit breakers shall be firmly anchored to walls and supporting structures (where used) using appropriate installation methods. Switches shall be installed with the turning axis of their handles approximately 5'-0" above finished floor.

END OF SECTION 16440

SECTION 16452 - GROUNDING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data & Shop Drawings for all items specified or on plans.

B. Comply with NFPA 70

C. Comply with UL 467

D. Comply with NRTL Regulation 1910.7 as defined in OSHA

E. NEC, Article 250

1. Testing Agency Field Supervision: Use persons currently certified by NETA or the National Institute for Certification in Engineering Technologies t

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Apache Grounding; Nashville Wire Products.
2. Boggs: H. L. Boggs & Co.
3. Chance: A. B. Chance Co.
4. Dossert Corp.
5. Erico Inc.; Electrical Products Group.
6. Galvan Industries, Inc.
7. Hastings Fiber Glass Products, Inc.
8. Heary Brothers Lightning Protection Co.
9. Ideal Industries, Inc.
10. ILSCO.
11. Kearney.
12. Korns: C. C. Korns Co.
13. Lightning Master Corp.
14. Lyncole XIT Grounding.
15. O-Z/Gedney Co.
16. Raco, Inc.
17. Salisbury: W.H. Salisbury & Co., Utility.
18. Thomas & Betts, Electrical.
19. Utilco Co.

2.2 WIRE, CABLE AND GROUNDING CONDUCTORS

A. Material: Use only copper wire for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.

A. Equipment Grounding Conductors: Insulated with green color insulation.

B. Grounding-Electrode Conductors: Stranded cable.

2.4 MISCELLANEOUS CONDUCTORS

A. Braided Bonding Jumpers: Copper tape, braided No. 30 AWG bare copper wire, terminated with copper ferrules.

B. Bonding straps: Soft copper. 0.05 inch (1mm) thick and 2 inches (50 mm wide, except as indicated..

2.5 CONNECTOR PRODUCTS

A. Pressure Connectors: High-conductivity-plated units.

B. Bolted Clamps: Heavy-duty type.

C. Exothermic-Welded Connections: Provided in kit form and selected per manufacturer's written instructions for specific types, sizes, and combinations of conductors and connected items.

PART 3 - EXECUTION

3.1 APPLICATION

A. Equipment Grounding Conductors:
   1. Feeders and branch circuits.
   2. Lighting circuits.
   3. Receptacle circuits.
   4. Flexible raceway runs.

B. Provide ground for all separately Derived Systems: Where NEC requires grounding, ground according to NEC Paragraph 250-26.

C. Exothermic-Welded Connections: Used for connections to structural steel. Comply with manufacturer's written instructions.

C. Equipment Grounding-Wire Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

D. Noncontact Metal Raceway Terminations: Where metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing.

E. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. Where these requirements are not available, use those specified in UL 486A and UL 486B.

F. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors or tools and dies recommended by manufacture

3.2 FIELD QUALITY CONTROL

A. Maximum grounding to resistance values are as follows:

1. Equipment Rated 500 kVA and Less: 10 ohms.

B. Excessive Ground Resistance: Where resistance to ground exceeds specified values, notify Owner promptly and include recommendations to reduce ground resistance and to accomplish recommended work.

C. Report: Prepare test reports, certified by the testing organization, of ground resistance at each test location. Describe measures taken to improve test results.

END OF SECTION 16452

SECTION 16461 – DRY-TYPE TRANSFORMER (660 VOLTS OR LESS)

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data.

B. Comply with IEEE C57.12.91.

C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. General-Purpose, Dry-Type Transformers, 600 V or Less:

1. Comply with NEMA ST 20 and list and label as complying with UL 1561.
2. Continuous copper windings without splices, except for taps, with brazed or pressure type internal coil connections.
3. Enclosure: Outdoor, ventilated, raintight, NEMA 250, Type 3R
4. Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and two 2.5 percent taps below normal full capacity , Two 2.5 percent taps above and four 2.5 percent taps below normal full capacity.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Arrange equipment to provide adequate spacing for access and for cooling air circulation.

B. Mount transformers larger than 75 kVA on 8" concrete bases.

END OF SECTION 16461

SECTION 16475 - FUSES

PART 2 – GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data, Shop Drawings for all items specified and on drawings.

B. Comply with OSHA Regulation 1910.7.

C. NFPA 70 for all components and installation.

1.2 SPARE PARTS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Spare Fuses: Furnish quantity equal to 20 percent of each fuse type and size installed, but not less than 1 set of 3 of each type and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Cooper Industries, Inc. Bussmann Division and Gould Shawmut.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuse; class as specified or indicated; current rating as indicated; voltage rating consistent with circuit voltage.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine utilization equipment nameplates and installation instructions to verify proper fuse locations, sizes, and characteristics.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

A. Motor Branch Circuits: Class RK1, time delay.

B. Other Branch Circuits: Class RK5, non-time delay.

3.3 INSTALLATION

A. Install fuses in fusible devices as indicated. Arrange fuses so fuse ratings are readable without removing fuse.

3.4 IDENTIFICATION

A. Install typewritten labels on inside door of each fused switch to indicate fuse replacement information.

END OF SECTION 16475

SECTION 16500 - LIGHTING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: Product Data for each luminaire, including lamps.

Contractor to submit product data on **ALL** lighting for Architect's approval before installation. All light fixtures to be of institutional or industrial quality.

B. Fixtures, Emergency Lighting Units, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Coordinate ceiling-mounted luminaires with ceiling construction, mechanical work, and security and fire-prevention features mounted in ceiling space and on ceiling.

PART 2 - PRODUCTS

2.1 LUMINAIRES

A. Fixture

1. Products: Lighting Fixtures shall be as noted on drawings.

2. Voltage: [**120**] -V ac.
3. Mounting: [**Recessed ceiling**] [**Pendant**] [**Surface ceiling**] [**Surface wall**] [**Suspended**] Mounting height to be determined as standard heights. Contractor shall consult with Architect if clarification is required.

4. Nominal Dimensions: <**Insert nominal length, width, and height in inches (mm).**>
5. Lamps: 4 lamps per 2 x 4 fluorescent trougher light fixtures to be screw in florescent unless manufacturer specifies otherwise.
6. Ballast Types and Features: [**Electronic**].
7. Lens: As per Manufacturer spec>
8. External Finish: < As per Manufacturer spec.>
9. Trim and Hardware: As per Manufacturer spec
10. Other Features: As per Manufacturer spec.>
11. Minimum CU for typical RCR shall be as follows (typical cavity reflectances are ceiling = 80 percent, wall = 50 percent, and floor = 20 percent): RCR [**3**]
12. Minimum Spacing to Mounting Height Ratio: As noted on drawings
13. Minimum Visual Comfort Probability: As per Manufacturer spec.
14. Maximum Luminance Ratio: < As per Manufacturer spec.>
15. Other Requirements: <**Manufacturer's directions and specification should be followed for installation of light fixture. It is the Contractor's responsibility to**

ensure that all the required specifications and directions for installing light fixtures are acquired and utilized..>

2.2 FLUORESCENT LAMP BALLASS

A. Description: Include the following features, unless otherwise indicated:

1. Designed for type and quantity of lamps indicated at full light output[**except for emergency lamps powered by in-fixture battery-packs**].
2. Externally fused with slow-blow type rated between 2.65 and 3.0 times the line current.

B. Electronic ballasts for linear lamps shall include the following features, unless otherwise indicated:

1. Comply with NEMA C82.11.
2. Ballast Type: [**Instant**] start, unless otherwise indicated.
3. Programmed Start: Ballasts with two-step lamp starting to extend life of frequently started lamps.
4. Sound Rating: [**A**].
5. Total harmonic distortion rating of less than [**10**] percent according to NEMA C82.11.
6. Transient Voltage Protection: IEEE C62.41, Category A.
7. Operating Frequency: [**20 kHz**] or higher.
8. Lamp Current Crest Factor: Less than [**1.7**].
9. Parallel Lamp Circuits: Multiple lamp ballasts connected to maintain full light output on surviving lamps if one or more lamps fail.

C. Electromagnetic ballasts for linear lamps shall have the following features, unless otherwise indicated:

1. Comply with NEMA C82.1.
2. Type: Energy saving, high-power factor, Class P, automatic-reset thermal protection.
3. Ballast Manufacturer Certification: Indicated by label.

D. Ballasts for compact lamps in recessed fixtures shall have the following features, unless otherwise indicated:

1. Type: [**Electronic**].
2. Power Factor: 90 percent, minimum.
3. Flicker: Less than 5 percent.
4. Lamp Current Crest Factor: Less than [**1.7**].
5. Electronic Ballast Operating Frequency: [**20 kHz**] or higher.
6. Lamp end-of-life detection and shutdown circuit.
7. Transient Protection: Comply with IEEE C62.41 for Category A1 locations.

E. Ballasts for compact lamps in nonrecessed fixtures shall include the following features, unless otherwise indicated:

1. Power Factor: 90 percent, minimum.
2. Ballast Coil Temperature: 65 deg C, maximum.
3. Transient Protection: Comply with IEEE C62.41 for Category A1 locations.

4. Ballasts for dimmer-controlled fixtures shall comply with general and fixture related requirements above for electronic ballasts and the following features:
5. Dimming Range: 100 to [5] percent of rated lamp lumens.
6. Ballast Input Watts: Can be reduced to [20] percent of normal.
7. Compatibility: Certified by manufacturer for use with specific dimming system indicated.

2.3 EXIT SIGNS

A. General: Comply with UL 924; for sign colors and lettering size, comply with authorities having jurisdiction.

B. Internally Lighted Signs:

1. Lamps for AC Operation: Light emitting diodes, 70,000 hours minimum of rated lamp life.

C. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.

1. Battery: Sealed, maintenance-free, nickel-cadmium type with special warranty.
2. Charger: Fully automatic, solid-state type with sealed transfer relay.
3. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.

2.4 EMERGENCY LIGHTING UNITS

A. General: Self-contained units complying with UL 924.

1. Battery: Sealed, maintenance-free, lead-acid type with minimum 10-year nominal life and special warranty.
2. Charger: Fully automatic, solid-state type with sealed transfer relay.
3. Operation: Relay automatically turns lamp on when power supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
4. Wire Guard: Where indicated, heavy-chrome-plated wire guard protects lamp heads or fixtures.
5. Integral Time-Delay Relay: Holds unit on for fixed interval when power is restored after an outage; time delay permits high-intensity-discharge lamps to restrike and develop adequate output.

2.5 FLUORESCENT EMERGENCY LIGHTING FIXTURES

A. External Type: Self-contained, modular, battery-inverter unit, suitable for powering one or more fluorescent lamps, remote mounted from light fixture. Comply with UL 924.

1. Emergency Connection: Operate one fluorescent lamp continuously. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
2. Battery: Sealed, maintenance-free, nickel-cadmium type with minimum seven-year nominal life.
3. Charger: Fully automatic, solid-state, constant-current type.
4. Housing: NEMA 250, Class 1 enclosure.

2.6 FLUORESCENT LAMPS

A. Low-Mercury Lamps: Comply with Federal toxic characteristic leaching procedure test, and yield less than 0.2 mg of mercury per liter, when tested according to NEMA LL 1.

B. T8 rapid-start[**low-mercury**] lamps, rated 32 W maximum, 2800 initial lumens (minimum), CRI of 75 (minimum), color temperature of [**3500**] K, and average rated life of 20,000 hours, unless otherwise indicated.

C. Compact Fluorescent Lamps: CRI 80 (minimum), color temperature [**3500**], average rated life of 10,000 hours at 3 hours operation per start, unless otherwise indicated.

1. T4, Twin Tube: Rated 9 W, 600 initial lumens (minimum).
2. T4, Twin Tube: Rated 13 W, 825 initial lumens (minimum).
3. T4, Double-Twin Tube: Rated 13 W, 900 initial lumens (minimum).
4. T4, Double-Twin Tube: Rated 18 W, 1200 initial lumens (minimum).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set units level, plumb, and square with ceiling and walls, and secure.

B. Support for Recessed and Semirecessed Grid-Type Fluorescent Fixtures: Install ceiling support system rods or wires at a minimum of 4 rods or wires for each fixture, located not more than **6 inches (150 mm) from fixture corners.**

C. Support for Suspended Fixtures: Brace pendants and rods over **48 inches (1220 mm)** long to limit swinging. Support stem-mounted, single-unit, suspended fluorescent fixtures with twin-stem hangers. For continuous rows, use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of chassis, including one at each end.

D. Air-Handling Fixtures: Install with dampers closed.

E. Lamping: Where specific lamp designations are not indicated, lamp units according to manufacturer's written instructions.

F. All Light Fixture installation shall be governed by the most recent version of the National Electric Code.

END OF SECTION 16500

SECTION 16526 – SPORTS FIELD LIGHTING

PART 1 – GENERAL

1.1 SUMMARY

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

B. The purpose of these specifications is to define the performance and design standards for Ivanna Eudora Lean Athletic Facility. The manufacturer / contractor shall supply lighting equipment to meet or exceed the standards set forth by the criteria set forth in these specifications.

C. The sports lighting will be for the following fields:
   1. Track
   2. Field Events: Soccer, football, Athletics
   3. Tennis Court
   4. Parking Lot

D. The primary goals of this sports lighting project are:

   1. Life Cycle Cost: In order to reduce the operating budget, the preferred lighting system shall be energy efficient and cost effective to operate.

   2. It is the primary goal of this project to minimize spill light and glare.

1.2 LIGHTING PERFORMANCE

A. Performance Requirements: Playing surfaces shall be lit to an average constant light level and uniformity as specified in the chart below. Lighting calculations shall be developed and field measurements taken on the grid spacing with the minimum number of grid points specified below. Measured average illumination level shall be +/- 10% of predicted mean in accordance with IESNA RP-6-01, and measured at the first 100 hours of operation.

Area of Lighting	Average Constant Light Levels	Maximum to Minimum Uniformity Ratio	Grid Points	Grid Spacing
Track	40 footcandles	3:1.0	50	30' x 30'
Field Events	50 footcandles	2:1.0	115	30' x 30'
Tennis Court	65 footcandles	1.7:1	30	20' x 20'
Parking Lot	5 footcandles	NA	100	30' x 30'

1.3 LIFE CYCLE COSTS

A. Energy Consumption: The average kWh consumption for the total lighting system shall be 193.44 or less.

B. 10-Year Life Cycle Cost: Manufacturer shall submit 10-year life cycle cost calculations as follows. Equipment price and total life cycle cost shall be entered separately on bid form.

1.4 WARRANTY AND GUARANTEE

A. 10-Year Warranty: Each manufacturer shall supply a signed warranty covering the entire system, excluding fuses and lamps, for 10 years from the date of shipment. Labor shall be included for 2 years. Lamps shall be warranted for 2 years for parts, and 1 year for labor. Warranty may exclude fuses, storm damage, vandalism, abuse and unauthorized repairs or alterations.

A. Equipment On-Site: The equipment must be on-site 5-7 weeks from receipt of approved submittals and receipt of complete order information.

1.6 PRE-BID SUBMITTAL REQUIREMENTS

A. Approved Product: Musco's Light-Structure Green™ System is the approved product. All substitutions must provide a complete submittal package for approval as outlined in Submittal Information at the end of this section at least 10 days prior to bid. Special manufacturing to meet the standards of this specification may be required. An addendum will be issued prior to bid listing any other approved lighting manufacturers and designs.

B. Design Approval: The owner / engineer will review pre-bid shop drawings from the manufacturer's to ensure compliance to the specification. If the design meets the design requirements of the specifications, a letter will be issued to the manufacturer indicating approval for the specific design submitted.

1.7 ALTERNATE SYSTEM REQUIREMENTS

A. Compliance to Specifications: Acceptance of a bid alternate does not negate the contractor and lighting manufacturer's responsibility to comply fully with the requirements of these specifications. Any exceptions to the specifications must be clearly stated in the prior approval submittal documents.

B. Light Level Requirements: Manufacturer shall provide computer models guaranteeing light levels on the field for 5000 hours. If a constant light level cannot be provided, a maximum Recoverable Light Loss Factor of 0.70 shall be applied to the initial light level design to achieve the maintained light levels outlined in 1.2.A. For alternate systems, scans for both initial and maintained light levels shall be submitted.

C. Revised Electrical Distribution: Manufacturer shall provide revised electrical distribution plans to include changes to service entrance, panel and wire sizing.

PART 2 – PRODUCT

2.1 LIGHTING SYSTEM CONSTRUCTION

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

1. Galvanized steel poles and crossarm assembly.
2. Pre-stressed concrete base embedded in concrete backfill or baseplate pole foundation.
3. All luminaires shall be constructed with a die-cast aluminum housing to protect the luminaire reflector system.
4. Manufacturer will remote all ballasts and supporting electrical equipment in aluminum enclosures mounted approximately 10' above grade. The enclosures shall include ballast, capacitor and fusing for each luminaire. Safety disconnect per circuit for each pole structure will be located in the enclosure.
5. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.

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

C. Durability: All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed steel shall be hot dip galvanized per ASTM A123. All exposed hardware and fasteners shall be stainless steel of at least 18-8 grade, passivated and polymer coated to prevent possible galvanic corrosion to adjoining metals. All exposed aluminum shall be powder coated with high performance polyester. All exterior reflective inserts shall be anodized, coated with a clear, high gloss, durable fluorocarbon, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All wiring shall be enclosed within the crossarms, pole, or electrical components enclosure.

D. Lightning Protection: All structures shall be equipped with lightning protection meeting NFPA 780 standards. Contractor shall supply and install a ground rod of not less than 5/8" in diameter and 8' in length, with a minimum of 10' embedment. Ground rod should be connected to the structure by a copper main down conductor with a minimum size of #2 for poles with less than 75' mounting height and 2/0 for poles with more than 75' mounting height.

E. Safety: All system components shall be UL Listed for the appropriate application.

F. Electric Power Requirements for the Sports Lighting Equipment:

1. Maximum total voltage drop: Voltage drop to the disconnect switch located on the poles shall not exceed three (3) percent of the rated voltage.

2.2 STRUCTURAL PARAMETERS

A. Support Structure Wind Load Strength: Poles and other support structures, brackets, arms, bases, anchorages and foundations shall be determined based on the IBC 2003 Building Code, wind speed of 140 mph. Luminaire, visor, and crossarm shall withstand 150 mph winds and maintain luminaire aiming alignment.

B. Structural Design: The stress analysis and safety factor of the poles shall conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

C. Soil Conditions: The design criteria for these specifications are based on soil design parameters as outlined in the geotechnical report. If a geotechnical report is not provided by the owner, the foundation design shall be based on soils that meet or exceed those of a Class 5 material as defined by 2001 IBC, Table 1804.2-I-A OR 1997 UBC, Table 18-I-A.

D. Foundation Drawings: Project specific foundation drawings stamped by a registered structural engineer. The foundation drawings must list the moment, shear (horizontal) force, and axial (vertical) force at ground level for each pole.

PART 3 – EXECUTION

3.1 FIELD QUALITY CONTROL

A. Illumination Measurements: Upon substantial completion of the project and in the presence of the Contractor, Project Engineer, Owner's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with IESNA RP-6-01, Appendix B.

B. Correcting Non-Conformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including footcandles, uniformity ratios, and maximum kilowatt consumptions are not in conformance with the requirements of the performance specifications and submitted information, the Manufacturer or Contractor shall be liable to any or all of the following:

1. Manufacturer or Contractor shall at his expense provide and install any necessary additional fixtures to

meet the minimum lighting standards.

2. Manufacturer or Contractor shall minimize the Owner's additional long term fixture maintenance and energy consumption costs created by the additional fixtures by reimbursing the Owner the amount of $1,000.00 USD.

SECTION 16750 - VOICE AND DATA COMMUNICATION CABLING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Summary: Includes wire, cable, connecting devices, installation, and testing for wiring systems to be used as signal pathways for voice and high-speed data transmission.

B. Submittals: Product Data and cable administration drawings.

C. Comply with NFPA 70.

D. Coordinate premises wiring Owner's telecommunications and LAN equipment suppliers.

PART 2 - PRODUCTS

2.1 CABLE AND WIRING COMPONENTS

A. Twisted-Pair Cables, Connectors, and Terminal Equipment:

1. Cables: Listed as complying with Category [**3**] [**5**] [**3 and 5**] of TIA/EIA-568-A.
2. Conductors: Solid copper.
3. UTP Cable: Comply with TIA/EIA-568-A. Four, thermoplastic-insulated, individually twisted pairs of conductors; No. 24 AWG, color-coded; enclosed in PVC jacket.
4. STP Workstation Cable: Comply with TIA/EIA-568-A. Two, thermoplastic-insulated, individually twisted pairs of conductors; No. 22 AWG, color-coded, overall aluminum and polyester shield and No. 22 AWG, tinned-copper drain wire; enclosed in PVC jacket.
5. UTP and STP Plenum Cable: Listed for use in air-handling spaces. Features are as specified for cables, conductors, UTP cable, and STP workstation cable except materials are modified as required for listing.

B. Cross-Connect Panel: Modular array of IDC terminal blocks arranged to terminate building cables and permit interconnection between cables.

1. Number of Terminals per Field: One for each conductor in assigned cables.
2. Mounting: [**Backboard**] [**Rack**].

C. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.

1. Number of Jacks per Field: One for each four-pair [**UTP cable or two-pair STP cable indicated**] [**conductor group of indicated cables, plus spares and blank positions adequate to satisfy specified expansion criteria**].
2. Mounting: [**Backboard**] [**Rack**].

D. Jack Assemblies: Four-position modular RJ14 jacks in flush-mounting wall plate, unless otherwise indicated.

E. Jack Assemblies: Dual, Category 5, 6-position modular RJ45 jacks in flush-mounting wall plate, unless otherwise indicated.

F. Wall Plates: Designed for telephone service. Match those indicated for power receptacle outlets in same spaces for materials and finish. For wall telephone units, include provision for support of unit.

G. Terminal Strip: 25-pair industry standard "66 connecting block" with pinchdown terminals.

H. Terminal Unit: Category 5 patch block assembly with 12 Category 5 RJ45-type jack ports and industry standard "110 connecting block" with pinchdown terminals.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Telephone Service: Comply with telephone exchange carrier's requirements.

B. Existing Telephone Outlets and Wiring: Maintain fully operational until new system has been tested and is operational.

C. Install wiring in compliance with EIA/TIA 568, Category 5 requirements.

D. Wiring Method: Conceal wiring, unless otherwise indicated. Install flush outlet boxes with jack assemblies at outlets. Connect to cable fished in walls and ceilings, unless walls are solid or filled with insulation or ceilings are not accessible for wiring. **[Install cable in raceway] [Prewire during construction]** where fished wiring paths are not available. Terminate raceway with a bushing in ceiling space above outlet, unless otherwise indicated.

E. Exposed Cable: Install parallel or perpendicular to surfaces or exposed structural members and follow surface contours where possible.

F. Cable Support: Secure cable to independent supports at intervals as required to prevent sagging between supports. Use metallic supports designed for this purpose with corrosion-resistant finish.

G. Splices: Do not splice cable between the normal terminations of runs.

H. Ground equipment. Install ground terminal at local exchange carrier service location.

I. Tighten electrical connectors and terminals according to manufacturers published torque-tightening values. If manufacturers torque values are not indicated, use those specified in UL 486A and UL 486B.

J. Identify telephone system backboards and cabinets with the legend "Telephone." Identify terminals of terminal strip and jack outlets and pull and junction boxes with approved designations.

3.2 TESTING

A. Test each pair or conductor of each cable run for continuity of pair loop.

B. Test each complete installed Category 5 wiring connection, including cable, connections, jacks, and terminal blocks, for compliance with Category 5 signal transmission criteria.

END OF SECTION 16715

SECTION 16990 – SHORT CIRCUIT/COORDINATION STUDY

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Section 16050 and all other related sections of Division 16 contain requirements that relate to this Section.

1.2 DESCRIPTION OF WORK

A. The electrical switchboard manufacturer shall provide an electrical short circuit and coordination study for the complete normal distribution system.The study shall include a complete system short circuit and protective device coordination study for the utility company's primary service, 208 volt systems affected by the work of this Contract. The studies shall include all portions of the electrical distribution system from the normal sources of power hroughout the low voltage distribution system. Normal system operating method, alternate operation, and operations which could result in maximum fault conditions shall be thoroughly covered in the study. The following shall be included:

1. A complete tabulation of short circuit levels at all buses, including service transformers, panelboards, transfer switches, etc. The levels shall include:
   a. Maximum three-phase fault current for equipment rating.
   b. Actual three-phase fault level for protection coordination.
   c. Three phase fault and phase to ground fault current for coordination purposes. Minimum phase to ground (arcing) ground fault.

2. A set of time-current coordination curves from the service transformer down through the building feeders, subfeeders, and indicated 208V panels.

3. A tabulation of all recommended protective device settings.

B. Short circuit study shall be performed immediately after award, prior to shop drawing review of panels and equipment.

1.3 SUBMITTALS

A. The studies shall be submitted to the A/E prior to granting final approval of the distribution equipment shop drawings and/or prior to release of equipment for manufacture.

PART 2 - PRODUCTS

2.1 SHORT CIRCUIT STUDY

A. The study shall be in accordance with ANSI C37.5, IEEE Standard 241, 242, 399, and 602.

B. The study input data shall include the utility company's short circuit single and three phase contribution, with the X/R ratio for each, resistance and reactance components of the branch impedances, motor, and generator contributions, base quantities selected, and all other applicable circuit parameters.

C. Short circuit momentary duties and interrupting duties shall be calculated on the basis of maximum available fault current at each distribution panelboard, pertinent branch circuit panelboards, and other significant locations through the system.

2.2 PROTECTIVE DEVICE COORDINATION STUDY

A. A protective device coordination study shall be performed to select and to check the selection of protective relay characteristics and settings, ratios and characteristics of associated voltage and current transformers, low voltage breaker trip characteristics and settings.

B. The coordination study shall include all voltage classes of equipment from the utility's incoming line protective device down to and including, each motor controller and/or panelboard. The phase and ground overcurrent protection shall be included as well as settings for all other adjustable protective devices.

C. The time-current characteristics of the specified protective devices shall be plotted on the appropriate log-log paper. The plots shall include complete titles, representative one-line diagram and legends, associated power company's relays or fuse characteristics, significant motor starting characteristics,complete parameters of transformers, complete operating bands of low voltage circuit breaker trip curves, and fuse curves. The coordination plots shall indicate the types of protective devices selected, proposed relay taps, time dial and instantaneous trip settings, ANSI transformer magnetizing inrush and withstand curves per ANSI C37.91, cable damage curves, symmetrical and asymmetrical fault currents and generator decrement curves. All requirements of the National Electrical Code shall be adhered to. Reasonable coordination intervals and separation of characteristic curves shall be maintained. The coordination plots for phase and ground protective devices shall be provided on a system basis.

D. The selection and settings of the protective devices shall be provided separately in a tabulated from listing circuit identification, IEEE device number, current transformer ratios, manufacturer, type, range of adjustment and recommended settings. A tabulation of the recommended power fuse selection shall be provided for all fuses in the system. Discrepancies, problem areas, or inadequacies shall be promptly brought to the project Electrical Engineer's attention.

2.3 STUDY REPORT

A. The results of the power system study shall be summarized in a final report. Three bound copies of the final report shall be submitted to the project Electrical Engineer.

B. The report shall include the following sections:

1. Description, purpose, basis and scope of the study; and a single line diagram of the portion of the power system which is included within the scope of study.

2. Tabulations of circuit breaker, fuse, and other equipment, ratings versus calculated short circuit duties, and commentary regarding same.

3. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip settings, fuse selection, and commentary regarding same.

4. Fault current tabulations including a definition of terms and a guide for interpretation.

5. Tabulation of appropriate tap settings for relay seal-in units.

PART 3 – EXECUTION

3.1 EVALUATION

A. The short circuit tabulation, curves, and device settings shall be combined in a single manual.

B. Sufficient data from the short circuit study is required prior to shop drawing approval to verify that the equipment ratings selected are adequate. Final verification and settings of protective devices shall be based on the study. The final short circuit and coordination device study shall be completed and furnished to the Owner and Architect before the Architect's and Owner's acceptance of the project.

C. Inspect, set, test and calibrate all protective relays, circuit breakers, fuses and other applicable devices as recommended by the short circuit and coordination study.

D. Obtain all information required for the study from the utility company and all required equipment manufacturers.

END OF SECTION 16990

Ivanna Eudora Kean Athletic Facility

Lighting Specifications

10-April-2006

PART 1 – GENERAL

1.1 SUMMARY

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

B. The purpose of these specifications is to define the performance and design standards for Ivanna Eudora Lean Athletic Facility. The manufacturer / contractor shall supply lighting equipment to meet or exceed the standards set forth by the criteria set forth in these specifications.

C. The sports lighting will be for the following fields:
   1. Track
   2. Field Events: Soccer, football, Athletics
   3. Tennis Court
   4. Parking Lot

D. The primary goals of this sports lighting project are:

   1. Life Cycle Cost: In order to reduce the operating budget, the preferred lighting system shall be energy efficient and cost effective to operate.

   2. It is the primary goal of this project to minimize spill light and glare.

1.2 LIGHTING PERFORMANCE

A. Performance Requirements: Playing surfaces shall be lit to an average constant light level and uniformity as specified in the chart below. Lighting calculations shall be developed and field measurements taken on the grid spacing with the minimum number of grid points specified below. Measured average illumination level shall be +/- 10% of predicted mean in accordance with IESNA RP-6-01, and measured at the first 100 hours of operation.

Area of Lighting	Average Constant Light Levels	Maximum to Minimum Uniformity Ratio	Grid Points	Grid Spacing
Track	40 footcandles	3:1.0	50	30' x 30'
Field Events	50 footcandles	2:1.0	115	30' x 30'
Tennis Court	65 footcandles	1.7:1	30	20' x 20'
Parking Lot	5 footcandles	NA	100	30' x 30'

1.3 LIFE CYCLE COSTS

A. Energy Consumption: The average kWh consumption for the total lighting system shall be 193.44 or less.

B. 10-Year Life Cycle Cost: Manufacturer shall submit 10-year life cycle cost calculations as follows. Equipment price and total life cycle cost shall be entered separately on bid form.

a.	**Luminaire energy consumption** # luminaires x __kW demand per luminaire x $ 0.20 kW rate x 1250 annual usage hours x 10 years		
b.	**Cost to relamp all luminaires during 10 years** 1250 annual usage hours x 10 years / lamp replacement hours x $125 lamp & labor x # fixtures	+	
	TOTAL 10-Year Life Cycle Operating Cost	=	

1.4 WARRANTY AND GUARANTEE

A. 10-Year Warranty: Each manufacturer shall supply a signed warranty covering the entire system, excluding fuses and lamps, for 10 years from the date of shipment. Labor shall be included for 2 years. Lamps shall be warranted for 2 years for parts, and 1 year for labor. Warranty may exclude fuses, storm damage, vandalism, abuse and unauthorized repairs or alterations.

1.5 DELIVERY TIMING

A. Equipment On-Site: The equipment must be on-site 5-7 weeks from receipt of approved submittals and receipt of complete order information.

1.6 PRE-BID SUBMITTAL REQUIREMENTS

A. Approved Product: Musco's Light-Structure Green™ System is the approved product. All substitutions must provide a complete submittal package for approval as outlined in Submittal Information at the end of this section at least 10 days prior to bid. Special manufacturing to meet the standards of this specification may be required. An addendum will be issued prior to bid listing any other approved lighting manufacturers and designs.

B. Design Approval: The owner / engineer will review pre-bid shop drawings from the manufacturer's to ensure compliance to the specification. If the design meets the design requirements of the specifications, a letter will be issued to the manufacturer indicating approval for the specific design submitted.

1.7 ALTERNATE SYSTEM REQUIREMENTS

A. Compliance to Specifications: Acceptance of a bid alternate does not negate the contractor and lighting manufacturer's responsibility to comply fully with the requirements of these specifications. Any exceptions to the specifications must be clearly stated in the prior approval submittal documents.

B. Light Level Requirements: Manufacturer shall provide computer models guaranteeing light levels on the field for 5000 hours. If a constant light level cannot be provided, a maximum Recoverable Light Loss Factor of 0.70 shall be applied to the initial light level design to achieve the maintained light levels outlined in 1.2.A. For alternate systems, scans for both initial and maintained light levels shall be submitted.

C. Revised Electrical Distribution: Manufacturer shall provide revised electrical distribution plans to include changes to service entrance, panel and wire sizing.

PART 2 – PRODUCT

2.1 LIGHTING SYSTEM CONSTRUCTION

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

1. Galvanized steel poles and crossarm assembly.
2. Pre-stressed concrete base embedded in concrete backfill or baseplate pole foundation.
3. All luminaires shall be constructed with a die-cast aluminum housing to protect the luminaire reflector system.
4. Manufacturer will remote all ballasts and supporting electrical equipment in aluminum enclosures mounted approximately 10' above grade. The enclosures shall include ballast, capacitor and fusing for each luminaire. Safety disconnect per circuit for each pole structure will be located in the enclosure.
5. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.

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

C. Durability: All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed steel shall be hot dip galvanized per ASTM-A123. All exposed hardware and fasteners shall be stainless steel of at least 18-8 grade, passivated and polymer coated to prevent possible galvanic corrosion to adjoining metals. All exposed aluminum shall be powder coated with high performance polyester. All exterior reflective inserts shall be anodized, coated with a clear, high gloss, durable fluorocarbon, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All wiring shall be enclosed within the crossarms, pole, or electrical components enclosure.

D. Lightning Protection: All structures shall be equipped with lightning protection meeting NFPA 780 standards. Contractor shall supply and install a ground rod of not less than 5/8" in diameter and 8' in length, with a minimum of 10' embedment. Ground rod should be connected to the structure by a copper main down conductor with a minimum size of #2 for poles with less than 75' mounting height and 2/0 for poles with more than 75' mounting height.

E. Safety: All system components shall be UL Listed for the appropriate application.

F. Electric Power Requirements for the Sports Lighting Equipment:

1. Maximum total voltage drop: Voltage drop to the disconnect switch located on the poles shall not exceed three (3) percent of the rated voltage.

2.2 STRUCTURAL PARAMETERS

A. Support Structure Wind Load Strength: Poles and other support structures, brackets, arms, bases, anchorages and foundations shall be determined based on the IBC 2003 Building Code, wind speed of 140 mph. Luminaire, visor, and crossarm shall withstand 150 mph winds and maintain luminaire aiming alignment.

B. Structural Design: The stress analysis and safety factor of the poles shall conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

C. Soil Conditions: The design criteria for these specifications are based on soil design parameters as outlined in the geotechnical report. If a geotechnical report is not provided by the owner, the foundation design shall be based on soils that meet or exceed those of a Class 5 material as defined by 2001 IBC, Table 1804.2-I-A OR 1997 UBC, Table 18-I-A.

D. Foundation Drawings: Project specific foundation drawings stamped by a registered structural engineer. The foundation drawings must list the moment, shear (horizontal) force, and axial (vertical) force at ground level for each pole.

PART 3 – EXECUTION

3.1 FIELD QUALITY CONTROL

A. Illumination Measurements: Upon substantial completion of the project and in the presence of the Contractor, Project Engineer, Owner's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with IESNA RP-6-01, Appendix B.

B. Correcting Non-Conformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including footcandles, uniformity ratios, and maximum kilowatt consumptions are not in conformance with the requirements of the performance specifications and submitted information, the Manufacturer or Contractor shall be liable to any or all of the following:

1. Manufacturer or Contractor shall at his expense provide and install any necessary additional fixtures to meet the minimum lighting standards.

2. Manufacturer or Contractor shall minimize the Owner's additional long term fixture maintenance and energy consumption costs created by the additional fixtures by reimbursing the Owner the amount of $1,000.00 USD (one thousand dollars) for each additional fixture required.

3. Manufacturer or Contractor shall remove the entire unacceptable lighting system and install a new lighting system to meet the specifications.

SUBMITTAL INFORMATION

Design Submittal Data Checklist and Certification

All items listed below are mandatory, shall comply with the specification and be submitted according to pre-bid submittal requirements

Included	Tab	Item	Description
	A	Letter/ Checklist	Listing of all information being submitted must be included in a cover letter. List the name of the supplier's local representative and his/her phone number. Signed submittal checklist to be included.
	B	On Field Lighting Design	Lighting design drawing(s) showing: a. Field Name, date, file number, prepared by, and other pertinent data b. Outline of field(s) being lighted, as well as pole locations referenced to the center of the field (x & y). Illuminance levels at grid spacing specified c. Pole height, number of fixtures per pole, as well as luminaire information including wattage, lumens and optics d. Height of meter above field surface e. Summary table showing the number and spacing of grid points; average, minimum and maximum illuminance levels in foot candles (fc); uniformity including maximum to minimum ratio, coefficient of variance and uniformity gradient; number of luminaries, total kilowatts, average tilt factor; light loss factor. f. Alternate manufacturers shall provide both initial and maintained light scans using a maximum 0.70 Light Loss Factor to calculate maintained values.
	C	Life Cycle Cost calculation	Document life cycle cost calculations as defined in the specification. Identify energy costs for operating the luminaires. All costs should be based on 10 Years.
	D	Electrical distribution plans	If bidding an alternate system, manufacturer must include a revised electrical distribution plan including changes to service entrance, panels and wire sizing, signed by a licensed Electrical Engineer.
	E	Performance Guarantee	Provide performance guarantee including a written commitment to undertake all corrections required to meet the performance requirements noted in these specifications at no expense to the owner.
	F	Warranty	Provide written warranty information including all terms and conditions.
	G	Project References	Manufacturer to provide a list of project references of similar products completed within the past three years.
	H	Product Information	Complete set of product brochures for all components, including a complete parts list and UL Listings.
	I	Non-Compliance	Manufacturer shall list all items that do not comply with the specifications.
	J	Compliance	Manufacturer shall sign off that all requirements of the specifications have been met at that the manufacturer will be responsible for any future costs incurred to bring their equipment into compliance for all items not meeting specifications and not listed in item N – Non-Compliance

Manufacturer: _____ **Signature:** _____

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